


January 2015

Prehospital Emergency Medical Services Treatment Protocols: Aligning With National Best Practices

Zachary Ryan Charest
Eastern Kentucky University

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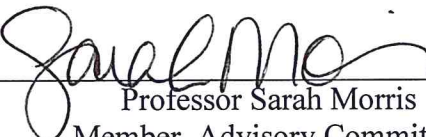
By

Zachary R. Charest


Thesis Approved:




Dr. Sandy Hunter
Chair, Advisory Committee



Professor Sarah Morris
Member, Advisory Committee



Professor Nancye Davis
Member, Advisory Committee



Dr. Jerry J. Pogatshnik
Dean, Graduate School

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Prehospital Emergency Medical Services Treatment Protocols

Aligning With National Best Practices

By

Zachary R. Charest

Bachelor of Science
Eastern Kentucky University
Richmond, Kentucky
2012

Submitted to the Faculty of the Graduate School of
Eastern Kentucky University
in partial fulfillment of the requirements
for the degree of
MASTER OF SCIENCE
August, 2015

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Dedication

For my parents, Don Charest and Diane Gillespie. Both of whom have supported and helped me grow as a person and professional.

For my professors, for your knowledge, support and wisdom, that impacts not only on me, but those whom I serve on a daily basis.

For my friends, who have always been around for a laugh, stress relief, a shoulder to lean on and making the college experience rich with fond memories.

Lastly, for my patients, from whom I have learned about life and medicine. May this research help anyone who requires the helping hand of EMS in their life.

Acknowledgments

I would like to express my deepest gratitude to my thesis committee: Chair- Dr. Sandy Hunter, member - Professor Nancy Davis, member - Professor Sarah Morris. Not only have you guided me through the thesis process, each one of you have taught me so much in and out of class on how to be a Paramedic, student, professional and person. The journey we shared in my education is one that I will benefit from and cherish for my life. I am extremely privileged to have both studied from and subsequently alongside such fine scholars and people.

Chuck O'Neil, Darby McDonald and the rest of the Kentucky Board of EMS staff. Your assistance with my data collection was instrumental in the completion of this thesis. You opened your doors with extreme hospitality and made me feel at home, making data collection, which can be quite arduous, a very enjoyable experience.

To all my colleagues, coworkers, and classmates. Your positive attitudes, mentorship, thirst for knowledge, passion and pride for this profession constantly inspired me to advance my knowledge and abilities in this great profession.

Abstract

Many variances in prehospital Paramedic treatment protocols exist amongst Emergency Medical Service (EMS) Providers in the State of Kentucky. These differences lead to inconsistencies in quality of patient care delivered, reduce ease of mobility of providers and result in a decreased oversight from the Kentucky Board of EMS (KBEMS). To investigate the impact of protocol variances on patient care, a mixed methods study consisting of a convenience sample of Kentucky EMS prehospital Paramedic treatment protocols was collected and compared to the Kentucky state-wide treatment protocols. A literature review of best practices regarding EMS protocols was conducted. Of all protocols 81.9% average compliance was achieved to the state standard; of the custom protocols (e.g. Stanford and Rural Metro EMS) only 41.9% average compliance was achieved. Lapses in compliance result in deviation from both KBEMS and national standards of patient care. The markedly low compliance to state standards demonstrates the need for a mandated state-wide treatment protocol. When compared to national standards such as the American Heart Association, the Kentucky protocol was consistent in content, with opportunity for improvement in design and minor adjustments available to satisfy both national standards and local needs. An interview panel of Kentucky Paramedics supports these conclusions and suggests that the lack of a mandated protocol had clinically significant impacts on patient outcomes. With mandated adoption of a renovated statewide prehospital Paramedic treatment protocol, KBEMS would be able to ensure the highest quality of patient care throughout Kentucky while simultaneously supporting the national EMS vision and needs of local EMS providers.

