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CAPSTONE PROJECT

Submitted in partial fulfillment for the
Degree of Master of Public Administration

Governors State University
University Park, IL 60484

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Abstract

Current ambulance patient compartment designs have proven dangerous to paramedics during patient transport. Currently, there are no set safety standards for patient compartments of ambulances. This study focused on three fire protection districts: Coal City, Wilmington, and Elwood; each identified that the current ambulance design is very dangerous for paramedics in a crash, particularly concerning usage of seat belts and dangers of the side-facing CPR seat and bench seat. Each fire district addressed these issues with new ambulance designs. The mixed methods research began with observations recorded from riding with paramedics on actual calls on both the old and new ambulances and then conducting follow-up interviews to examine paramedics’ current practices, seat belt usage, and seating preference. The study concluded with a survey asking paramedics about seating preference and seat belt usage on both ambulances. This research revealed that most paramedics understand threats to their personal safety and view safer changes positively. However, along with safer ambulance designs, cultural and attitude changes are necessary as well. Future research should continue to focus on seat and restraint designs that allow paramedics to perform job skills and keep them safe in a collision.
Introduction

Ambulances, and the paramedics that work in them, are often viewed as life-saving beacons of hope in emergency situations. Patients needing emergency medical care trust that they, their friends, and their family will be well cared for during transport to the hospital. Most of the time, ambulance transports are uneventful. However, accidents and crashes do occur. In the case of an ambulance crash, the following actual incidents show that ambulances are actually not safe, thus resulting in tragic results.

“Case 1. In May 2001, an Emergency Medical Technician (EMT) aged 26 years died when her ambulance was struck head-on by a pick-up truck at 6:30 a.m. The EMT had been riding unrestrained in the patient compartment while attending a patient during a nonemergency transport. During the collision, the EMT struck the front bulkhead of the patient compartment; she died en-route to the hospital from blunt force trauma to the head and chest. The patient and pick-up driver also suffered fatal injuries. The ambulance driver had been driving unrestrained and suffered multiple serious injuries, including a fractured leg.

“Case 2. In July 2001, an EMT aged 27 years died when her ambulance struck an elevated train-track support column at 12:30 p.m. She had been riding unrestrained in the patient compartment while attending a patient during a nonemergency transport. During the collision, the EMT and the patient both struck the front bulkhead of the patient compartment. Both the driver and the patient were hospitalized; the EMT was transported to a hospital, where she was pronounced dead.
"Case 3. In March 2002, an EMT aged 22 years who was driving and a paramedic aged 37 years were injured when their ambulance struck an oncoming vehicle head-on and overturned. The paramedic was riding unrestrained on the patient compartment squad bench while attending a patient during a nonemergency transport. A relative of the patient was seated in the rear-facing attendant’s seat and was wearing a seatbelt. During the collision, the unrestrained EMT driver sustained minor injuries. The paramedic struck the interior cabinets and shelves of the patient compartment. The EMT and paramedic were transported to the hospital, where the EMT was treated and released; the paramedic was hospitalized and released two days later. The patient’s injuries included scalp and shoulder contusions and a shoulder laceration. The patient’s relative sustained minor internal injuries." (Centers for Disease Control and Prevention, 2003, p. 154).

Those three cases show a major problem that has not received enough attention: injuries incurred and deaths of EMTs working in the patient compartments of ambulances due to trauma resulting from insufficient and impractical safety restraints. Since no complete national account of ground ambulance crashes exists, one can only imagine the immensity of this problem. These are deaths of and injuries to people trying to help other people that are highly unnecessary and can be prevented.

Today, all standard operating guidelines state that paramedics must wear safety belts. It goes without saying that the majority of paramedics do wear seatbelts when riding in the cab of the ambulance. However, when riding in the patient compartment of an ambulance while tending to a patient, the seat belts on
the seats are impractical; paramedics feel that if they wear seatbelts in the back of the ambulance, they are not able to fully access patients. Therefore, they simply do not wear them. Furthermore, they have to walk around in the patient compartment while the ambulance is moving; in this case, they hold on to the hand rails attached to the ceiling of the ambulance and hope that the driver does not hit a bump or accelerate/decelerate too fast.

Indeed, the lack of seatbelt usage by EMS personnel in the back of the ambulance is very unsafe, and it is a national issue that needs to be addressed. Too many Emergency Medical Services (both EMT-Basic and EMT-Paramedic) are injured/killed in ambulance accidents because of the lack of personal restraint equipment and the poor layout of the seating in the patient compartment of the ambulance. Most ambulances are insufficiently equipped to properly restrain the EMT; they are equipped with a CPR seat to the patient’s right side (considered a very dangerous seat because of its side-facing orientation and location between cabinets), a captain’s chair behind the head of the patient, and a bench seat with only a lap belt as the restraint. Since wearing a seatbelt prevents EMTs from having access to all sides of patients at once, many EMTs will not wear it; thus, leaving them utterly unrestrained and susceptible to injury in an accident. In case of an accident, the care providers are useless to patients if they are injured or killed. This raises the question: What is the best way to secure an EMT in the back of an ambulance and in which seat to ensure that the EMT is safe and still has unlimited access to the patient? This issue of restraint systems to protect the EMTs and allow them to do their jobs is one that should have been addressed long ago.
Existing literature, which is very sparse, shows that more injuries are incurred when a responder is sitting in a side-facing seat, as opposed to a forward- or rear-facing seat and that responders do not wear seat belts as they feel that they are not fully able to access their patient or equipment during transport (Levick & Grzebieta, 2007; Levick, Donnelly, Blatt, Gillespie & Schultze, 2001). The National Institute for Occupational Safety and Health, or NIOSH, a department within the Centers for Disease Control and Prevention (CDC), investigates incidents in which a firefighter or EMS provider is killed in the line of duty. NIOSH’s complete reports serve as the most detailed documents on the causes of responder deaths in ambulance crashes and include recommendations on how to prevent those fatal events from reoccurring (CDC, n.d.; 2003; 2004; 2006; 2010; 2011). Furthermore, Dr. Nadine Levick has conducted the most comprehensive studies on ambulance safety, including topics such as what causes injuries and what can be done to enhance safety in the back of the ambulance for providers (Levick, 2008; 2013; Levick & Grzebieta, 2007; Levick, Donnelly, Blatt, Gillespie & Schultze, 2001). Articles by Batchelor (2009) and Nordberg (2010) discuss what different ambulance designs some emergency response agencies, including Winter Park, FL, and Careflite, Inc., Dallas, TX, have implemented to better protect their first responders. Finally, there are a few studies that explain why EMS personnel do not wear seat belts in the back of the ambulance (Slattery & Silver, 2009; Byran & Gilad, 2012) and what can be done to change attitudes to promote personal safety (Lindsey, 2009).
When it comes to deficiencies in the literature, there are very few studies available on what exactly causes injury/death during an ambulance crash, and there is also very little literature available on crash tests or studies concerning ambulance crashes. Furthermore, research on ergonomic and restraint improvements that would be acceptable and user friendly to EMS personnel leave much to be desired. Since there is very little available on this topic, it is necessary to study it further to ensure future ambulances are better equipped to protect the lives and safety of those working to protect the lives of others.

In order to decrease injuries and deaths to paramedics caring for patients in ambulances, this study aimed to address why EMS providers do not wear seatbelts in the patient compartment of the ambulance during transport and what changes can be made to the existing restraints and the seating layout in the ambulance to gain compliance in safer personal practices. Using a convergent parallel mixed methods design, first qualitative data was collected from riding with paramedics on ambulance calls to observe which seat they sit in and why they chose that seat. Also, whether or not the paramedic wears a seat belt, and why the paramedic was unable to wear a seat belt was documented. One ambulance call was observed in the old ambulance design and one in the new ambulance design for comparison. After collecting data from both ambulances, an interview was conducted with the respective paramedics asking for their usage of certain seats and seat belt usage. Next, quantitative data was collected through a survey administered to EMS providers with at least three years of experience working on an advanced life support (ALS) ambulance at Elwood Fire Protection District, Wilmington Fire
Protection District, and Coal City Fire Protection District. All three of these fire protection districts are located in suburban areas of Will County, Illinois. These surveys explored the Theory of Reasoned Behavior as it relates to the opinions and current practices of paramedics when it comes to their willingness to wear seating restraints and sit in safer forward- or rear-facing seats while treating patients.

Emergency medical services providers and perhaps fire chiefs or those who are concerned with the safety of their EMS personnel will find this study of interest, because it points out a major national problem that needs to be addressed immediately. The safety of EMS providers should be a priority. The results of this study and the proposed solutions should be examined for usability and validity in order to determine if the results could help improve the safety of those who care for the injured and ill.

To bring the importance of this research closer to home, last summer, on July 1, 2014, an ambulance from the Wilmington Fire Protection District (Wilmington, Illinois) blew a tire while transporting a patient to the hospital. Luckily, the driver kept the ambulance upright, but lost control, and the ambulance crashed into a ditch. The driver, the patient, and the medic in the back caring for the patient were all transported to the hospital with minor injuries. However, the medic in the back was not wearing her seatbelt, was thrown to the front of the ambulance, and sustained a head laceration that has left her with a scar. Incidents such as these are more frequent than one would think and are undoubtedly unnecessary. This research could go a long way in preventing these incidents from occurring and improving the overall safety and security of the patients and the emergency services
providers in the patient compartment of ambulances. Next, the purpose statement explains the intent of this study.

**Purpose Statement**

In order to decrease injuries and deaths to paramedics caring for patients in the ambulance, this study aimed to address why EMS providers do not wear seatbelts in the patient compartment of the ambulance during transport and what changes can be made to the existing restraints and the seating layout in the ambulance to gain compliance in safer personal practices. The following research questions were addressed in this study.

**Research Questions**

With the idea of improving safety for paramedics caring for patients in an ambulance, the hypothesis is as follows: If new ambulances are constructed with forward- and rear-facing seats that allow responders to access their patients and equipment while still being restrained themselves, then the responders will wear the safety restraints during ambulance transports; thus, resulting in fewer injuries/deaths during crashes.

Interviews and survey results from the experienced paramedics working at Elwood Fire Protection District, Wilmington Fire Protection District, and Coal City Fire Protection District help to explain current seatbelt usage and seating preference in the patient compartment of the ambulance during transport and suggest changes that could be made to gain compliance with usage to better protect the paramedic in the instance of an ambulance crash.
Quantitative Descriptive Questions

Why does the paramedic not always wear a seatbelt when riding in the cab of the ambulance?

Why does the paramedic not always wear his/her seatbelt in the back of the ambulance when transporting a basic life support (BLS) patient?

Why does the paramedic not always wear his/her seatbelt in the back of the ambulance when transporting an advanced life support (ALS) patient?

When caring for a patient during transport, which seat is the paramedic more likely to sit in: the CPR seat, the captain’s chair, or the bench seat?

What is the understanding of the paramedic of the safety of sitting in a forward-or-rear-facing seat in the instance of an ambulance crash?

What changes is the paramedic willing to make to current practices in order to promote personal safety while caring for a patient during transport?

Inferential Questions

What is the understanding of the paramedic of the risks of serious injury or death from not wearing a seatbelt while treating a patient in the ambulance?

What is the understanding of the paramedic that, during a crash, a side-facing seat, such as the CPR seat or the bench seat, is more dangerous and will result in a greater chance of a severe injury or death than sitting in a forward- or rear-facing seat?

How would paramedics view changes to seatbelts if they were designed to allow the paramedic to access his/her patient and equipment while also effectively restraining the paramedic in the instance of a crash?
How would paramedics view changes to seats if seating was changed to all captain’s chairs that would swivel to either a forward- or rear-facing position and give the paramedic access to the patient and equipment and thus lessen the chance of a serious injury or even death in the instance of a crash?

*Qualitative Central Question*

How would a paramedic describe his/her feelings concerning the overall safety of the patient compartment of the ambulance while en route to the hospital caring for a patient?

*Subquestions*

How would a paramedic describe his/her experiences with wearing a seatbelt while caring for a patient in the back of the ambulance?

How would a paramedic describe his/her ability to access equipment and the patient while wearing a seatbelt during transport?

What does the paramedic feel could be changed in order to ensure compliance with wearing a seatbelt when caring for and transporting a patient to the hospital?

What is the paramedic’s experience when it comes to sitting in the CPR seat, the captain’s chair, and the bench seat during transport?

What are the paramedic’s feelings concerning the level of personal safety each seat would provide him/her during a crash?

What changes does the paramedic feel would have to be made in order to convince him/her to sit in a seat that would be forward- or rear-facing as opposed to side-facing?
Some questions to be included in the research involve what seat the medic sits in during patient transport and why, whether the medic does/does not wear a seatbelt while providing care to patients during a transport, his/her ability to access the patient and/or equipment while wearing a seatbelt, what the paramedic knows about current safety standards, whether the medic feels safe, and allows for the medic to offer suggestions on what he/she thinks can be done to improved conditions for his/her overall safety while still allowing him/her to provide appropriate care to patients. An example of the worksheet used to record observations and the follow-up interview questions, please see Appendix E.

The survey tool is referenced in Appendix F. The next section discusses the theory utilized in the study.

Theory

This research used the pragmatic worldview as a philosophical foundation for the mixed methods research. The pragmatic worldview arises out of actions, situations, and consequences, and is concerned with applications and solutions to problems (Creswell, 2014, p.10). All approaches are used to understand the problem; it draws from both quantitative and qualitative assumptions, because they work to provide the best understanding of the research problem (Creswell, 2014, p. 11).

When it comes to attempting to explain the reasons why EMS personnel do not wear seat belts in the patient compartment of the ambulance during transport, why they do not sit in the safer forward – or rear-facing seating, and how to change these detrimental behaviors, the Theory of Reasoned Action/Planned Behavior
could be applied. The Theory of Reasoned Action was developed by Ajzen and Fishbein in 1980, and it was used to study the “discrepancy between attitude and behavior” as it related to voluntary behavior (“Theory of Planned,” 2014). The Theory of Planned Behavior came later when it appeared that behavior was not 100% voluntary and under control (“Theory of Planned,” 2014). The Universite of Twente website states that the Theory of Planned Behavior aims to predict deliberate behavior, because “behavior can be deliberative and planned” (2014). Furthermore, this theory indicates that “behavioral intentions are influenced by the attitude about the likelihood that the behavior will have the expected outcome and the subjective evaluation of the risks and benefits of that outcome” (“The theory of,” 2013).