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Chapter 1: Introduction

The United States of America has many things to offer its citizens: domestic security, world-leading industries, inalienable rights and freedoms, along with both cultural and geographical diversity. Unfortunately, in some cases that same diversity that we hold with reverence produces some unique challenges. A very common area of dissonance arises between governance and geo-cultural diversity. The quality of response you receive on the worst day of your life, when you call 911, may be dictated by the area of the country or area of the state, and in some cases what area of town, you live in. That safety net of 911 is always available to Americans, and no matter the reason for the call, with a simple press of those three numbers any problems are expected to be resolved within minutes. However, the quality of care you will receive in a medical emergency is dependent on the prehospital treatment protocols utilized by your local ambulance service. In order to practice medicine, a person must be a licensed practitioner, such as a physician. In order for other health care providers such as Physician Assistants, Emergency Medical Technicians (EMTs) and Paramedics to render care, they have to do so under a physician's orders. These orders can be the traditional oral orders, where a physician instructs other providers what to do directly. These orders can also be written, as when a family doctor would write a prescription order to a pharmacist to fill a medication for a patient. In the realm of Emergency Medical Services (EMS), EMTs and

Paramedics provide care according to a written document of standing orders called a treatment protocol. EMS treatment protocols are written by a physician specifically referred to as a medical director for that EMS system. These orders describe what the EMS provider should do given a certain patient presentation. Shockingly, in some areas if you were to fall and severely break an ankle, Paramedics may not be allowed to administer pain medications to ease your pain and suffering. This is because the EMS provider's medical director has a view on pain management that is not aligned with national standards of care. Some other areas might have a treatment protocol that does not have all the medications available for providers to help someone who is having difficulty breathing while gasping for air. Kentucky is a state where such problems with inconsistent patient treatment protocols exists. While many Emergency Medical Service systems are working to improve deficits in treatment protocols, lack of oversight and accountability still result in gaps in quality patient care. This problem is not specific to Kentucky; many other areas of the country, such as California, are plagued with a lack of consistency in patient care (Connell, 2007). Many other states have several protocols specific to smaller geographic areas instead of a single statewide protocol (Paramedic Protocol Provider, 2015). Fortunately, this flaw has received attention on a national level. Many issues such as standardization of EMS educational standards and scope of practice for health care providers are already widely being corrected. However, the issue of consistent evidence-based prehospital treatment protocols has only recently been

addressed. The EMS profession is moving to a model of protocols that are both evidence-based and provide a minimum standard of care for all Paramedics and EMTs to administer to their patients (NASEMSO, 2014). Kentucky has an excellent opportunity to align with this emerging trend while improving EMS across the entire state. In order to provide quality and effective prehospital patient care while maximizing the efficiency of Kentucky's Emergency Medical Care system, a statewide prehospital patient treatment protocol that is aligned with current national best practices, the National Highway Traffic Safety Administration Emergency Medical Service (EMS) Scope of Practice Model and that fulfills the needs of Kentucky EMS systems should be developed and mandated as a minimal care standard for all Kentucky EMS systems. This would greatly improve the EMS system across Kentucky and help ensure that the best possible prehospital care is available to its citizens.

Chapter 2: Literature Review

Current National Vision for EMS

To address questions about the best way for emergency medical services to provide medical direction for its Paramedics, it is important to achieve a baseline understanding of the EMS profession, its history and current national visions for the profession.

In the nascency of the profession, EMS was the job of the local mortician who responded to emergencies like car accidents in a hearse and provided transport of patients to the hospital. Later in the 1970s EMS started to develop as a profession as a result of major sources of federal funding from the Department of Transportation. This funding was the result of a white paper that exposed the high mortality rates on American highways due to trauma. This document lead to large improvements in EMS and formal organization such as the certification standard of Emergency Medical Technicians (EMTs). An abrupt halt of federal funding and organizing in the 1980s gridlocked progression of EMS on a national level (Committee on the Future of Emergency Care in the United States Health System, 2007).