Boston University’s School of Public Health website explains that the Theory of Planned Behavior is comprised of the following six constructs that represent a person’s actual control over behavior:

1. **Attitudes** refer to the degree of the person’s evaluation (whether favorable or unfavorable) to the behavior of interest. This is a consideration of the outcome of performing the behavior.

2. **Behavioral intention** refers to motivational factors that influence the behavior where “the stronger the intention to perform the behavior, the more likely the behavior will be performed”.

3. **Subjective norms** refer to the belief about whether most people would approve or disapprove of the behavior.
4. **Social norms** refer to the codes of behavior in a smaller group of peers or in the larger cultural context.

5. **Perceived power** refers to the degree of which the person believes he/she has control over perceived factors that may “facilitate or impede” his/her ability to perform the behavior.

6. **Perceived behavioral control** refers to the degree of difficulty the person will have performing the behavior of interest (2013).

Essentially, the theory states that if a person has a more favorable attitude, subjective norm, and perceived control, then that person will be more likely to perform the behavior (“Theory of Planned,” 2014).

The Theory of Planned Behavior has been applied to studies of decision-making when it comes to whether or not to wear a seat belt, whether to check oneself for disease, and whether or not to use condoms when having sex (“Theory of Planned,” 2014).

Applying these theories to the research helps to explain the independent variables, the willingness of the EMS provider to wear safety restraints and sit in safer forward- or rear-facing seating, to influence the dependent variable of creating a safer working environment in the back of the ambulance, resulting in less instances of injury/death in the case of a crash.

To follow the aforementioned constructs, **attitude** is the first – the EMS provider in the back of the ambulance will evaluate the severity of the patient’s condition. The worse the patient condition, the more the EMS provider will have to move around in the patient compartment to retrieve supplies and perform
necessary interventions. Therefore, the EMS provider will sit in the seat with the best accessibility to the patient and will most likely not wear a seat belt because of constantly having to move around the patient compartment and perform the necessary tasks.

Next is behavioral intention – the importance of wearing a safety restraint has not been underemphasized in emergency services; however, the motivational factors to wear a safety restraint and sit in a forward- or rear-facing seat as opposed to a side-facing seat for the provider’s own safety are outweighed by the motivational factors to provide the best care possible for the patient.

Third are subjective norms – while it is important for the provider to understand that his/her superior officer (i.e., fire chief) requires seat belts to be worn at all times in a moving apparatus, the provider may appear in a negative light to his/her peers when he/she wears a safety restraint or sits in a forward- or rear-facing seat and therefore did not properly care for the patient.

Fourth concern social norms – The job of the EMS provider is to provide emergency care and life-saving interventions to those in need. Therefore, it is a standard that the provider correctly identifies injury, illness, and life threats and does whatever is necessary to intervene on the patient’s behalf, because it is expected.

Fifth concentrates on perceived power – factors that would impede the EMS provider’s decision to wear a seat belt and not sit in a side-facing seat are the condition of the patient and the ability to access the patient. For example, if the EMS provider has to start an IV in the left arm of the patient, he/she must sit in a side-
facing seat, as it may be that the only rear-facing seat in the patient compartment is situated behind the patient’s head. It would be impossible to start an IV in either extremity from behind the patient’s head.

The final construct is *perceived behavior control* – when it comes to wearing safety restraints in the patient compartment of the ambulance, while it may be a necessary precaution for the safety of the EMS provider, it can severely limit the provider’s ability to care for the patient. For example, a patient in full cardiac arrest requires all of the following interventions: high quality CPR, defibrillation, airway intervention, and medications. A safely restrained EMS provider, or, in this case, multiple providers, will not be able to perform all of those interventions, nor be successful in providing any one intervention. Therefore, the EMS provider finds it easier to perform the task while not being restrained.

In researching theories and applying them to the attitudes and behaviors of EMS providers when it comes to sitting in safer (side- or rear-facing) seats and wearing safety restraints, areas of change can be identified and modified so that EMS providers will be more likely to comply with personal safety requirements. A common attitude of any person employed in the emergency medicine field is to provide the best care to preserve the life and health of each and every patient, for that is the job. The provider will even selflessly put the care of the patient before his/her own safety. That should not be the case. There are changes that can be implemented to the patient compartment of the ambulance that will allow the care provider to access the patient and be safely restrained. Change takes time, but if the former two conditions can be met, EMS providers will be compliant, and thus there
will be far fewer injuries and deaths to EMS personnel in the back of the ambulance. In the next section, the terms needed to understand the study have been defined.

**Terms and Concepts**

The following terms and concepts are necessary for understanding the study. **EMS** stands for Emergency Medical Services, According to Sanders, McKenna, Quick, and Lewis (2007), it is “a national network of services coordinated to provide aid and medical assistance from primary response to definitive care” (p. 1366). **EMT** stands for Emergency Medical Technician. This usually refers to an EMS provider at the EMT-Basic licensed level. An EMT-Basic is certified in basic life support, including use of automated external defibrillators, some emergency medications, basic airway procedures, and driving operations (Sanders et al., 2007). **Paramedic** is licensed to the state EMT-Paramedic level and provides the highest level of care to the patient in the ambulance. A paramedic is licensed to perform all system-allowed prehospital emergency care interventions, including patient assessment, cardiac rhythm interpretation, drug therapy, airway management, and defibrillation (Sanders et al., 2007). **Fire Protection District** refers to an entity, independent of city or county government, which provides fire suppression, emergency medical services, etc., to the entities within its boundaries. It is funded by property taxes and governed by a board of trustees. **Patient compartment** refers to the back, or box, area of the ambulance in which the paramedic administers patient care during transport to the hospital.
**Safety restraints/seat belts** refer to the lap belts standard on the paramedic seats in the back of the ambulance.

**CPR seat** refers to the side-facing seat located to the patient cot’s right side (driver side of the ambulance).

**Captain’s chair** refers to the rear-facing seat located at the patient cot’s head.

**Bench seat** refers to the side-facing seat located to the patient cot’s left side (passenger side of the ambulance).

Due to the unnecessary injuries and deaths to paramedics working in the back of an ambulance during crashes, this study was developed to find solutions to create a safer working environment for these paramedics. The research questions were developed, the theory was explained, and the terms were defined to help with the understanding of the importance of this study.
Literature Review

In an inherently dangerous profession in which time is of the essence when treating those who are critically injured or ill, the highest degree of safety standards and expectations should be enforced when it comes to the means of transportation from scene to hospital. After all, those who care for others deserve to go home to their families at the end of their shift safely. However, accidents still occur, despite the best and safest emergency driving practices. Overall, analyzing the literature available on ambulance crash test dynamics and studying what causes injuries and fatalities to those in the patient compartment of the ambulance has revealed that the data and information are sorely lacking; indeed, there are no dynamic safety testing standards specifically for ambulance vehicles in the USA, even though these vehicles have been identified to have high crash injury and fatality rates per mile (Levick, Donnelly, Blatt, Gillespie, & Schultze, 2001, p. 1).

Concerning existing standards, according to George (2016):

It wasn’t until 1968 in the United States did the National Academy of Sciences – National Research Council (NAS-NRC) report to the U.S. Department of Transportation and the National Highway Traffic Safety Administration (NHTSA) to make recommendations on ambulance design standards. The NAS-NRC Committee on Ambulance Design recommended ambulance standards including size, shape, color, electrical systems, and emergency equipment. According to Sanders, McKenna, Quick, and Lewis (2007), with the help of the NHTSA, the KKK A-1822 D ambulance design
standards were developed. This lead to the development of further federal specifications that many states use as the basis for ambulance standards.

Concerning ambulance safety standards, currently, not many exist. In fact, what does exist seems to regulate the ambulance cab over the patient compartment. Two main standards exist establishing ambulance safety standards, the Ambulance Manufacturers Division (AMD) Standards and the Federal Specification for the Star-of-Life Ambulance from the U.S. General Services Administration (GSA) standard KKK-A-1822F.

The most recently updated AMD Standard (2014) is very similar to the 2007 standard. This standard sets safety regulations for structural components of the ambulance. According to the document, the AMD represents more than 90% of ambulance production in North America (Ambulance Manufacturers Division [AMD], 2014). It is partnered with the National Truck Equipment Association (NTEA), which represents the country's manufacturers and distributors of commercial trucks and produces “highly specialized vehicles,” such as towing and recovery vehicles, and small- and mid- sized busses, along with ambulances (AMD, 2014, p. i). The AMD works with the GSA to continually develop the KKK-A-1822 ambulance standards. Furthermore, the AMD standard document points out that federal laws and regulations require all motor vehicles, including ambulances, to follow all Federal Motor Vehicle Safety Standards (FMVSS), which set performance requirements for the safety of new motor vehicles and equipment.
Mostly, the AMD standard includes static load testing specifications and electrical system regulations, among other overall structural engineering components of the ambulance. Specifically, as it concerns the patient compartment, the standard is limited to a sound level test, a carbon monoxide level test, a handrail static load test, a lighting level test, and specifications on occupant head clearance zones. There are no regulations on ambulance safety restraints.

The other major specification document regulating ambulance standards, the GSA KKK-A-1822F standard, offers little more on safety standards for the patient compartment. In fact, it simply identifies the minimum requirements for new ambulances built on Original Equipment Manufacturers (OEM) chassis, and “establishes minimum specifications, performance parameters and essential criteria” and to provide a degree of standardization of ambulance design (General Services Administration [GSA], 2002, p. 1). Again, this document does not specifically designate a section on safety restraint design or regulation but rather states that the seats will have a safety restraint. However, in section 3.10.3, the standard does say that the patient compartment seating will conform to all FMVSS standards and will include a safety belt, padded back, and padded headrest (GSA, 2002). Furthermore, section 3.11.15 states that all seats in the patient compartment “shall be equipped with safety restraint systems appropriate for each type of seating configuration” (GSA, 2002, p. 34). Thus, this document states that
there must be safety restraints appropriate to the seat, but does not provide any specifications or performance regulations. (pp. 9-11)

Dr. Nadine Levick is the founder of the EMS Safety Foundation and has conducted extensive research on finding ways to make the patient compartment safer for EMS workers. Levick’s work helped determine the shortcomings of ambulance safety regulations, and her research looks at where improvements are necessary. In her essay “Rig Safety 9-1-1: What You Need to Know about Ambulance Safety & Standards”, she discussed the federal ambulance safety standard KKK-A-1822 and how that and the Ambulance Manufacturers Division (AMD), do not provide standards of crash protection (Levick, 2008, p. 2). Furthermore, she stated that those two, in some areas, “even conflict with current technical automotive safety engineering practices” (Levick, 2008, p.2). From her work, and from exploring the General Services Administration’s “Federal Specifications for the Star-of-Life Ambulance” (2002), it is necessary to point out that the cab of the ambulance has to comply with federal vehicle safety standards, yet the patient compartment is exempt from any specific standards. Conversely, the AMD released a position statement asserting that, “The FMVSS (Federal Motor Vehicle Safety Standards) and Star of Life Specifications establish comprehensive performance standards, including with regard to seating seat belts and seating attachments” (AMD, n.d., p. 1). This seems to contradict that there are virtually no safety standards governing the inside of the patient compartment of the ambulance. It is worth noting that no other standards have been found to establish safety specifications for the patient compartment. Yet, the AMD also claims that in most
ambulance accidents, the safety restraint equipment was properly installed and functioning correctly, that rather those injured and/or killed were not using the safety restraints (AMD, n.d., p.3). In response, Levick and Grzebieta (2009) argued that the AMD does not have standards for a dynamic crash test (their standards are for static crash tests), in the U.S., ambulance patient compartments are exempt from FMVSS safety standards, and the AMD is not an independent standardizing body and does not write standards for any other vehicle (p.2). Furthermore, when looking to identify what is causing injuries and deaths to responders, the safety standards, or lack thereof, deserved an in-depth study.

When looking for specific injuries resulting in deaths of EMS workers in the patient compartment, the small amount of literature available on the topic overwhelmingly suggested that head injuries due to lack of restraints are the major cause. The Centers for Disease Control article “Ambulance Crash-Related Injuries Among Emergency Medical Service Workers ---United States, 1991—2002”, states that between the years of 1991 to 2002, 22% of EMS workers killed during ambulance accidents died of head injuries due to lack of safety restraints in the patient compartment of the ambulance (2003, p. 155). Further, it provided three case studies of accident accounts in which the EMT working with a patient in the patient compartment was killed in an ambulance accident due to head injury; these case studies supported the data provided on lack of safety restraint use (CDC, 2003, pp. 154-155). “Characteristics of Fatal Ambulance Crashes in the United States: An 11-Year Retrospective Analysis”, confirmed the fact that the most serious and fatal injuries occurred in the rear of the ambulance, and to “improperly restrained”
occupants (Kahn, Pirallo, & Kuhn, 2001). According to Smith (2015), an overwhelming four in five EMS providers in the back of an ambulance were unrestrained at the time of a crash (p. 92). In fact, Smith (2015) claimed that whether or not the provider was wearing a seatbelt in a collision “significantly” predicted the severity of occupant injuries and fatalities (p. 92). Furthermore, an unrestrained EMS provider is not only a hazard to himself in an accident, but could also become a projectile hazard to the patient (Levick, Li, & Yannaccone, 2001).

Even though there is no complete account of injuries or deaths related to ground ambulance crashes, it should be agreed that one fatality of someone who is helping another is one too many.