Issues such as disparity in pay, as well as a complete schism in rules, regulations and operations across state, county and municipal lines, still plague EMS in the United

States, due in large part to the relative nascency of the field. The profession of civilian EMS has only existed since the 1970s. Prior to the '70s prehospital treatment was only utilized in part during war times in the form of Army field medics. EMS developed sporadically across the United States with little regulation beyond what was required to become certified as an EMT. Diversity in EMS systems across the nation result in several unique complexities and inconsistencies. Some EMS services are paid, volunteer or combination agencies, while some are organized as fire-service based, contract, private, municipal, tribal, clinical or air transport services. Experts forecast a shortage of EMTs and Paramedics secondary to a budget crisis in several cities and areas that are forced to cut EMS funding. The fragmentation of regulations and pay across the EMS profession set the stage for many different issues that could arise from a lack of cohesion or universal management (Stateline, 2013). Other issues facing the EMS profession include: issues with interoperability, duplication of resources, federal, state and local level policy discrepancies, lack of disaster preparedness, profession-wide identity confusion, lack of evidence-based data and research, and most pertinent to this paper research, a lack of national quality of care measures (Committee on the Future of Emergency Care in the United States Health System, 2007). A national committee based under the Institute of Medicine was formed to investigate the future of emergency care in the United States health care system; this committee recommends having standardized protocols in regards to triage, treatment and transport to appropriate facilities, consistency in credentials of

medical directors, standardization of education for EMS providers as well as a standardized scope of practice for care providers and national certifications. It has been eight years since the committee made the recommendation for national standardization of medical protocols on a national level, yet protocol consistency has yet to be accomplished even on a state level (Committee on the Future of Emergency Care in the United States Health System, 2007).

One of the major issues challenging the EMS profession is a lack of consistent certification levels for EMS providers. The National EMS Scope of Practice Model is a document that was produced by the National Highway Traffic Safety Administration (NHTSA) that addresses this problem. This document identifies the four levels of prehospital health care providers as Emergency Medical Responder, Emergency Medical Technician, Advanced Emergency Medical Technician and Paramedic. This document is vital in the development of any triage, treatment and transport protocols, as they require alignment with the National EMS Scope of Practice Model. A universal scope of practice provides many benefits to the Emergency Medical Service field including the ability to standardize education standards and reduces identity confusion amongst the public and professionals alike, all while facilitating the lateral movement of EMS professionals across jurisdictions. The National Registry of Emergency Medical Technicians has already begun implementation of the NHTSA's National EMS Scope of Practice model (National Highway Traffic Safety Administration, 2007).

The International Association of Fire Chiefs (IAFC) is a committee of leaders and subject material experts within both the domestic and international fire service. Many fire service providers are also responsible for providing EMS to their communities and are stakeholders for positive changes in the EMS field. The IAFC agrees with the Institute of Medicine's recommendations to develop an evidence-based patient triage, treatment and transport protocol. They add an additional comment that medical directors should be allowed latitude to amend protocols to include new treatments in accordance with an appropriate quality assurance program. The IAFC's support of the recommendations made by the Institute of Medicine, specifically on an evidence-based and standardized patient triage, treatment and transport protocol is a major indication of support for progressive change by fire service leadership. The IAFC also largely supports the remaining recommendations made by the Institute of Medicine, proposing minor alterations in their response (International Association of Fire Chiefs: EMS Section, 2007).

The National Association of State EMS Officials (NASEMSO) was tasked with applying the recommendation from the Institute of Medicine to develop a standardized and evidence-based prehospital triage, treatment and transport protocol for emergency medical services. NASEMSO completed the 2-year project in September 2014 and published the final project in October 2014. NASEMSO states that the document is a guide for state, regional and local EMS systems to develop protocols. They further

comment that the guidelines are not all-inclusive, but instead focus on a basic core of clinical guidelines. The document is a great tool to develop protocols, but in and of itself does not provide a finished product for adoption. The format of the guideline is more textual than reference material. An amended field version would be of great benefit to prehospital health care providers. This guideline was prepared by a committee with members representing both clinical and field medicine and many subject matter experts. The document was open for committee and then subsequent public comments, at the conclusion of which suggestions were included (The National Association of State EMS Officials, 2014).