Even though head injuries from lack of restraint are the major causes of death of Emergency Medical Technicians (EMTs) from the literature, it seemed that most of the literature is lacking an explanation as to why the EMTs were not safely secured. Looking at the layout of the patient compartment, and more specifically, the location and orientation of the seating compared to the patient cot, could explain why EMS providers are not wearing their seatbelts. When referring to the orientation of the seating, it describes the way the seat is facing in the patient compartment. For example, the bench seat is a side-facing seat on the passenger side of the compartment. The captain’s chair is a rear-facing seat at the head of the patient cot. The CPR seat is a side-facing seat, surrounded by cabinets at waist and head level, on the driver side of the patient compartment, facing the patient cot. Often, wearing seatbelts from any of these aforementioned seats does not allow easy access to supplies and the patient. Furthermore, when it comes to the seating, the
fact that certain seats (i.e., the CPR seat) may be located between cabinets is another point of concern. For example, the CPR seat could be considered the most dangerous, as, during a frontal collision, the occupant is bounced back and forth between cabinets with the potential of causing severe head and internal organ injuries. Again, there is not much information available on actual crash-test data, but some case studies of actual accidents exist which have investigated the dangers of certain seats. For example, in the NIOSH case study of a firefighter/EMT fatality, “Career Firefighter/EMT Dies in Ambulance Crash – Florida”, the investigation yielded that, “The victim, who was belted into the captain’s chair in the patient compartment, died on impact and was pronounced dead on scene” (CDC, 2006, p.1). It goes on to say, “The victim was sitting on the attendant’s seat (captain’s chair) with his seatbelt on, in the patient compartment, behind the driver. After the crash, he was found sitting in the impact area between the tree and the passenger compartment, entangled with various metal structures and items within the compartment” (CDC, 2006, pp. 3-4). Furthermore, NIOSH studied other fatal ambulance crashes and found that, in both crashes, the caregiver in the back of the ambulance was seated on the bench seat, not wearing a safety restraint, and, despite the fact that the patient compartment suffered no damage, the caregivers died from head injuries (CDC, 2001-11; 2004).

The article “Safety in Numbers: A Survey on Ambulance Patient Compartment Safety”, published the results of a survey on which seats EMS personnel typically utilize during transports: it identified that 78% of respondents claimed to use side-facing seats (i.e., the bench seat and/or CPR seat) and that only
12% of total respondents used seatbelts all or most of the time during emergency transports (Proudfoot, Moore, & Levine, 2007, p. 87). Marie Nordberg (2010) wrote about Dallas-based CareFlite, Inc., which, at the time, was the only ground ambulance in the United States to have completely eliminated side-facing seats; she reported that Jim Swartz, the president and CEO of CareFlite, Inc., felt the need to remove the bench seats from the ambulance, because, “...if you wear a shoulder harness on a bench seat and you have a sudden stop, it’s going to cut your head off” (p. 53). This, and other case studies on ambulance crash investigations, would help to explain what happens to cause the injuries/fatalities, so that future crash studies will identify the mechanisms of injury to make improvements.

Undoubtedly, solutions need to be identified to these injury- and death-causing issues. The literature available on what crash tests are now being conducted and how the safety aspect is being improved comes from Dr. Nadine Levick. Levick (2007), in her “AMD Standards 001 – 025 Draft Review”, said that we need to conduct dynamic crash tests on ambulances with different types of safety restraints. Her “Crashworthiness Analysis of Three Prototype Ambulance Vehicles” tests three USA prototype ambulance vehicles with the intent to analyze “vehicle specifications, inspections, crash tests, and published crashworthiness and injury mitigation literature” (Levick & Grzebieta, 2007, p.1). The study revealed the United States safety standards are near non-existent and leave much to be desired (Levick & Grzebieta, 2007, pp. 6-7). She also discussed the far superior ambulance safety standards in Australia and Europe that could be useful to adopt to improve the overall safety of U.S. ambulances (Levick & Grzebieta, 2007, p. 2). The study
concluded with the recommendations to improve upon the seat design and equipment location and anchors (Levick & Grzebieta, 2007, p.7).

There are more options for restraints now that are designed to allow EMTs to move more freely around the patient compartment while also being secured. From the ambulance conference RETTmobil, author Matthew G. Crossman (2009) reported that most ambulances at the conference displayed forward- or rear-facing single seats, with over-the-shoulder seatbelts with all necessary equipment within arm’s reach and that the stretcher moves on most units so that the care provider can position himself/herself to access the patient (p. 4). Levick (2013) also attended a conference in which she reported that she was able to view a European ambulance; she pointed out the forward- or rear-facing seating and the more convenient positioning of supplies and providers (pp. 33-34). Concerning safety restraints, Alan M. Petrillo (2013) reported that Horton Emergency Vehicles is marketing their new HOPS system: HOPS, or Horton Occupant Protection System, “starts with a three-point seat harness system used in conjunction with barrier seat bolsters to confine the occupant. A detachable feature on the over-the-shoulder part of the harness allows the medical responder to move forward to access a patient without removing the seat belt.” He also discussed that other ambulance manufacturers are now offering similar options when it comes to seating and safety restraints (Petrillo, 2013). Furthermore, Batchelor (2009) described the new Winter Park, Florida, ambulance that allows an EMS worker to be restrained while also being close enough to provide patient care. Also, the students from the MIT engineering program designed a new ambulance that features a five-point harness, seats that
swiveled, and cut down on the number of “strike zones” that an EMT could hit his head on while working (Gagne, 2013). Concerning these “strike zones”, the Centers for Disease Control and Prevention posted research that suggested increasing the head clearance for EMS workers above the seating positions to significantly reduce the potential for a head injury (2010; 2011). More recently, Sagarra (2015) described a new ambulance designed for the Pulaski County Ambulance District in Missouri. Delivered in February, 2015, this new ambulance focuses on safety, efficiency, and technological intelligence. In a joint effort of Ferno, a company which designs and markets ambulance equipment, NIOSH, and the AMD, they discovered that, in an ambulance crash, seatbelts for providers are a major issue, along with the ambulance interiors being so large that providers cannot be restrained and also access the patient, supplies, and equipment (p. 43). From this research, Sagarra (2015) described that the new ambulance has replaced hard cabinets with movable supply bags, monitors, oxygen equipment, IV tools, laptops, stretchers, and work trays. The equipment, which is hung on a tiered iNSTraxx track system along the interior sides of the ambulance, can be moved around and secured in moments, based upon the anticipated needs of the call. Furthermore, the bench seat was replaced with a forward-facing seat adjacent to the patient cot; this seat can move forward and backward, the supplies are within the provider’s reach, and the provider can also make eye contact with the patient.

Perhaps the last and most important challenge when looking to provide a safer environment in the patient compartment of ambulances is the challenge of changing the attitudes and habits of those who will be working in the ambulance
patient compartment. This is an area majorly lacking in literature and highly
deserving of more research. The study “EMS Provider and Patient Safety During
Response and Transport: Proceedings of an Ambulance Safety Conference” pointed
out that EMS providers pride themselves on selflessness and that this attitude
fosters disregard for the provider’s own safety to care for the patient (Brice,
Studneck, Bigham, Martin-Gill, Custalow, Hawkins, & Morrison, 2012). Indeed, from
personal experience and from working with many experienced EMTs (both of the
Basic and Paramedic levels), the existing seat belts hinder full access to the patient,
thus, they are not used, since the provider feels he/she cannot perform his/her job.
Also, certain seats do not provide adequate patient access, so it is not uncommon for
providers to be unrestrained in dangerously oriented side-facing seats. In order to
effectively administer patient care and perform the tasks of the job, care providers
must be able to move around to all sides of the patient, and since seatbelts hinder
the ability to do so, they are not worn.

Firefighters and EMS workers are creatures of habit and tradition, and
changes do not come easily. A survey conducted by Eyal Byran and Issachar Gilad
(2012) provided data on work routines and activities, comfort, safety, and health
complaints. To summarize, their survey results showed that the most preferred seat
was the bench seat (side facing) as opposed to the captain’s chair (rear facing),
because the bench seat allowed better patient access (Byran & Gilad, 2012).
Furthermore, they pointed out, due to the need to move around to fully access the
patient, most paramedics chose not to use seatbelts (Bryan & Gilad, 2012, pp. 224-
225). This showed that most care providers are concerned about the ability to
perform their jobs over their own personal safety, which should not be the case. Drs. David E. Slattery and Annemarie Silver used a cardiac arrest scenario to explain how impossible it is for an EMS provider to wear a seatbelt and work a cardiac arrest in their essay, “The Hazards of Providing Care in Emergency Vehicles: An Opportunity to Reform” (2009). They concluded that perhaps ambulances should be supplied with mechanical equipment that would perform necessary interventions during the cardiac arrest and the provider could be seated and restrained; these suggestions included the Auto Pulse, which is a board that performs high quality chest compressions and a mechanical ventilator (Slattery & Silver, 2009). When it came to changing attitudes and compliance rates with using safety restraints, only one article provided helpful information. “Bigger isn’t Better in Ambulance Design”, by Fire Chief Jeffrey T. Lindsey (2009), looked at the issue from the point of a fire chief: He stated that the design of the patient compartment has been the same for years and that is what responders view as normal. He also stated that the ambulance manufacturers offer the safety upgrades, but “customers haven’t wanted the changes” (Lindsey, 2009). Indeed, according to Chief Lindsey, personnel safety starts with the fire chief and other leaders in the fire service. Of course, the fire service draws heavily from tradition, and thus change is not often well received. A strong leader needs to encourage change and set the example. Change is needed for the ultimate safety of personnel and patient (Lindsey, 2009). Finally, another survey on ambulance patient compartment safety, “Safety in Numbers: A Survey on Ambulance Patient Compartment Safety”, provided data on some changes that providers might be open to utilizing, such as using new restraints that “allowed
mobility all or most of the time" (Proudfoot et al., 2007, p. 87). This is just a
generalized survey; one specifically addressing the use or potential use of new
seating layouts and new safety restraints would be more beneficial.

Ambulance crash statistics and the injuries associated with them are not
frequently recorded, which leaves a large gap in literature that identifies all of the
issues that need to be addressed with ambulance safety. What does exist, however,
points out that the position and layout of existing seating and the lack of adequate
restraints in the patient compartment of the ambulance have resulted in
unnecessary tragedies. Therefore, until more information and data are available, we
must continue addressing this issue. Most of the literature suggested that recently
this has become a major issue and new studies are now being done and new safety
standards are being developed. For example, in the past year, NIST (National
Institute of Standards and Technology) and partners have submitted 86 items in
compartment design for upcoming revision and NIOSH furthered development of
guidelines for equipment mounting and impact crashworthiness to propose new
designs to keep EMS providers seated and restrained while caring for patients in the
back of the ambulance while also keeping equipment and supplies within reach
(Erich, 2014).

Truly, future ambulances will most likely provide a safer working
environment for the EMS personnel. It is just a matter of time. Until then,
comprehensive dynamic crash test data needs to be collected and studied, and
responders need to feel that new safety measurements will allow them to provide
the best care possible to their patients while protecting them at the same time.
Compliance in utilizing these safety measures will only come with that caveat. At the end of the day, safety in a dangerous job is the ultimate goal; those who risk their lives and well being to protect and serve those during emergencies deserve the best possible safety equipment, for, as the fire service aspires, “Everyone Goes Home”.

Next, obtaining both qualitative and quantitative data through a mixed methods study emphasized the need to better design ambulances with paramedic safety as a priority.
Methods

Mixed methods research is a research option that combines both qualitative and quantitative forms of research. It involves philosophical assumptions, the use of qualitative and quantitative approaches, and the mixing or integrating of both approaches in a study (Creswell, 2014).

The type of design used for this study was the convergent parallel mixed methods approach. Creswell (2014) describes this design as collection of both qualitative data and quantitative data separately with separate analysis. The results of both are then compared to look for similarities or differences. Further, Creswell (2014) states this approach assumes that both data types provide different information, but should yield the same results. Below is a diagram of the procedures.

Figure 1. Diagram of the convergent parallel mixed methods approach.

Figure 1. Flow chart displays the convergent parallel mixed methods approach per Creswell, J. (Ed. 4). 2014, Research Design. Los Angeles: Sage.
Research Design

This research began with the collection of qualitative data obtained from riding in the ambulance with three paramedics from three suburban fire protection districts south of Chicago, Illinois: Elwood, Wilmington, and Coal City. Observations were recorded on seat belt usage and seat preference during two emergency transports with each paramedic, one in the old (standard) ambulance and one in the new ambulance. Observations were recorded on where the paramedic sat, what the paramedic did in that seat, and whether or not the paramedic wore a seat belt. If the paramedic did wear a seat belt, observations were recorded on what may have prevented paramedics from wearing a seat belt. Appendices A through C show the layouts of the old and new designs of each ambulance included in the study. At the conclusion of the emergency transport, interviews with each respective paramedic yielded data on why the paramedic sat in a particular seat and whether or not he/she was able to wear a seat belt (and why or why not he/she was able/unable to wear a seatbelt) while also caring for the patients. Qualitative data was also collected using interviews. Open-ended questions helped to gain a more comprehensive understanding of the problem from the views of experienced EMS personnel. Paramedics were asked follow-up questions on their knowledge of current ambulance safety standards and what changes the paramedic would suggest to improve his/her safety in the back of the ambulance. The observation and interview sheet and the raw data collected are included in Appendix E.

For the purposes of this research, data from all ambulance transports were collected, whether the paramedic ran the call ALS (advanced life support) or BLS
(basic life support), as it would be unethical to intervene in the paramedic’s patient care decisions. However, it is worth noting that patients receiving ALS care require more interventions and advanced care than do BLS patients. Furthermore, no patient information was collected or compromised during this research. Finally, as a licensed paramedic employed at each of the three fire protection districts, the researcher informed the respective paramedics that she would assist them with patient care at any time should they require assistance.

Quantitative data collection involved a survey tool, the second phase of the mixed methods research. Surveys were administered to consenting paramedics at Coal City Fire Protection District, Wilmington Fire Protection District, and Elwood Fire Protection District. These surveys asked yes/no questions based upon the paramedic’s understanding of threats to his/her safety in the back of the ambulance, the new safety options being made available by ambulance manufacturers, what the paramedic feels about his/her level of safety in the old ambulance design versus the new ambulance design, and what the paramedic might like to see in the future. The survey was administered second to the observations/interviews so as to not allow the participants to know what was being observed so that behaviors were not changed. Analyzing the quantitative data involved quantifying the results of the surveys. The results of the surveys were used to suggest changes that paramedics feel would better protect their safety.
Mixed Methods Data Analysis

Convergent parallel mixed methods data analysis procedures involved analyzing the qualitative data (first phase) independent of the quantitative data (second phase) and then analyzing the results together to look for similarities or differences. The particular approach for this research involved a side-by-side comparison. First, the statistical quantitative results obtained from the surveys were analyzed, followed by analysis of the qualitative data obtained through observations and interviews. Themes were then identified in the qualitative data to either support or oppose quantitative data. It appeared that the data from the interviews shared a heavy correlation with the data obtained through surveys.

Validity approaches in both qualitative and quantitative research establish the validity of scores from the quantitative research and discuss validity of qualitative findings (Creswell, 2014, p.225). Validity strategies were actively incorporated into the study. According to Creswell (2014), for the convergent parallel mixed methods approach, validity should be “based on establishing both quantitative validity (e.g., construct) and qualitative validity (e.g., triangulation) for each database” (p. 223). Member checking was another method to check for validity - after the data had been analyzed and interpreted, the researcher conducted follow-up interviews with the paramedics and asked them to comment on what had been found. Also, the researcher’s bias was clarified to help establish validity; as a practicing paramedic, the researcher was interested in what could be changed in the ambulance that will be used by fellow paramedics to help improve personal safety. The researcher has an in-depth understanding of this issue along with personal
experience. This will also help establish validity. Finally, the researcher also considered using an external auditor to review the entire project.

When checking for reliability, procedures of case studies were documented as thoroughly as possible and have been described and discussed so that they can be replicated.

**Study Limitations**

With this study, call type was unpredictable. For the observation portion, it would have been unethical to ask the care provider to perform certain interventions or to upgrade patient care for the research. Also, every call is different; therefore, the medics’ behavior varied per call for treatment and level of care required.

The main challenges in using this design involved identifying the appropriate experienced EMS providers (sample size) to analyze during qualitative data collection who would honestly answer follow-up interview questions and gaining a large participation rate in the survey quantitative data collection process.

Qualitative and quantitative data analysis yielded the findings in the following section.
Qualitative Findings

Upon analyzing the qualitative data, the following includes observations collected from observations and follow-up interviews.

Only two of the nine calls were BLS calls. One paramedic did not wear a seat belt the entire BLS transport, and the other did wear a seat belt. The paramedic that did wear a seat belt sat in the captain’s chair behind the patient, and did not need to get up to move around the ambulance at all, as all interventions had been completed. The patient was on a backboard, therefore the paramedic could see the patient and communicate with the patient. The paramedic that did wear a seat belt had been involved in an ambulance crash, so this paramedic understood that the risk for a crash is real.

For the Coal City paramedics, all three paramedics primarily sat in the CPR seat. This is an option in both of their ambulances. One paramedic also utilized the captain’s chair, and the other sat in the bench seat as well. None of the paramedics wore a seat belt at all during the transports. The paramedics that sat in the CPR seat were able to assess and communicate with their patients, could reach the cardiac monitor to reassess vitals, could grab the cellular telephones to call the hospital, and the computer to complete the patient report. In all cases, the paramedics could not reach all of their supplies while restrained in any of the seats.

During the interviews with the Coal City paramedics, one paramedic mentioned that sitting in the CPR seat allows access to the monitor, the telephone, and the patient. Another paramedic mentioned that the CPR seat allows the paramedic to reach supplies without reaching over the patient. One paramedic
commented that sitting in the captain’s chair is more comfortable than the other two seats, and the paramedic that sat in the bench seat shared that it was the best place to monitor the patient.

When asked about why they did not wear seat belts, one stated that it was not possible to reach everything while wearing a seat belt. Routine (not used to wearing a seat belt), “just did not think about it”, and a bad habit were provided as reasons.

Conditions that would incline these medics to wear a seat belt included inclement weather, driver skill, and when the patient is stable and requires no other interventions. Situations that would make it more difficult to wear a seat belt would include when the paramedic “can’t reach anything and is moving constantly”, critical calls, full arrests, and seizures.

One paramedic claimed to have no knowledge of ambulance safety standards, one recommended that “seat belts save lives”, and the third paramedic knew that Illinois Department of Public Health (IDPH) requires equipment to be strapped down.

All three paramedics agreed that they like the new ambulance better than the old ambulance. Reasons included that the new ambulance “rides nicer”, is bigger and roomier, and set up better. One paramedic even noted that from the CPR seat, everything is “pretty much in reach”.

When asked their opinions of what changes the medics would like to see to make future ambulances safer for them, suggestions included air bags in the patient compartment, more training with new drivers, attempt to complete as many
interventions as possible prior to transport, utilizing the automatic function on the
monitor for obtaining periodic vital checks, and potentially installation of “right/left
turn and brake indicator lights” in the inside of the back of the ambulance near the
clock so that the paramedic can know what the driver is doing and can prepare for
the action ahead of time.

The Elwood study yielded different results, as the new ambulance no longer
has a CPR seat, and the old ambulance has a child safety seat belted onto the CPR
seat so that crews are unable to use it. It has been there for the past five years. All
six calls run by the Elwood paramedics were ALS. The most commonly used seat
was the captain's chair behind the patient. In this seat, the paramedics called the
hospital from the cellular telephone and worked on the computer report. One
paramedic wore the seat belt in this chair in both ambulances. The other two did
not wear seat belts at any time during their transports. The medics also moved to
the bench seat or the side-facing captain’s chair to assess and talk to their patients.
None of the paramedics could reach all of the necessary equipment while seated;
they all stood up and moved around during transport. Frequent causes of this
included having to hit the NIBP button on the cardiac monitor, administer oxygen to
the patients, to administer medication to the patient, and all three walked around
the patient to disconnect the patient from the cardiac monitor and switch oxygen
over from the main to a portable prior to arrival at the hospital.

During the interviews, one medic discussed that sitting in the captain’s chair
behind the patient (who was on a backboard) allowed for the paramedic to wear a
seat belt while also being able to assess and communicate with the patient. This
medic noted that all necessary interventions were completed prior to transport and that the patient was stable; thus, requiring no further care. The other two paramedics also indicated they sat in the captain’s chair to do the computer report and call the hospital. They chose either the bench seat or the side-facing captain’s chair to assess and communicate with the patients and repeat vitals.

When asked what prevented the paramedics from wearing a seat belt, one mentioned he had to get up to administer medications to the patient per communication with the hospital. One stated if he needed to move quickly to care for the patient, the seat belt is “one less thing to worry about.” He mentioned there are bars to hold onto that run parallel with the cot on the ceiling. The third medic said that he “moves too much” and that patient care does not allow for wearing a seat belt. He further explained that this may be a “culture thing taught by seasoned medics.” Further, he explained that there is “more concern for patient care than for yourself.”

The paramedics suggested that they will wear seat belts when the patient is stable, interventions are complete, they are able to assess and communicate with the patient adequately, in situations where there are extra personnel in the back to assist with patient care, there is inclement weather, and the driver is not the best.

Calls that make it more difficult for the paramedics to wear a seat belt include critical patients, trauma patients, full arrests, “load and go” patients, patients with respiratory compromise, patients having strokes, and when patient care requires the paramedic to “adapt and be creative”.

Concerning knowledge of safety standards, one stated that “Europe is way ahead of us” but had no knowledge of current United States ambulance safety standards. The second paramedic mentioned the inclusion of seat belts, air bags, and the safety net (which is in the new ambulance). The third paramedic in the Elwood study actually assisted in spec’ing out the new Elwood ambulance, so he knows that the chassis is regulated by NHTSA, but thinks that only a couple of ambulance companies have standards on the box (patient compartment), there are no crash/rollover ratings, and that Braun recently conducted the first rollover crash tests.

One paramedic preferred the old ambulance, stating it is easier to reach supplies and offers more room. The old design allows for having an extra paramedic to assist in the back, and the two paramedics will not get in each other’s way. The second paramedic preferred the old ambulance also because it is roomier, and the bench seat allows the paramedic to slide down the seat instead of having to stand up to move. This paramedic also mentioned he liked the new design as well, but simply because he mentioned it is more “comfortable”. The third paramedic preferred the new ambulance, because he feels safer sitting in a side-facing captain’s chair over a bench seat. Further, he liked that the three captain’s chairs limit the number of people that can function in the back of the ambulance. He mentioned the cot loading system and the redundant controls also as positives, but he did mention one drawback is that there is no room to work on the right side of the patient, as the cot is located closer to the driver-side wall and not centered.
Some changes suggested by the Elwood paramedics include making sure all equipment is secured, better restraints, a “cover or dome that would hold you on to a chair in the case of a crash”, staying with a center-loading cot to allow access to patients from both sides, keeping the CPR seat for extreme calls (“Something is better than nothing.”), side curtain air bags, a better spot for the cardiac monitor so the paramedic is not reaching over the patient to access it, and one paramedic supported the captain's chairs replacing the bench seat, claiming paramedics would feel more comfortable and secure in the captain’s chair. One paramedic mentioned the possibility of helmets for the paramedics, as head injuries are the most common injury to paramedics in an ambulance crash. Finally, one paramedic claimed that culture is an issue: He stated that paramedics are resistant to changing a practice that they are used to, but the new members are open to change, so we should be emphasizing safety and good practices early. Another paramedic echoed that sentiment in saying we are strict about firefighter safety and that strictness should also be included in EMS. He wants to go home to his family at the end of his shift.

Whereas Coal City did not have a major design change between their two ambulances (did not remove CPR seat), and Elwood made a major design change (removing CPR seat and replacing bench seat with two side-facing captain’s chairs), Wilmington took a moderate approach to change. Originally, Wilmington was not due to spec out a new ambulance; however, they did have an ambulance crash; thus, creating a necessity. Wilmington's chief had intended to purchase the new ambulance following Elwood’s new design; however, the cot in Wilmington’s new ambulance was placed in the center of the floor, therefore not allowing room for the
two side-facing captain’s chairs. Wilmington settled with removing the CPR seat, yet keeping the bench seat.

One of the six calls run by Wilmington paramedics was BLS. The rest were ALS. The captain’s chair behind the patient was the most frequently used seat, followed by the bench seat. None of the paramedics sat in the CPR seat in the old ambulance. The paramedics sat in the captain’s chair to call the hospital and work on the computer report. Two of the three paramedics wore a seat belt while sitting in the captain’s chair. On the BLS call, the paramedic stayed seat belted in the captain’s chair throughout transport, because all interventions were completed prior to transport, and the patient was on a backboard, allowing the paramedic to assess and communicate with the patient from that spot. All of the paramedics got up and moved around during the ALS transports, because they could not reach what they needed from sitting. They moved to the bench seat to reassess vitals and communicate with the patient. One patient was more critical, a “load and go” trauma patient, so minimal interventions were completed on scene. This medic placed anticipated equipment on the bench seat next to him prior to transport. One paramedic that did move from the captain’s chair to the bench seat put his seat belt on when he moved to the bench seat.

During the interviews, some interesting thoughts were shared by the three Wilmington paramedics. They explained that they sit in the captain’s chair, because they can see the cardiac monitor, can access the telephone, can reassess and communicate with patients on backboards, the seat belt has a shoulder strap along with the waist belt, and is safer, and they can communicate with the driver. They
explained sitting in the bench seat allows for patient contact, view of the monitor, and for more space to lay out equipment needed to treat the patient.

When the paramedics did not wear a seat belt, one stated he could not reach the monitor from sitting, one stated that he chose not to wear a seat belt, because it is a “pain in the butt” to put on and take off, especially when he is constantly moving. The third paramedic agreed that on his trauma call he could not wear a seat belt, because he was constantly moving to care for his patient.

The paramedics stated they wear a seat belt when they are able to based upon patient condition, when equipment is within reach, and when interventions are completed at the scene. Calls that these medics mentioned that make it more difficult to wear a seat belt include full arrests, patients require more care, traumas, pediatric calls, patients with airway compromise, and needing to access medications (drug box is secured inside of a cabinet). None of the three paramedics had any knowledge of current ambulance safety standards.

As far as which ambulance the paramedics prefer, there was no clear winner. Two medics prefer the new ambulance because the box is bigger height-wise. Two mentioned the benefit of the redundant controls in the new ambulance as well. Of course, it was mentioned that the new ambulance also has a better suspension and also the power load cot is of benefit. One paramedic also mentioned he likes that the new ambulance has no CPR seat. On the other hand, one medic mentioned that the old ambulance has more cabinet space, and one mentioned that it is beneficial to have a CPR seat over no CPR seat.
Some changes Wilmington paramedics suggested include air bags “to make a big bubble,” better drivers, compartment indicator lights with no sound so equipment does not fall out during transport, a harness system, captain’s chairs that swivel, a reel system for the oxygen, acquiring an AutoPulse for CPR, and, of course, a culture change.

One paramedic in the Wilmington study was very passionate about making the ambulances safer for the paramedics. He really emphasized the need for a cultural and attitude change. He mentioned that the fire service is more influential in this career than EMS in that they emphasize a risk/benefit analysis (Risk a lot to save a lot, risk little to save little, and risk nothing to save nothing.), and there is a lot more training for the fire service, even though most calls are EMS. He thought that if paramedics knew of the hazards to their safety in the back of an ambulance, they would try harder to be safe. Even though he said most paramedics will put their patients’ safety before their own, training and practicing completing more interventions and moving equipment to where it can be reached from sitting will make a huge difference in paramedic safety. He thought training and designating roles on scene would help eliminate that attitude that “we have always done it like that”. Concerning the elimination of the CPR seat, this paramedic thought it is “awesome”; it is just a nuisance seat, as paramedics cannot see anything while sitting there and notes that it is not even practical in a full arrest as there are wires everywhere connecting the monitor to the patient. Truly, he felt that “If you set your medics up for success, then they have a safe and comfortable ride.”
Quantitative Findings

The second part of the study included data collected from surveys on seat belt usage and seating preference. Participation could have been slightly better; 20 surveys were given out at both Wilmington and Coal City Fire Protection Districts. Wilmington had an 85% participation rate and 100% of the surveys were completed by Coal City paramedics. Only 18 surveys were given out at Elwood FPD, as there are only 18 full-time members. In Elwood, 78% of the surveys were completed and returned. A total of 51 surveys were completed. The survey tool and all of the data collected are referenced in Appendix F.