The National Association of EMS Physicians' (NAEMSP) has developed a plan for implementation of Evidence-Based Guidelines (EBGs) into the national EMS system. NAEMSP aims to identify EMS stakeholders and encourage cooperation of those stakeholders to increase scientific research in the development of EBGs, promote interest in the rest of the medical community in support of EBGs, incorporate EBGs into new EMS educational standards and to implement new EBGs in EMS systems (The National Association of Emergency Medical Service Physicians, 2014).

United States House of Representatives Bill 809: Field EMS Quality, Innovation, and Cost Effectiveness has been introduced to the U.S. House of Representatives and recommended for subcommittee. The bill includes many of the items covered in the recommendations made by the Committee on the Future of Emergency Care in the

United States Health System in their report, Emergency Medical Service: At the Crossroads. Included in the bill is the development and implementation of evidence-based guidelines for the triage, treatment and transport of patients. This bill signifies that the idea of EBGs has moved beyond just recommendations and now has been introduced in the U.S. House of Representatives (Field EMS Quality, Innovation, and Cost Effectiveness Improvements Act, H.R.809, 2013).

The National Association of Emergency Medical Technicians published a position paper stating that no single model of Emergency Medical Services fits all services and that individual EMS providers should reserve the right to conduct Emergency Medical Services in a way that best suits their community's needs. The statement is broad and does not specifically mention patient treatment protocols. Any inference on NAEMT's position regarding a national standard protocol would be just that, an inference. However, it would be safe to infer that NAEMT would also support the IAFC's standpoint that local medical directors should still have the right to implement new protocols with proper quality assurance measures in place to trail new evidence-based guidelines. NAEMT has taken the lead role in support of the EMS field bill which includes provisions for the development and standardization of evidence-based treatment protocols. NAEMT is an organization that provides education and representation of EMTs and Paramedics. They provide classes such as Advanced Medical Life Support (AMLS) and Prehospital Trauma Life Support (PHTLS) while advocating for EMS by

lobbying on Capitol Hill and conducting EMS research (National Association of Emergency Medical Technicians, 2007). The NAEMT support of the Field EMS Quality, Innovation, and Cost Effectiveness Bill is a large backing by a national leader of EMS demonstrating the national support for positive change in the way EMS's manage patient treatment protocols.

One of the challenges facing a statewide or national standard for prehospital treatment protocols is current legal organizations of EMS services. Some states, as is the case in Kentucky, have an organization that manages EMS systems for their jurisdiction, but do not have the legislative authority needed to provide power to the organization. There is concern that giving legal power to an organization to dictate how individual EMS systems operate and, more specifically, how they provide care, will not work. Connecticut currently employs a statewide system in which Emergency Medical Services are legally controlled by a central organization. Like many EMS systems, Connecticut's program came to fruition in response to the 1966 white paper titled *Accidental Death and Disability: The Neglected Disease of Modern Society*. This paper addressed trauma as the number one cause of death for pre-middle-aged Americans. Connecticut responded by becoming one of the first states to form regulatory requirements governing prehospital care. After a subsequent study on trauma conducted by Yale University, the Connecticut Office of Emergency Medical Services (OEMS) was created. This office oversaw all EMS operations within the state and established five distinct EMS regions in order to