Concerning demographics, age and years of experience for each category were mostly evenly distributed. However, an overwhelming 92% of the total surveys returned were completed by male participants and only 8% were female. Majority of the employees at each fire district are male.

The first questions not dealing with demographics provided pictures of four ambulance patient compartment designs. The first picture showed the new Coal City ambulance design, the second showed the new Elwood design, the third was the new Wilmington design, and the fourth was the old Coal City design, which is the control, as that is the same design in both Elwood’s and Wilmington’s ambulances as well. The first question asked the participant to indicate which design was the most appealing.
An overwhelming majority (57%) indicated they preferred the design of Coal City's new ambulance. This is not entirely surprising, as it is very similar to the control ambulance design, complete with CPR seat. One interesting observation was that both participants from Wilmington (47%) and Coal City (70%) overwhelmingly indicated that their respective new design appealed to them, whereas participants from Elwood FPD (71%) overwhelmingly indicated that Coal City's new design appealed most to them. This may also not be as surprising; however, as again, it is a less-drastic change from the original design, and Elwood's new design is very different (no CPR seat, two captain's chairs replacing the bench seat).

The second question asked participants which design they feel is the safest. The same pictures in the same order were presented from the previous questions.

Table 1. Please indicate which design appeals to you.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>10 (34%)</td>
<td>1 (14%)</td>
<td>1 (11%)</td>
<td>2 (40%)</td>
<td>0 (0%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (17%)</td>
<td>2 (29%)</td>
<td>8 (89%)</td>
<td>2 (40%)</td>
<td>0 (0%)</td>
<td>17 (34%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>14 (48%)</td>
<td>4 (57%)</td>
<td>0 (0%)</td>
<td>1 (20%)</td>
<td>1 (100%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>29 (57%)</td>
<td>7 (14%)</td>
<td>9 (18%)</td>
<td>5 (10%)</td>
<td>1 (1%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
Table 2. Please indicate which design you feel is the safest.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>7 (35%)</td>
<td>6 (30%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (50%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>2 (10%)</td>
<td>7 (35%)</td>
<td>6 (100%)</td>
<td>2 (67%)</td>
<td>0 (0%)</td>
<td>17 (34%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>11 (55%)</td>
<td>7 (35%)</td>
<td>0 (0%)</td>
<td>1 (33%)</td>
<td>1 (50%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (39%)</td>
<td>20 (39%)</td>
<td>6 (12%)</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

In total, 39% indicated that they felt that Coal City’s new design is the safest, and 39% indicated that they felt Elwood’s new design is the safest. The old design was felt to be the least safe (6%). Breaking this down further, only 43% of Elwood participants felt that their new design was the safest, as opposed to a majority (50%) indicating that they felt that Coal City’s new design is the safest. Wilmington participants indicated they felt Elwood’s new design is the safest (41%) as opposed to their new design (35%), and Coal City participants overwhelmingly indicated they feel their ambulance is the safest (55%), with Elwood’s new ambulance coming in second at 35%. While it is interesting to note that Wilmington feels that Elwood’s new design is safer than theirs, Elwood participants have been running EMS calls in the back of their new ambulance. While the intent was for this new design to be safer, the experiences the Elwood medics have with the new design may reflect in their feelings that the new ambulance design may potentially not be safer.

The next nine questions concentrated on seat belt usage. When asked if the medic wears a seatbelt in the ambulance cab while en route to a call, 96% of total
respondents indicated that they do, and 100% of the participants indicated that they wear a seat belt when returning from the hospital. A total of 80% of the participants indicated that their respective fire districts have a policy regarding seat belt usage. Furthermore, 61% of total respondents indicated that they wear a seatbelt while providing Basic Life Support (BLS) care to patients during transport. BLS patients do not require much medical attention; thus, it is assumed that the provider will be able to remain seated during most of the transport. An Advanced Life Support (ALS) transport is different. These patients range from basic ALS care to very intensive critical care during transport. As the medic will need to move around more to provide this care to a patient, it is no surprise that 84% of the participants indicated that they do not wear a seatbelt while caring for these patients.

In order to effectively change the layout of the ambulance to encourage better seat belt usage compliance, the reason why medics are not wearing a seat belt must be identified. The next questions asking for conditions that must exist in order to influence the medics to wear their seat belts incorrectly referenced two other questions, majority of participants still answered. The first question asked if the medic does not wear a seat belt because he/she feels he/she cannot access the patient, and 90% answered yes.
Table 3. If you do not always wear a seat belt during patient transport, is it because you feel you cannot access your patient?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (30%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>14 (30%)</td>
<td>1 (33%)</td>
<td>2 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>18 (40%)</td>
<td>2 (67%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>46 (90%)</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Further, the following question asks if the medic would wear a seat belt if he/she could, in fact, still access the patient; 57% stated they would. This was a question with an incorrect reference, which may have been why 29% chose not to answer.

When asked if the medic does not wear a seat belt, because of inability to access supplies, 86% indicated yes.

Table 4. If you do not always wear a seat belt during patient transport, is it because you feel that you cannot access your supplies?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (32%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>13 (29%)</td>
<td>3 (50%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>17 (39%)</td>
<td>3 (50%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>44 (86%)</td>
<td>6 (12%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
The next question, which also had an incorrect reference to a previous question, asked the participant if he/she would wear a seat belt if he/she could access supplies: 73% indicated that they would.

Another change that has been made to new ambulance designs in an attempt to make them safer for medics is to change the seating arrangement. The next six questions asked medics about seat preference. Of the three seating options in the ambulance, the captain’s chair at the patient’s head, the bench seat at the patient’s left side, or the CPR seat on the patient’s right side, 14% indicated they are most likely to sit in the captain’s chair, 63% on the bench seat, 16% on the CPR seat, 6% on both the bench seat and CPR seat, and 2% on the captain’s chair and bench seat.

Table 5. When providing patient care during transport to the hospital, which seat are you most likely to sit in?

<table>
<thead>
<tr>
<th></th>
<th>Captain’s Chair</th>
<th>Bench Seat</th>
<th>CPR Seat</th>
<th>Bench/CPR Seat</th>
<th>Capt. Chair/Bench Seat</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>0 (0%)</td>
<td>12 (38%)</td>
<td>0 (0%)</td>
<td>2 (67%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (71%)</td>
<td>11 (26%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>2 (29%)</td>
<td>9 (28%)</td>
<td>8 (100%)</td>
<td>1 (33%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>7 (14%)</td>
<td>32 (63%)</td>
<td>8 (16%)</td>
<td>3 (6%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

The next question asked why medics why they chose the seats they do.
While there were many answers written that ranged from shoulder belt usage and access to cardiac monitor, the main responses were for patient care and access (20%), ability to communicate with patient (8%), access to equipment (6%), and all of the three previously mentioned (37%).

Inherently, there are risks involved with this profession. In fact, 96% of total participants indicated they realize there are risks to their life and safety while caring for patients in an ambulance. Of the three seating options, the CPR seat has been identified as the most dangerous. Even though only 16% of the participants stated they would sit in the CPR seat, 75% of total participants indicated that they are aware of risks of injury and death to themselves while sitting in this side-facing seat during a frontal collision. Wilmington and Elwood have eliminated the CPR seat from their new ambulances, and Elwood has placed a covered child seat in the CPR seat of their old ambulance to mitigate this risk. Coal City kept the CPR seat in their new ambulance, but made changes to the layout to limit the risk to providers. It is reasonable then that no Elwood or Wilmington participants indicated that they sit in the CPR seat. However, 40% of Coal City participants indicated they still use the
CPR seat, even though 75% of them indicated they realized the dangers of sitting there.

With the obvious dangers involved in the job and the fact that a majority of the participants realize the increased danger of sitting in the CPR seat, only 39% stated they would be open to eliminating the CPR seat. Further analysis yields quite interesting results: participants from Elwood, the district that has eliminated the CPR seat and usage of the CPR seat, revealed that 57% are not open to eliminating the CPR seat. Wilmington participants indicated at 53% that they would be willing to eliminate it, and Coal City voted overwhelmingly at 75% that they did not want it eliminated.

Table 7. Would you be open to eliminating the CPR seat?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>6 (30%)</td>
<td>8 (27%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>9 (45%)</td>
<td>7 (23%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>5 (25%)</td>
<td>15 (50%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (39%)</td>
<td>30 (59%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

The next question offered an option to the bench seat, which is also a side-facing seat. The question asked the medics if they would be willing to replace the bench seat with two captain’s chairs on swivels (could face the patient for patient care and could swivel forward during transport), which is what Elwood did with their new ambulance. A total of 55% agreed that they would be open to this change.
Elwood participants overwhelmingly approved of this change (71%), even after using it the past two years. Wilmington was more reserved at 47% favorable, and Coal City was mostly favorable at 55%.

Table 8. Would you be open to replacing the bench seat with 2 captain’s chairs that swivel if you could access your patient/equipment during transport?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>10 (36%)</td>
<td>4 (20%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>8 (29%)</td>
<td>7 (35%)</td>
<td>2 (67%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>10 (36%)</td>
<td>9 (45%)</td>
<td>1 (33%)</td>
<td>20 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>28 (55%)</td>
<td>20 (39%)</td>
<td>3 (6%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

The last two questions focused on current ambulance safety standards, of which was previously explained are few. A small majority at 53% of the total indicated they are familiar with current ambulance standards, while only a small number 27% of total respondents indicated they feel that the current standards are sufficient.
Table 9. Are you familiar with current ambulance safety standards?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>8 (30%)</td>
<td>6 (26%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (19%)</td>
<td>11 (48%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>14 (52%)</td>
<td>6 (26%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>27 (53%)</td>
<td>23 (45%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Table 10. Do you feel that current ambulance safety standards are sufficient?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>1 (7%)</td>
<td>3 (27%)</td>
<td>10 (42%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (36%)</td>
<td>3 (27%)</td>
<td>8 (33%)</td>
<td>1 (50%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>8 (57%)</td>
<td>5 (45%)</td>
<td>6 (25%)</td>
<td>1 (50%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>14 (28%)</td>
<td>11 (20%)</td>
<td>24 (47%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Discussion

Overall, the data collected from the ride-a-als and interviews did not provide any surprising results. In fact, the data collected from the qualitative portion showed a strong correlation with the quantitative portion. While roughly half of the paramedics did wear a seat belt during BLS transports, they mostly did not wear seat belts during ALS transports. Reasons frequently mentioned for not wearing a seat belt during an ALS transport included that the paramedics could not reach all necessary supplies nor adequately communicate with patients. None of the
current designs allowed for any of the paramedics to reach all needed supplies or conduct all necessary patient care interventions while sitting.

As it concerns seat preference, the Coal City paramedics chose the CPR seat, since they have not eliminated it, but the Elwood and Wilmington paramedics overwhelming chose to use the captain’s chair behind the patient or the bench seat. The Elwood paramedics could not choose the CPR seat, as their new ambulance no longer has one and the old ambulance has a child safety seat secured to the CPR seat. The Wilmington paramedics, however, do have the option to use the CPR seat in their old ambulance but did not use it and also chose the captain’s chair behind the patient as well.

Indeed, the data indicated that paramedics prefer Coal City’s new ambulance design, which is very similar to the old ambulance design but with few subtle changes. It also showed that paramedics are split between whether Coal City’s new design or Elwood’s new design is safer. Coal City’s new ambulance still has a CPR seat, however it has been modified to make it slightly safer. What is interesting is that only 39% of responding paramedics were in favor of eliminating that CPR seat. Furthermore, the survey results indicated that paramedics do not wear seat belts on ALS calls, mostly because they cannot reach supplies or adequately assess the patient from any one seat. The ambulance design changes did not seem to matter. This was noted in the observation portion as well. Also, most indicated that the preferred to sit on the bench seat, even though they also indicated that they are aware of the risks of sitting in the side-facing bench seat during a frontal collision.
Furthermore, the data indicated that seat belt usage compliance prior to and after transporting a patient to the hospital is met, for the most part. However, when it comes to patient care in the back of the ambulance, a large number of medics do not wear their seat belts for various reasons, including inability to access supplies and the patient, especially while caring for patients that require ALS care. Many medics indicated that they understand the risks to their health and safety, but the results seem to indicate they would be open to changing the design to make it safer. Changing the CPR seat seemed less favorable than changing the bench seat, but the overall conclusion is that the medics would be open to changes that would ultimately better protect them while they provide life-saving care to their patients.

The data showed that there are a few solutions that can be implemented to help mitigate these problems. For one, ride-a-longs showed that the paramedics not seated in a CPR seat stood up to hit the blood pressure button on the cardiac monitor when it was appropriate to obtain necessary periodic vital signs. There is a feature on these monitors which can be set ahead of time to take a blood pressure at a set time interval automatically without the paramedic having to hit the button. The paramedics interviewed all knew about this feature, but were unsure of how to set it up.

Another common reason paramedics were observed to stand up during transport were to complete necessary interventions to the patient and to disconnect the patients from oxygen and cardiac monitor prior to hospital. A common suggestion to solve this problem, as mentioned in some interviews, would be to complete as many interventions as possible prior to transport, so that the
paramedic can stay seated. Along with this, the paramedics can unhook the patients after arriving at the hospital. This may pose a problem; however, as there is an emphasis in total call time – that is to say, fire department entities emphasize the importance of completing the calls as quickly as possible to ensure the ambulance is back in service in a short amount of time. Thus, it is contradictory for a fire department to have a policy that says the paramedics must have a short on-scene time and a quick hospital turn-around time while also saying it is important for the paramedics to stay seated restrained throughout transport. If the paramedics spend a little more time on-scene, they complete majority of interventions prior to transport. This allows the paramedics to stay seated during transport until arrival at the hospital.

In some cases, this is not always possible, as there are situations that dictate rapid patient transport with most, if not all, interventions done while en route to the hospital. These interventions include patients having a stroke or trauma patients. Paramedics cannot do anything to stabilize these patients; they need to receive definitive professional care immediately.

Full arrests were commonly mentioned to be reasons why paramedics cannot stay seated during transport. An example of interventions to be followed during a cardiac arrest is found in Appendix D. Paramedics cannot sit and perform high-quality chest compressions on a patient in this situation. A change in patient care has recently been implemented that will help to remedy this issue. If an adult patient is in full arrest (not breathing with no pulse), there is nothing that a hospital crew can do that the paramedic cannot, and every time an adult patient is moved,
CPR quality is compromised. Thus, the EMS region that all three departments operate within has implemented high-quality on-scene CPR. Paramedics now stay on-scene with full arrest patients and work them as they lie. If, within a set time period, there is no change in patient condition, the EMS providers call the hospital, and the hospital will give orders to terminate resuscitation. This means that a majority of these patients will no longer be transported.

However, if a patient goes into full-arrest while a crew is already en route to the hospital, mechanical CPR devices can be acquired. For example, Elwood Fire Protection District has one AutoPulse on each ambulance. This device provides high-quality chest compressions on a patient, replacing the need for a paramedic to stand over a patient doing chest compressions during transport. These devices are costly, but not as costly as the life of a paramedic.

Also noteworthy concerning seat belt usage is the fact that it is most likely that two of the three paramedics wore a seat belt as often as they could. Wilmington experienced an ambulance crash where the paramedic was not wearing a seat belt and ended up with a head injury. This tragic event may have motivated them to try to find a way to make the ambulance safer.

Finally, as mentioned frequently during the interviews, culture impedes safety. Indeed, paramedics are creatures of habit. All of the old ambulance designs had a CPR seat. Many paramedics in the surveys indicated they are not open to removing the CPR seat. Even though many indicated they knew that that seat is the most dangerous to them, and most indicated they do not sit in that seat, they still would rather have it, because it is better than no seat if it is needed. However,
surveys indicated, with affirmation from the interviews, that many paramedics did not know that there were no safety regulations for the patient compartment of the ambulance. Many indicated they were open to changes that would make the ambulance safer for them and came up with a large variety of ideas on what could be changed to make the ambulance safer. However, culture must be changed. The easiest way to do this would be to start emphasizing safe practices early on, especially with new paramedics. They will pick the new habits and safer attitudes up quicker than it will take to change attitudes of seasoned paramedics that have been operating this way their whole careers and fortunately have suffered no negative consequences.

Furthermore, more training on ways to be more efficient with patient care and with emphasis on the importance of paramedic safety with a risk/benefit analysis similar to the fire service should be common.

**Conclusion**

EMS providers have one goal: to care for and save their patients’ lives. The attitude that the patient comes first is admirable, and indeed that is the profession. However, a paramedic that is hurt or injured is of no use to the patient. This is taught in both the emergency medical technician – basic and – paramedic classes for all aspects of the job, with the exception of transport. One of the necessary changes that will help keep paramedics safer while performing their inherently dangerous job is to design ambulances with better seating and seat restraint options that allow the paramedics to adequately reach their patients and the supplies they need to treat their patients. Side-facing seats should be
eliminated, as they result in serious injury to the paramedic in a collision. Restraint
systems need to be redesigned to allow paramedics to be restrained while also still
being able to perform the necessary patient care tasks. New patient care protocol
and technological advances, from the new protocol to work full arrest patients on-
scene instead of transporting to mechanical CPR devices and automated blood
pressure cuffs, should be adopted and purchased to make the job safer. Finally, the
focus on the safety of the paramedic should be emphasized, teaching paramedics to
perform as many patient care interventions prior to transport, allowing them to
wear a seat belt during transport.

While a complete culture change emphasizing seat belt usage may not
happen overnight, this study showed some common issues that can be solved
immediately, but most of this will come over time.
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Appendix

A. The Coal City Fire Protection District ambulance.
   A1. The current patient compartment design of the ambulance.
   A2. The CPR seat.
   A3. The new ambulance.
   A5. The new ambulance CPR seat.

B. The Wilmington Fire Protection District ambulance.
   B1. The current patient compartment design of the ambulance.
   B2. The CPR seat.
   B3. The new ambulance.
   B5. The new ambulance CPR seat area.

C. The Elwood Fire Protection District ambulance
   C1. The current patient compartment design of the ambulance.
   C2. The CPR seat.
   C3. The new ambulance.
   C5. The new ambulance CPR seat area.

D. Region 7 ALS SMO code for ventricular fibrillation/pulseless ventricular tachycardia.

E. The observation and interview worksheet and data collected.

F. The survey instrument and data collected.
G. Letter of Consent Form

H. Graduate Capstone Final Transmittal Form

I. Signature Page

J. OPUS Digital Repository Authorization Form
Appendix A. The old Coal City Fire Protection District ambulance.
A1. The current patient compartment design of the ambulance.
A2. The CPR seat.
A3. The new Coal City Fire Protection District ambulance.
A5. The new ambulance CPR seat.
Appendix B. The old Wilmington Fire Protection District Ambulance.
B1. The current patient compartment design of the ambulance.
B2. The CPR seat.
B5. The new ambulance CPR seat area.
Appendix C. The old Elwood Fire Protection District ambulance.
C1. The current patient compartment design of the ambulance.
C2. The CPR seat.
C4. The new patient compartment design of the ambulance.
C5. The new ambulance CPR seat area.
Appendix D. This is an example of a protocol to be followed for a patient in full cardiac arrest. This is significant in that it depicts treatments to be administered to the patient in the back of a moving ambulance.
Appendix E. The observation and interview worksheet.

**Observation Notes**

At which fire protection district is this paramedic employed?

Is this ambulance one of the standard designs or a new design?

Is this a Basic Life Support (BLS) or an Advanced Life Support (ALS) transport?

While the ambulance is moving, which seat is the paramedic sitting in?

Is the paramedic wearing his/her seat belt? Does he/she wear the seatbelt during the entire time of the transport?

Does the paramedic stand up and/or walk around in the back of the ambulance while the ambulance is moving?

If “yes” for the previous question, why did the paramedic stand up or walk around?
Does it appear that the paramedic can adequately reach the patient and the equipment needed to treat the patient?

Other notes or observations?
1. Coal City
   Years as medic: 4.5 yrs   Years in EMS: 6 yrs
   old ambulance 3125
   BLS (suicidal subject with head lacerations)
   Paramedic sat in captain’s chair. Then in CPR seat to talk to patient.
   No seat belt.
   Got up to open/close window. Fan control not working. Moved from
   Captain’s chair to CPR seat to get pt. signature on computer. Got up to hit
   Automatic BP button on monitor.
   Cannot reach pt. or equipment from captain’s chair.
   Sat in captain’s chair to work on computer report.
   Could adequately communicate with patient from captain’s chair.
   Medic sat in CPR seat the rest of the time to work on report.

   New ambulance 3114
   ALS (heroin withdrawals)
   Sat in captain’s chair to call hospital. Sat in CPR seat to talk to pt. and work
   On report.
   No seat belt.
   Medic got up to readjust pt. on cot and hang IV bag.
   Medic could reach monitor from CPR seat. Could do IV bag from captain’s
   Chair. Moved to bench seat to hook IV to pt.
   Medic could adequately see, assess, and communicate with pt. from CPR seat.

INTERVIEW

- sat in CPR seat, because it’s by the monitor, phone, and pt.
  sat in captains chair because it’s more comfortable

- did not wear seat belt because of “laziness”, routine (used to be up moving),
  not able to reach everything in either ambulance.

- will wear seat belt in bad weather, or depending on driver

- calls that make it more difficult to wear seat belt would be where medic
  can’t reach anything and is moving constantly

- no knowledge of ambulance safety standards

- prefers new ambulance (3114); rides nicer, more room, set up better

- suggests changes to include airbags in p. compartment for safety
6. Coal City
   Years as medic: 1 month
   Years in EMS: 3 yrs
   old ambulance 3125
   ALS (chest pain)
   Sat on bench seat near the rear.
   No seat belt.
   Got up to hit auto BP button twice, grab cell phone from action area, remove
   BP cuff, pulse oximeter, monitor leads, and oxygen off of pt. prior to arrival
   At hospital.
   Medic could not reach pt. and equipment needed.
   Medic was able to complete computer report and communicate with and
   Assess pt. from bench seat.
   IV, oxygen, monitor, 12-lead ECG, baby ASA all administered prior to
   Transport.

   New ambulance 3114
   ALS (MVA)
   Sat in CPR seat. Left jump bag on captain’s chair.
   No seat belt. Stayed in CPR seat.
   Medic can reach monitor from CPR seat. Could reach pt. from CPR seat to
   Remove BP cuff, monitor leads, and pulse oximeter prior to arrival at
   Hospital. Could also reach cell phone on action area.
   IV access done en route. All other interventions completed prior to transport
   Medic stayed in CPR seat throughout transport and worked on computer
   Report.

   **NOTE: medic had paramedic student during transport as well. **

INTERVIEW
- sat on bench seat because can monitor pt. best
- did not wear seat belt because “just did not even think about it”
- will wear seat belt in inclement weather, on back roads at night, and when
  pt. is stable so you wouldn’t need to move as much
- calls that make it more difficult to wear seat belt would be full arrests,
  seizures, and critical calls where you are constantly moving and treating pt.
- current knowledge of ambulance safety standards: “seat belts save lives”
- no preference on ambulance. New is bigger. Likes power load cot on new.
  New is “luxury”. “Kind of like it better.”
- suggests changes to include airbags that connect to “things"
  AutoPulse for CPR. “technology frees up manpower”
Trust your driver.
Sitting in CPR seat allows medic to reach equipment, monitor and pt.
without needing to get up.
Moving CPR seat further back, would sit there because can see pt. better.
Do everything prior to transport.
7. Coal City

Years as medic: 6 yrs  
Years in EMS: 11 yrs

old ambulance 3125
ALS (abdominal pain)
Sat in CPR seat.
No seat belt.
Medic got up out of seat to get supplies and the cell phone.
Medic can reach oxygen, monitor, and phone from CPR seat.

New ambulance (3114)
ALS (trauma – chest and left forearm)
Sat in CPR seat.
No seat belt.
Medic got up to take manual BP initially, to care for and reassess pt.
Could not reach pt. and equipment needed to treat pt. from sitting.
Used auto BP after pt. was stabilized.

INTERVIEW
- Medic sat in CPR seat because could reach supplies without having to reach across pt.

- No reason for not wearing seat belt. Bad habit.

- Will wear seat belt during bad weather or if driver not good.

- calls that make it more difficult to wear seat belt include critical pts.
  Must be proactive with pt. care.

- current knowledge of ambulance standards: box dimensions, IDPH requires equipment to be strapped down. (assisted in spec'ing out new ambulance)

- prefers new ambulance (3114). New one is bigger.
  Always sits in CPR seat, so everything is “pretty much” in reach.

- suggests changes that include: better training with new drivers (“teach them to calm down”)
  put pt. in sideways, and medics face forward. Like London
  have supplies by you prior to transport
  put pt. on monitor prior to transport, set auto BP
  FL and TX ambulances have “right/left/brake light indicators” in back of
    Ambulance by clock so medic knows when driver is turning/braking
2. Elwood  
   Years as medic: 4 yrs.  
   Years in EMS: 13 yrs  
   old ambulance (615)  
   ALS (trauma – neck pain)  
   Sat in captain’s chair to work on computer report and administer O2.  
   No seat belt during entire transport. Did wear seat belt while administering  
   Oxygen, working on computer, and taking notes.  
   Got up to do neuro assessment on pt., hit button on monitor to send 12-lead  
   To computer, and unhook pt. while pulling into hospital.  
   Was able to administer oxygen from captain’s chair while seat belted.  
   new ambulance (614)  
   ALS (abdominal pain)  
   Sat in captain’s chair to work on computer report and call hospital.  
   Wears seat belt when in captain’s chair behind pt. No seat belt when in  
   Side/forward facing captain’s chair.  
   Got up to administer oxygen and medication, per medical control, to  
   Disconnect monitor from pt. prior to arrival at hospital. Had pt. sign  
   Computer when backing into ambulance bay.  
   Could not reach pt. and equipment needed. Had to get drug box out of  
   Compartment. Could not reach pt. to administer oxygen from captain’s  
   Chair.  
   From side/front captain’s chair, medic had to stand and reach over pt. to get  
   Tape from compartment.  
   Prior to transport, medic knelt on floor next to pt. to start IV; could not  
   Reach pt. from seat.  

INTERVIEW  
- sat in captain’s chair behind pt. on backboard because all interventions  
  were completed prior to transport. Could see and assess pt., could lean  
  forward with seat belt on and communicate with pt.  
  sat next to pt. to administer drugs.  

- did not wear seat belt because “no seat to sit in” (neck pain) and had to get  
  up to administer medications (abdominal pain)  

- will wear seat belt when pt. is stable, interventions are complete, nothing  
  needed en route, able to reassess pt. adequately, can communicate with pt.,  
  and multiple people are in back
- calls that may make it more difficult to wear seat belt include: critical pt., trauma, full arrest, respiratory, “load and go”, bleeding control (direct pressure). “too many to list”

- knowledge of current ambulance standards include: “Europe is way ahead of us.” Does not know safety standards.

- prefers old design (615). Easier to reach supplies, more versatile, more room. Pt. not in the way. Can have 2 people in back and not worry about getting in each other’s way.

- suggested changes: standard location for sharps container/trash center-loading cot.
  CPR seat for “extreme” calls. (“something is better than nothing”)
  Side curtain air bags
  Different drug security system, size of drug box, secure.
  Culture is an issue. New, younger members more open to change. Start Behavior early.
  Helmets? “Head injuries most common injuries.”