manage EMS's and receive federal funding. Connecticut's communications systems including 911 dispatch, Central Emergency Medical Dispatch (which provides field medical control) as well as the requirements for dispatcher certifications are all controlled by the OEMS. OEMS also dictates the levels of health care providers and applicable training requirements for obtaining certifications. Medical direction in Connecticut is accomplished via an EMS provider's local sponsoring hospital. State regulations govern the amount of ambulance coverage a municipality must provide to its citizens as well as the amount of money ambulance services can bill for services provided. An important legal precedent has been set by Connecticut; it is a state that has a regulatory board over the state's entire EMS system and has the ability to ensure quality patient care by making regulations and mandates (Gelder, Frantz & Bogucki, 2005). The current view of national players in EMS is that the configuration of the profession is too fragmented and in need of drastic reorganization. Previous recommendations have been made and acted upon by documents such as the field improvement bill and the National Scope of Practice Model. Consistent, evidence-based guidelines are also an item that the profession is focusing on improving. In order to ensure that consistent, evidence-based guidelines are utilized by EMS systems and to confirm that quality prehospital care is being provided, new legislation must be implemented to allow state and possibly national oversight. This type of organizational system is already in place and effectively governing EMS in states like that of Connecticut.

Current Best Practices

Research of current protocols used by Kentucky EMS providers uncovered several areas of non-compliance when compared to the Kentucky Board of EMS statewide protocol. In order to identify if these deviations from the state recommendations were clinically significant, the following section of the literature review discusses evidence-based data and research specific to individual protocol elements within the Kentucky Statewide Treatment Protocol where deviations with custom protocols were identified. This information confirms whether specific protocols within the statewide set are, or are not, in alignment with current national evidence-based standards. This confirmation process of the statewide protocols identifies that services that are not in compliance with the state, are also not in compliance with national standards of best practice.

Each section is separated by protocol title in italics, and applicable information found in the review is listed below.

Use of Lights/Sirens

The NHTSA reports that from the years of 1992-2011 the following data was collected about ground ambulance crashes:

Fatalities Ambulance Accidents (n=29)

Emergency mode (use of lights and sirens): 58%

Non-emergency mode (not using lights and sirens): 42%

Injury Ambulance Accidents (n=1,500)

Emergency mode (use of lights and sirens): 59%

Non-emergency mode (not using lights and sirens): 34%

(National Highway Traffic Safety Administration, 2014)

There has been much debate in recent years over the use of emergency lights and sirens both responding to and transporting from emergency medical calls. Some studies, such as one conducted by the National Highway Traffic Safety Administration, show that more injuries happen while transporting with lights and sirens. This study further identifies that it does not account for the proportional time spent in non-emergency mode versus emergency mode. Other research, such as the Hunt et al., (1995) shows that use of lights and sirens only reduces response / transport times by an average of 43.5 seconds. The use of lights and sirens for transport is only recommended for extreme cases (Hunt et al., 1995). All research agrees however, that there should be a policy / standard operating procedure in place for emergency services personnel to make an educated decision on the

use of lights and sirens to facilitate the safe transport of their patient, themselves and the safety of the public around them.

Magnesium Sulfate in treatment of acute bronchospasm

Magnesium sulfate has statistically shown to improve spirometric airway function by 16% but clinical significance is unknown. Given that Magnesium Sulfate has safe IV use, few side effects and is inexpensive, its use in moderate to severe asthma cases is recommended (Alter, Koepsell, & Hilty, 2000). While this study is from 2000, no more current or conflicting information was located during research, thus the source is still considered accurate. Magnesium sulfate should not regularly be used in routine or mild asthma cases, but is both safe and effective in managing severe asthma cases. (Rowe, Bretzlaff, Bourdon, Bota, Camargo, 2000). Both studies conclude that there are no adverse effects to using Magnesium Sulfate in indicated patients, but should be reserved for mild to severe cases. The treatment of severe bronchorestriction using magnesium sulfate is also included in the National Model EMS Clinical Guidelines (National Association of State EMS Officials, 2014).

Use of Lidocaine in intubation of patients with head injury

No data supports that the administration of lidocaine prior to intubation in patients with a head injury provides any benefit and this practice should be limited to clinical

trials. (Robinson, & Clancy, 2001). This article is dated, but no more current publications were found and this source is considered to be current and accurate. This protocol is not included in the National Model EMS Clinical Guidelines (National Association of State EMS Officials, 2014).