Mentions that “615 is set up for worst-case scenarios; can have 4 people in back. 614 is set up for ideal BLS transport.”
5. Elwood

Years as medic: 9 yrs   Years in EMS: 14 yrs

old ambulance (615)
ALS (MVC – head pain, right shoulder pain)
Sat in captain’s chair.
Did not wear seat belt.
Got up to put oxygen on pt. Moved to captain’s chair to write down info. And call hospital. Got up to switch oxygen over, take monitor leads off. Moved to bench seat for vitals and to reassess.
Could not reach to take a manual BP. Had to also get up to get ice and gauze To dress pt. wounds.
Prior to transport, medic put c-collar on pt., did a head-to-toe assessment and Neuro assessment, monitor, blood sugar, and IV.

new ambulance (614)
ALS (chest pain)
Sat in captain’s chair behind pt.
Did not wear seat belt.
Got up to move to captain’s chair behind pt. to call hospital, captain’s chair Next to pt. to get vitals and for assessment. Took monitor leads off, switch Oxygen over, and have pt. sign computer.
Medic did all manual BPs; could reach pt. to do manual BPs on right arm.
Prior to transport, medic put pt. on oxygen, monitor, gave baby ASA, vitals, 12-lead ECG, IV, obtained blood sugar, and gave nitro.

INTERVIEW
- sat in bench seat or captain’s chair next to pt. to communicate with pt., take vitals, start IV, give medications. Captain’s chair behind pt. to get info., prepare medications, call hospital, and work on report.

- did not wear seat belt because “If I need to move quickly, I need to move quickly and that’s one less thing to worry about.” There are bars to hold on to.

- will wear seat belt when pt. condition is very stable (basic transport), there is severe weather, and when driver is not good

- calls that make it more difficult to wear seat belt include: full arrests, strokes, chest pain, and critical traumas (GSWs, crush, chest injuries)

- current knowledge of ambulance safety standards include: seat belts, air bags, and safety net (614)

- prefers comfort of new (614) – more padding, comfortable prefers layout of old (615) – don’t have to “leap frog” seats; can slide down seat instead of getting up; has more room
- suggested changes include: equipment is secured
  cover (or dome) that goes over chair to hold you in a crash
  better restraints
  better security for pts. In crash

Strict about firefighter safety, but what about EMS? Willing to comply with changes
as long as can still treat pts. Wants to go home.
8. Elwood

Years as medic: 3 yrs
Years in EMS: 14 yrs

old ambulance (615)
ALS (trauma – broken right arm, possible concussion)
Sat in captain’s chair behind pt. to fill out computer report and on bench seat
To assess and talk to pt.
Did not wear seat belt.
Got up to put manual BP cuff on pt., moved to bench seat after calling
Hospital, and to take monitor off pt. prior to arrival at hospital.
Medic had to get up to hit NIBP button on monitor and to get Zofran from
Cabinet and administer to pt.
Prior to transport, medic splinted pt.’s arm, checked pupils, c-collar and
Backboard, monitor, manual vitals, IV, and morphine.
Since pt. was on backboard, medic could communicate with pt. from
Captain’s chair behind pt.’s head.

new ambulance (614)
ALS (possible stroke)
Sat in captain’s chair behind pt. to do computer report and on side
Captain’s chair next to pt. to assess and communicate with pt.
Did not wear seat belt.
Got up to put automatic BP cuff on pt., hit NIBP button on monitor, behind
Pt. to call hospital.
Medic cannot reach pt. and equipment. Also got up to take monitor off pt.
Prior to arrival at hospital.
Prior to transport, medic did vitals, stroke scale, blood sugar, monitor with
Automatic BP cuff, pulse oximeter, and IV.

INTERVIEW
- sat in captain’s chair to call hospital and work on report.
  Sat next to pt. to talk to, assess, and comfort pt., repeat vitals, hit NIBP

- did not wear seat belt because medic “moves too much”. Said pt. care
  may not allow for seat belt.
  May be a “culture thing”, taught and mentored by “seasoned” medics
  Habit, “more concern for pt. care than for yourself”

- will wear seat belt for BLS calls (sit in captain’s chair), when pt. is stable
  prior to transport, inclement weather

- calls that may make it more difficult for medic to wear seat belt include:
  full arrests, any call more advanced than basic ALS hook-up, severe
  deformity to limbs, when you have to adapt and be creative

- medic helped build new ambulance. Knows chassis regulated by NHTSA,
  only couple of ambulance companies have standards on box, no crash/
  rollover ratings, Braun rollover test
- prefers new ambulance because likes sitting in captain’s chair over bench seat. More “user friendly”. Likes that interior layout limits number of people that can be in back. Likes work area at head of pt. counter space more valuable than bench seat. Only drawback is no room on right side of pt. likes redundant controls and cot loading system.

- suggested changes: better area for monitor (not good to reach over pt.) cot could be more centered, people would feel more secure and comfortable in captain’s chair (would move less).
3. Wilmington
   Years as medic: 3 yrs
   Years in EMS: 7 yrs
   old ambulance (2615)
   BLS (non-traumatic back pain)
   Sat in captain's chair to call hospital
   Wore seat belt while typing report and calling hospital from captain's Chair.
   Medic did not get up and walk around during transport.
   Pt. was on backboard, so medic could effectively communicate with pt.
   From captain's chair. No further interventions required.
   Medic says he only sits in CPR seat if doing CPR.

   new ambulance (2614)
   ALS (potential diabetic issue)
   Sat in captain's chair
   Wore seat belt in captain's chair after giving report. Moved to bench seat
   And put seat belt back on.
   Got up to move from captain's chair to bench seat to do computer report
   And reassess pt. got up to hit NIBP on monitor twice. Unhook monitor
   From pt. prior to arrival at hospital
   Medic could not reach pt. and equipment from captain's chair behind pt.

   INTERVIEW
   - sat on captain's chair because was able to see monitor, make eye contact
     with pt., effectively reassess and communicate with pt. on backboard, and
     to access phone.
     Sat on bench seat for pt. contact, to do report, and see monitor

   - not able to wear seat belt when using monitor (could not reach from sitting)

   - will wear seat belt depending on nature of call. Automatic BP set on
     monitor, when equipment is within arms reach

   - calls that make it more difficult to wear seat belt include: full arrest,
     needing to move all the time, pt. needing more hands-on care, traumas,
     critical pediatric calls

   - no knowledge of current ambulance safety standards

   - prefers new ambulance (2614) for height (less likely to hit head), don't
     have to get up to reach redundant controls. Monitor swivels better.
     prefers old ambulance (2615) for CPR seat. Better to have seat than no seat.
     If full arrest, someone can sit in CPR seat.

   - suggested changes: harness system, captain's chairs that turn, reel
     system for oxygen
*** medic was in ambulance crash. Never wore seat belt before. Claims to always try to now. Open to newer, safer designs. ****
4. Wilmington  
   Years as medic: 3  
   Years in EMS: 7  
   old ambulance (2615)  
   ALS (diabetic)  
   Sat in captain’s chair and bench seat.  
   Did not wear a seat belt.  
   Moved from captain’s chair to bench seat to check monitor and call hospital  
     And back to captain’s chair to work on computer report  
     Hit automatic BP button twice, and talk to pt., recheck blood sugar, and  
     Detach monitor leads from pt. prior to arrival at hospital  
   Could not reach pt. and equipment  
   IV, monitor done prior to transport. Medic cannot see monitor from captain’s  
     Chair; monitor does not swivel far enough forward  
   
   new ambulance (2614)  
   ALS (trauma to foot)  
   Sat on bench seat.  
   Did not wear seat belt.  
   Got up to move talk to pt., then back to captain’s chair to call hospital. Back  
     To bench seat to start saline bag for IV, stood up to hang bag. Back to  
     Bench seat to work on report. Unhook pt. from monitor prior to arrival  
     At hospital.  
   From bench seat, medic cannot reach across to monitor.  
   IV, vitals, monitor, and medications given prior to transport.  
   
INTERVIEW  
   - sat in captain’s chair because “safe spot, facing back”, can wear shoulder  
     strap, good to manage airway, can talk to driver, “least area of harm”  
   - sat on bench seat because in old ambulance, cannot see monitor from  
     captain’s chair, can talk to pt., give medications, see monitor  
   
   - not able to wear seat belt because chose not to. “pain in the ass to put  
     on and take off”. Constantly moving to get equipment. Can’t sit and hang  
     bag  
   
   - will wear seat belt if better cabinet set up, better placement of tools, if  
     more interventions are completed on scene (“10-minute window”),  
     depending on pt. condition, protocol time window, cannot do everything  
     on scene for some calls  
   
   - calls that make it more difficult to wear seat belt include: full arrest,  
     trauma, pts. With airway compromise, there’s a lot going on, pt.  
     advocate (too hot/cold)  
   
   - no knowledge of current ambulance safety standards
- prefers new ambulance (2614). Suspension comfortable, better ride. Redundant controls, power load cot, likes that there is no CPR seat, has potential for equipment to be in reach

- suggested changes:
  *** “Risk/benefit analysis in fire service, but not in EMS. Should be!***
  “paramedic awareness of no safety standards”
  - if people knew, they’d try harder to be safe
  - focus on EMS training as much as fire training (more EMS calls)
  - comfort zone; “we’ve always done it like that”; more focused on pt. care than our own safety
  designate rolls on scene so more gets done prior to transport
  move stuff to where it can be reached from seated
  “awesome” getting rid of CPR seat
  - awful design; can’t see anything
  - not even practical in full arrest; wires everywhere, bad spot
  get an AutoPulse; takes away need for someone to stand up

  *** “If you set your medics up for success, then they have a safe and comfortable ride.” ***

9. Wilmington  
Years as medic: 12  
Years in EMS: 16  

old ambulance (2624)  
ALS (MVA – motorcycle crash)  
Does not wear seat belt.  
Got up to access equipment needed for pt. care.  
Cannot reach pt. and equipment from sitting, but grabbed most  
Of anticipated equipment needs prior to transport.  
Supplies placed on bench seat before transport. Did manual vitals from  
Bench seat.  
Prior to transport, completed full-spinal immobilization, splinting of  
Arm and leg. Everything else done en route. Took extra manpower.  

new ambulance (2614)  
ALS (chest pain)  
Sat in bench seat and captain’s chair.  
Did wear seat belt at times, when sitting in captain’s chair.  
Got up to switch oxygen from portable to main and to go to captain’s chair  
To do computer report and call hospital.  
Cannot reach pt. and supplies. Can reach monitor NIBP button from captain’s  
chair. Can talk to and monitor pt. from captain’s chair.  
Stays behind pt. unless pt. needs more care.  
Prior to transport, did IV, monitor, 12-lead ECG, vitals, oxygen, baby ASA,  
Nitro  

INTERVIEW  
- sat on bench seat because there was more space to layout equipment  
pt. care  
sat in captain’s chair most of time because it’s safer (lap belt and chest belt),  
can do report and still talk to pt., can communicate with driver  

- not able to wear seat belt during trauma call because needed to be able to  
mov quickly to access supplies  

- will wear seat belt depending on pt. condition and all necessary  
interventions completed prior to transport.  

- calls that make it more difficult to wear seat belt include: pt. condition  
bad, need to get medications out of drug box (usually on floor)  

- no knowledge of current ambulance standards  

- prefers new ambulance (2614) bigger box (height), but maybe less cabinets  
prefers old ambulance (2615) more cabinets
- suggested changes: air bags to make it a big bubble
  compartment indicator lights (no sound) so equipment doesn’t fall out
during transport
BETTER DRIVERS

Medic notes he does not sit in CPR seat.
Appendix F. The survey instrument.

**Ambulance Patient Compartment Safety Survey**

Please answer all questions about what safety measures the care provider uses to help promote provider safety during transport.

1. Please indicate which fire protection district you work for.
   - Elwood
   - Wilmington
   - Coal City

2. Please indicate how many years of experience you have performing in the capacity of an Emergency Medical Technician – Paramedic.
   - 1-3 years
   - 4-6 years
   - 7-9 years
   - 10 years or more

3. Please circle which age group you belong to.
   - 20-24 years old
   - 25-29 years old
   - 30-34 years old
   - 35-39 years old
   - 40+ years old

4. Please indicate your gender.
   - Male
   - Female
5. Please indicate which design appeals most to you.
6. Please indicate which design you feel is the safest.

A. 

B. 

C. 

D. 

7. Do you wear a seatbelt in the ambulance cab while en route to a call?

YES       NO

8. Do you wear a seatbelt when providing Basic Life Support (BLS) care to a patient during transport to the hospital?

YES       NO
9. Do you wear a seatbelt when providing Advanced Life Support (ALS) care to a patient during transport to the hospital?

   YES          NO

10. Do you wear a seatbelt in the ambulance cab when returning to quarters from the hospital?

    YES          NO

11. Does your fire station have a policy regarding seat belt usage in the ambulance?

    YES          NO

12. If you do not always wear a seat belt during patient transport, is it because you feel that you cannot access your patient?

    YES          NO

13. If you answered yes for question 9, would you wear a seat belt if you could do so while still being able to access your patient?

    YES          NO
14. If you do not always wear a seat belt during patient transport, is it because you feel that you cannot access your supplies?
YES   NO

15. If you answered yes for question 11, would you wear a seat belt if you could do so while still being able to access supplies?
YES   NO

16. When providing patient care during transport to the hospital, which seat are you most likely to sit in?
CAPTAIN'S CHAIR  BENCH SEAT  CPR SEAT

17. Which reason best describes why you sit in the seat you chose in the previous question? (circle all that apply)
EQUIPMENT ACCESS  PATIENT CARE/ACCESS
COMMUNICATION WITH PATIENT  OTHER _______________________

18. Are you aware of any hazards of sitting in the CPR seat that may exist during a frontal collision?
YES   NO
19. Are you aware of any risks of injury or death to yourself if the ambulance should crash while you are caring for a patient?

YES  NO

20. Would you be open to eliminating the CPR seat?

YES  NO

21. Would you be open to replacing the bench seat with 2 captain’s chairs that swivel if you could access your patient/equipment during transport?

YES  NO

22. Are you familiar with current ambulance safety standards?

YES  NO

23. Do you feel that current ambulance safety standards are sufficient?

YES  NO

    UNSURE

Thank you for your participation.
Ambulance Safety Research Survey Data Overview

NOTE: 20 surveys were given to each fire protection district except for Elwood. Elwood only has 18 full-time personnel.