Cyanokits for use in cyanide poisoning

Cyanokits are not being placed on all ambulances because of the high cost and relatively short-term shelf life. There are alternative locations Cyanokits could be stored in lieu of on each ambulance. Alternatives include making them available in Emergency Departments as well as with air medical services (Wiehe, 2014).

Fever treatment using active cooling and Acetaminophen

The use of Acetaminophen (15mg/kg; max dos of 1000mg) or Ibuprofen (10mg/kg; max dose of 800mg) is recommended in the treatment of fever in the National Model EMS Clinical Guidelines (National Association of State EMS Officials, 2014).

The available research provides conflicting data on the treatment of fevers in the prehospital setting. Wollard and Pitt (2003), conducted a literature review of 19 papers related to the topic of prehospital treatment of fever to reduce recurrent febrile seizures and found that neither antipyretic medication nor tepid sponging prevented the recurrence of febrile convulsions and both treatments have an associated risk to the patient and do

not recommend their use in prehospital treatment. There is a lack of literature specifically on Paramedic use in treatment of pyretic patients; however, several sources recommend its use by a child caregiver in the event of a patient having a fever and irritability (Snyder, Kivlehan, & Collopy, 2011). Limited literature was also available for adult fever treatment not of an environmental cause. This protocol requires further research to determine the best choice for prehospital treatment, but current research holds that acetaminophen is both safe and effective for home and in hospital treatments of fevers (Kanabar, 2014).

Morgan Lens / Procainamide drops

The use of the Morgan lens in treating eye infections and burns is advantageous and a critical early intervention in order to improve prognosis (Oppong, 1975). Furthermore, the use of the Morgan lens is well tolerated by patients and recommended as a treatment using lactated ringers (Jones, Schoenleber, & Gillen, 1998). The use of a Morgan lens should be considered in the treatment of chemical burns to the eye according to the National Model EMS Clinical Guidelines (National Association of State EMS Officials, 2014). Also, the use of a Morgan lens allows a health care provider to continue to treat the patient and not have to provide constant attention to the irrigation process and manually opening the eyelid (Ramponi, 2000).

Triage system

An efficient and consistent triage system also allows for the evacuation of the most critical patients by air or ground to the appropriate Level I trauma centers, while allowing local hospitals to absorb the less critical patients, in slightly larger numbers. This prevents either facility from crossing the surge capacity line (Ran et al., 2011). The CDC guidelines for field triage is the system that the National Model EMS Clinical Guidelines recommend (National Association of State EMS Officials, 2014). While there are different triage systems available, it is important that all services utilize a universal system. If a mass casualty incident (MCI) were to occur, the resources of the initial responding EMS agency would be overwhelmed and multiple additional EMS agencies would be required for the treatment and transport of patients. If multiple triage systems, or no triage system, were to be utilized by different responding agencies, the effective and timely transport of patients from the MCI to an appropriate facility would be compromised.

Continuous Positive Airway Pressure (CPAP) Devices

CPAP use by emergency medical service providers in the treatment of respiratory distress improves both heart rate and respiratory rates. The use of CPAP also decreased the length of stay in hospital and intensive care unit admissions. Patients who received CPAP also had improved rates of intubation and subsequent decreased length of stay in

ICU units (Aguilar et al., 2013). CPAP is a national standard of care and should be utilized by all prehospital Paramedic providers when indicated to best improve patient outcome.

Listing of User-Centered Protocols

Below is a list of references that include some progressive models for patient care protocols that are centered on the ability for a user to rapidly and efficiently gain access to applicable information in the field. Several of these below protocols combine pediatric and adult protocols on the same page and delineate treatments with graphics and/or color coding. Protocols with the ease of access philosophy keep most individual protocol lengths to one page to prevent the need to flip back and forth between multiple pages to obtain required information. A general trend is noticed moving away from the conventional text-type document, where there was an abundance of information, especially redundant information. By introducing a new section of ‘general treatment protocol’ many states were able to drastically reduce their protocol length to around 100-150 pages from the previous rough average of 300 pages. Many states also utilize color coding to greatly improve the ease of locating protocols and specific information within the protocol. Opposition of this model generally revolves around the idea that important information is not provided. An alternative model that supports both exhaustive

information on patient treatment and quick reference in the field could include two separate formats. First an abridged quick reference format outlined in this section, as well as an in-depth textual format that can be referenced for both initial teaching and refreshment of knowledge.