1. Please indicate which fire protection district you work for.

<table>
<thead>
<tr>
<th>District</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

2. Please indicate how many years of experience you have.

<table>
<thead>
<tr>
<th></th>
<th>1-3 years</th>
<th>4-6 years</th>
<th>7-9 years</th>
<th>10+ years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>2 (13%)</td>
<td>5 (33%)</td>
<td>2 (25%)</td>
<td>5 (38%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>6 (40%)</td>
<td>5 (33%)</td>
<td>2 (25%)</td>
<td>4 (31%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>7 (47%)</td>
<td>5 (33%)</td>
<td>4 (50%)</td>
<td>4 (31%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>15 (29%)</td>
<td>15 (29%)</td>
<td>8 (16%)</td>
<td>13 (25%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
3. Please circle which age group you belong to.

<table>
<thead>
<tr>
<th></th>
<th>20-24 years</th>
<th>25-29 years</th>
<th>30-34 years</th>
<th>35-39 years</th>
<th>40+ years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>3 (25%)</td>
<td>2 (14%)</td>
<td>2 (17%)</td>
<td>4 (67%)</td>
<td>3 (43%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>4 (33%)</td>
<td>8 (57%)</td>
<td>3 (25%)</td>
<td>0 (0%)</td>
<td>2 (29%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>5 (42%)</td>
<td>4 (29%)</td>
<td>7 (58%)</td>
<td>2 (33%)</td>
<td>2 (29%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>12 (24%)</td>
<td>14 (27%)</td>
<td>12 (24%)</td>
<td>6 (12%)</td>
<td>7 (14%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

4. Please indicate your gender.

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (30%)</td>
<td>0 (0%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>16 (35%)</td>
<td>1 (25%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>17 (37%)</td>
<td>3 (75%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>47 (92%)</td>
<td>4 (8%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

5. Please indicate which design appeals to you.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>10 (34%)</td>
<td>1 (14%)</td>
<td>1 (11%)</td>
<td>2 (40%)</td>
<td>0 (0%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (17%)</td>
<td>2 (29%)</td>
<td>8 (89%)</td>
<td>2 (40%)</td>
<td>0 (0%)</td>
<td>17 (34%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>14 (48%)</td>
<td>4 (57%)</td>
<td>0 (0%)</td>
<td>1 (20%)</td>
<td>1 (100%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>29 (57%)</td>
<td>7 (14%)</td>
<td>9 (18%)</td>
<td>5 (10%)</td>
<td>1 (1%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
6. Please indicate which design you feel is the safest.

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>7 (35%)</td>
<td>6 (30%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (50%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>2 (10%)</td>
<td>7 (35%)</td>
<td>6 (100%)</td>
<td>2 (67%)</td>
<td>0 (0%)</td>
<td>17 (34%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>11 (55%)</td>
<td>7 (35%)</td>
<td>0 (0%)</td>
<td>1 (33%)</td>
<td>1 (50%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (39%)</td>
<td>20 (39%)</td>
<td>6 (12%)</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

7. Do you wear a seat belt in the ambulance cab while en route to a call?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Elwood</td>
<td>14 (29%)</td>
<td>0 (0%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>17 (35%)</td>
<td>0 (0%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>18 (37%)</td>
<td>2 (100%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>49 (96%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

8. Do you wear a seat belt when providing Basic Life Support (BLS) care to a patient during transport to the hospital?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>13 (42%)</td>
<td>1 (5%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>12 (39%)</td>
<td>5 (25%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>6 (19%)</td>
<td>14 (70%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>31 (61%)</td>
<td>20 (39%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
9. Do you wear a seat belt when providing Advanced Life Support (ALS) care to a patient during transport to the hospital?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>0 (0%)</td>
<td>13 (30%)</td>
<td>1 (50%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>6 (100%)</td>
<td>10 (23%)</td>
<td>1 (50%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>0 (0%)</td>
<td>20 (47%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>6 (12%)</td>
<td>43 (84%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

10. Do you wear a seat belt in the ambulance cab when returning to quarters from the hospital?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (27%)</td>
<td>0 (0%)</td>
<td>14 (27%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>17 (33%)</td>
<td>0 (0%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>20 (39%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>51 (100%)</td>
<td>0 (0%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

11. Does your fire station have a policy regarding seat belt usage in the ambulance?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>12 (29%)</td>
<td>2 (22%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>14 (34%)</td>
<td>2 (22%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>15 (37%)</td>
<td>5 (56%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>41 (80%)</td>
<td>9 (18%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
12. If you do not always wear a seat belt during patient transport, is it because you feel you cannot access your patient?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (30%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>14 (30%)</td>
<td>1 (33%)</td>
<td>2 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>18 (40%)</td>
<td>2 (67%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>46 (90%)</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

13. If you answered yea for question 9, would you wear a seat belt if you could do so while still being able to access your patient?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>10 (34%)</td>
<td>1 (14%)</td>
<td>3 (20%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>10 (34%)</td>
<td>2 (29%)</td>
<td>5 (33%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>9 (31%)</td>
<td>4 (57%)</td>
<td>7 (47%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>29 (57%)</td>
<td>7 (14%)</td>
<td>15 (29%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
14. If you **do not** always wear a seat belt during patient transport, is it because you feel that you cannot access your supplies?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (32%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>13 (30%)</td>
<td>3 (50%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>17 (39%)</td>
<td>3 (50%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>44 (86%)</td>
<td>6 (12%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

15. If you answered yes for question 11, would you wear a seat belt if you could do so while still being able to access supplies?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>Elwood</td>
<td>12 (32%)</td>
<td>1 (14%)</td>
<td>1 (14%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>12 (32%)</td>
<td>2 (29%)</td>
<td>3 (43%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>13 (35%)</td>
<td>4 (57%)</td>
<td>3 (43%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>37 (73%)</td>
<td>7 (14%)</td>
<td>7 (14%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Table 16. When providing patient care during transport to the hospital, which seat are you most likely to sit in?

<table>
<thead>
<tr>
<th></th>
<th>Captain’s Chair</th>
<th>Bench Seat</th>
<th>CPR Seat</th>
<th>Bench/CPR Seat</th>
<th>Capt. Chair/Bench Seat</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>0 (0%)</td>
<td>12 (38%)</td>
<td>0 (0%)</td>
<td>2 (67%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (71%)</td>
<td>11 (26%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>2 (29%)</td>
<td>9 (28%)</td>
<td>8 (100%)</td>
<td>1 (33%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>7 (14%)</td>
<td>32 (63%)</td>
<td>8 (16%)</td>
<td>3 (6%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
Table 17. Which reason best describes why you sit in the seat you chose in the previous question?

<table>
<thead>
<tr>
<th></th>
<th>Equipment Access</th>
<th>Patient Care/Access</th>
<th>Communication with Patient</th>
<th>All 3</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>0 (0%)</td>
<td>4 (40%)</td>
<td>1 (25%)</td>
<td>6 (32%)</td>
<td>3 (20%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>3 (100%)</td>
<td>2 (20%)</td>
<td>0 (0%)</td>
<td>4 (21%)</td>
<td>8 (53%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>0 (0%)</td>
<td>4 (40%)</td>
<td>3 (75%)</td>
<td>9 (47%)</td>
<td>4 (27%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>3 (6%)</td>
<td>10 (20%)</td>
<td>4 (8%)</td>
<td>19 (37%)</td>
<td>15 (29%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

18. Are you aware of any hazards of sitting in the CPR seat that may exist during a frontal collision?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>11 (29%)</td>
<td>3 (25%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>12 (32%)</td>
<td>4 (33%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>15 (39%)</td>
<td>5 (42%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>38 (75%)</td>
<td>12 (24%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

19. Are you aware of any risks of injury or death to yourself if the ambulance should crash while you are caring for a patient?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>14 (29%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>15 (31%)</td>
<td>1 (100%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>20 (41%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>49 (96%)</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
Table 20. Would you be open to eliminating the CPR seat?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>6 (30%)</td>
<td>8 (27%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>9 (45%)</td>
<td>7 (23%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>5 (25%)</td>
<td>15 (50%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (39%)</td>
<td>30 (59%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Table 21. Would you be open to replacing the bench seat with 2 captain's chairs that swivel if you could access your patient/equipment during transport?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>10 (36%)</td>
<td>4 (20%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>8 (29%)</td>
<td>7 (35%)</td>
<td>2 (67%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>10 (36%)</td>
<td>9 (45%)</td>
<td>1 (33%)</td>
<td>20 (20%)</td>
</tr>
<tr>
<td>Total</td>
<td>28 (55%)</td>
<td>20 (39%)</td>
<td>3 (6%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Table 22. Are you familiar with current ambulance safety standards?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elwood</td>
<td>8 (30%)</td>
<td>6 (26%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (19%)</td>
<td>11 (48%)</td>
<td>1 (100%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>14 (52%)</td>
<td>6 (26%)</td>
<td>0 (0%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>27 (53%)</td>
<td>23 (45%)</td>
<td>1 (2%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>
Table 23. Do you feel that current ambulance safety standards are sufficient?

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Unsure</th>
<th>No Answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
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<td>3 (27%)</td>
<td>10 (42%)</td>
<td>0 (0%)</td>
<td>14 (28%)</td>
</tr>
<tr>
<td>Wilmington</td>
<td>5 (36%)</td>
<td>3 (27%)</td>
<td>8 (33%)</td>
<td>1 (50%)</td>
<td>17 (33%)</td>
</tr>
<tr>
<td>Coal City</td>
<td>8 (57%)</td>
<td>5 (45%)</td>
<td>6 (25%)</td>
<td>1 (50%)</td>
<td>20 (39%)</td>
</tr>
<tr>
<td>Total</td>
<td>14 (28%)</td>
<td>11 (20%)</td>
<td>24 (47%)</td>
<td>2 (4%)</td>
<td>51 (100%)</td>
</tr>
</tbody>
</table>

Thank you for your participation.
Appendix G. Letter of Consent.

Consent

GOVERNORS STATE UNIVERSITY
CONSENT FORM FOR RESEARCH PARTICIPATION

Study Title: Making an Inherently Dangerous Profession a Little Safer: New Ambulance Designs
Principal Investigator: Amanda George

Co-Investigators/Community Members:

I am a student in the Masters of Public Administration program at Governors State University, University Park, IL. I am inviting you to take part in this research that is studying whether the new designs of ambulances are creating safer working environments for paramedics. This form has important information about the reason for this study, what we will ask you to do if you decide to be in this study, and the way we would like to use the information about you if you choose to be in the study.

Why are you doing this study?

You are being asked to participate in a research study about your behavior in the patient compartment of the ambulance during emergency transports. The data collected (by survey, observation, and interview) intends to find which new safety features are approved by the paramedic, that is, which features the paramedic will use to allow him/her to effectively perform job duties as well as better protecting the paramedic in the case of a collision.

What will I do if I choose to be in this study?

If you volunteer to be in the study, you may be asked to fill out a survey and/or to allow the researcher to observe you during an emergency transport. If you participate in the observation portion, you may be asked to participate in a follow-up interview after returning to the fire station from the emergency call. At no time will this study compromise your ability to treat your patients nor will it negatively affect your employment.

Study time and location:

The survey should take no more than 10 minutes for the paramedic participant to complete and can be completed wherever the participant feels comfortable. For the observation, the duration will equal the total run time for the emergency call for the agency at which the participant is employed, and any follow-up interview from the observation is not anticipated to last any longer than 20 minutes and will be conducted at the fire station in a secure and private location.
What are the possible risks or discomforts?

To the best of our knowledge, participation in this study will not expose you to any risks other than those posed to you normally from the profession.

If you feel uncomfortable at any time during the survey, you may either skip the question or stop the survey at any time.

If you feel uncomfortable at any time during the observation, the observation will be stopped. Furthermore, during the follow-up interview, if at any time you are uncomfortable answering a question, the question can be skipped or the interview can be terminated.

What are the possible benefits for me or others?

Few studies exist on ambulance safety, and there are virtually no safety standards for ambulances in the United States. This research would study new safety features that local fire protection districts have implemented for what the paramedic perceives as making the environment safer as well as also allowing the paramedic to effectively treat his/her patients.

You may be impacted in this study in that you might see agreeable new safety features more frequently at your place(s) of employment. The intention is to create a safer working environment for you in the instance of an ambulance crash.

How will you protect the information you collect about me, and how will that information be shared?

All information collected will be confidential. At no time will any results or responses be released with any identifying information. However, results of this study may be used in publications and presentations at academic conferences, public meetings, etc. If the results of the study are published and/or presented, your name or other personally identifiable information will not be used unless you give explicit permission for this as outlined below.

Data will be destroyed one year after the research is completed.

Financial Information

Participation in this study will involve no cost to you nor will you be paid for participating in this study.

What are my rights as a research participant?

Participation in this study is voluntary. If at any time and for any reason, you would prefer not to participate in this study, please feel free not to. If at any time you would like to stop participating, please tell me. We can take a break, stop and continue at a later date, or stop altogether. You may withdraw from this study at any time, and you will not be penalized in any way for deciding to stop participation.
If you decide to withdraw from this study, the researchers will ask you if the information already collected from you can be used.

**What if I am a Governors State University student?**

You may choose not to participate or to stop your participation in this research at any time. This will not affect your class standing or grades at Governors State University.

**What if I am a Governors State University employee?**

Your participation in this research is in no way a part of your university duties, and your refusal to participate will not in any way affects your employment with the university, or the benefits, privileges, or opportunities associated with your employment at Governors State University.

**Who can I contact if I have questions or concerns about this research study?**

If you have any questions about your rights as a participant in this research, you can contact me at the following address:

Amanda George  
Student, Masters of Public Administration Program  
Phone: [Redacted]

Dr. Dwight Vick  
Assistant Professor of Public Administration  
College of Business and Public Administration  
Phone: [Redacted]

You may also contact one of the two Institutional Review Board chairpersons who approve all GSU research projects, Dr. David Rhea and Dr. David Schuit. You may reach Dr. Rhea by e-mail [Redacted]. You may also call the GSU Main Office at [Redacted] and ask to be transferred to their specific offices.
**Consent**
I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form after I sign it.

Participant’s Name (printed)

Participant’s Signature  Date

Name of Person Obtaining Consent  Date