The states grouped below appear to use a very similar version of the same protocol with all of the above philosophies of quick reference in practice.

Massachusetts: Emergency medical services pre-hospital statewide treatment protocols.

New Hampshire: State of New Hampshire patient care protocols.

Maine: Prehospital treatment protocols.

Vermont: Vermont statewide emergency medical services protocols.

North Carolina: Standards of medical oversight and data collection.

(Paramedic Protocol Provider, 2015)

Chapter 3: Methods

The objective of this study was to assess whether Emergency Medical Services in the State of Kentucky provide consistent levels of advanced life support care corresponding with those recommended by the Kentucky Board of Emergency Medical Services as well as national standards. The hypothesis was that EMS in KY does not provide consistent levels of care; there are several inconsistencies between separate EMS providers in the state, which was a principal catalyst for this research. A mixed methods approach was used to assess this objective.

A descriptive quantitative analysis was conducted using the Commonwealth of Kentucky Patient Care Protocol as the control for comparison of individual service protocols. The statewide protocol was utilized as a baseline metric because it was developed by KBEMS, the governing body that oversees all EMS systems in Kentucky. As such, this organization worked to develop a protocol that best fit the needs of Kentucky's citizens while ensuring quality patient care aligning with current best practices. Additionally, the current Kentucky statewide protocol was adopted from the state of New Hampshire. This fact lends some external validity ensuring that the information within the protocols is consistent with best medical practices throughout the United States.

Protocols for EMS providers within Kentucky were compared to the statewide protocol. A census of all EMS providers in Kentucky was attempted; however, not all protocols were available. In lieu of a census, a convenience sample of Kentucky EMS provider's protocols were collected at the Kentucky Board of EMS. The sample population was representative of Kentucky EMS providers as a whole, including fire-based EMS systems, third party governmental services, and private companies, as well as services covering small, medium and large populations in proportional quantities. Basic life support and Air Medical services were omitted from the sample because they fall below and above the scope of practice of the target sample of advanced life support ground ambulances, respectively. The Kentucky protocol was separated into categories (administrative, adult medical, adult trauma etc.). Each treatment protocol (e.g. respiratory distress, overdose, head injury, etc.) and specific treatments associated with those protocols were used to evaluate EMS providers. The interfacility transport protocol was omitted because a large number of sampled services did not provide such services.

Each EMS provider protocol was measured against the control of the KY statewide protocol and assigned a yes (Y) or no (N) value for each category. A descriptive analysis was conducted to identify average compliance levels of individual services' complete protocols, as well as individual treatment protocols across all services.

A qualitative analysis was conducted to better understand the implications of individual protocols utilized in different EMS agencies throughout Kentucky. Paramedics

working in central Kentucky were interviewed; the sample consisted of entry-level Paramedics, mid-level supervisors, and executive administrators with an average of 15.4 years of service working in EMS.

This study was approved by the Eastern Kentucky University Institutional Review Board. Descriptive analyses were conducted using Microsoft Excel.

Chapter 4: Results

Service Specific Results

Analysis of the comparison table between the Kentucky statewide protocol and those currently being utilized by Kentucky EMS systems has provided some important information regarding quality and consistency of Kentucky patient care protocols. When compared to the statewide protocol, the sampled services had an average compliance rate of 81.9%. Of the 53 sampled services, 39 utilized the KY statewide protocol in full or with inconsequential alterations (such as not utilizing rapid sequence intubation, or substituting similar medications based on availability). The remaining 15 services that utilized a custom protocol had 44.5% compliance with the KY statewide protocol. One outlier, Rowan County, utilized the North Carolina statewide protocol and achieved 82.1% compliance. Removing the outlier, the remaining 14 services had an average 41.9% compliance rate.

These data identify that when services develop their own custom protocols, there is a major lack of compliance to that of the statewide protocol. The statewide protocol is a consensus standard put forth by the Kentucky Board of EMS as the identified standard of care for the state. This research shows that services that take on producing their own protocols fail to meet the standard of care set forth by the Kentucky Board of EMS. The

failure of custom protocols to provide the standard of care indicates that all EMS systems should be required to adopt the KY statewide protocols. This ensures that patients that call 911 in Kentucky will all be receiving an adequate level of care identified by the Kentucky Board of EMS. This type of legislation has been demonstrated to work effectively in other states such as Connecticut (Gelder, 2005).

Many services have chosen to exclude advanced skills that require additional training. These skills include: rapid sequence intubation, surgical Cricothyrotomy, mechanical ventilators and other skills and medications pertaining to interfacility transports. This indicates that a modular or tiered protocol system would be of benefit. For example, a service can choose to be BLS or ALS, with the addition of the critical care skills and / or interfacility. A modular system would ensure compliance with the state recommendations while confirming all skills are provided by properly credentialed providers.

Protocol Specific Results

Analysis of the individual elements of the statewide protocols when compared to individual elements of the service specific protocols for all sampled EMS providers allows for identifying which current individual statewide protocols should be evaluated for alignment with current best treatment options, protocols that may not be feasible for

Kentucky EMS providers or protocols that need to be reinforced in services that are falling short of current best treatment options. These results are shown in Table 1.

| Table 1. Compliance of service protocols to Kentucky State Wide Treatment Protocol (continued) | | |
|---|---------------------------------|------------|
| Below 75% compliance to the KY statewide per protocol | Average Compliance per protocol | |
| | Compliant | Percentage |
| General / Administration | | |
| Use of Lights / Sirens | 39 | 72.2% |
| Trauma Triage Algorithm | | |
| * American College of Surgeons | 40 | 74.1% |
| Air Medical | | |
| * Safety | 41 | 75.9% |
| Blood borne / Airborne Pathogens | 39 | 72.2% |
| Decontamination | 39 | 72.2% |
| | | |
| Adult Medical Protocols | | |
| | | |
| Asthma / COPD / RAD | | |
| * Levalbuterol (xoponex) | 35 | 64.8% |
| * Mag Sulfate (2 grams in 100ml) IV drip over 10 minutes | 37 | 68.5% |
| Fever | 39 | 72.2% |
| * Cooling, BSI (respiratory protection) | 37 | 68.5% |
| * Temp > 101.5 admin Acetaminophen then ibuprofen if refractory | 37 | 68.5% |
| Poisoning: Overdose | | |
| ** Dystonic Reaction: Diphenhydramine | 40 | 74.1% |
| Poisoning: Cyanide | 30 | 55.6% |
| * Isolated Cyanide: Cyanokit | 28 | 51.9% |
| Poisoning: Nerve Agents and Organophosphates | 39 | 72.2% |
| * Atropine, Pralidoxime | 37 | 68.5% |
| * Diazepam, lorazepam or midazolam | 36 | 66.7% |
| Poisoning: Radiation Injuries | 38 | 70.4% |

| Table 1. Compliance of service protocols to Kentucky State Wide Treatment Protocol (continued) | | |
|---|---------------------------------|------------|
| Below 75% compliance to the KY statewide per protocol | Average Compliance per protocol | |
| | Compliant | Percentage |
| Pediatric Medical Protocols | | |
| Pediatric Assessments | 39 | 72.2% |
| * Consistent with PALS | 40 | 74.1% |
| Apparent Life Threatening Event | 39 | 72.2% |
| * Always transport | 39 | 72.2% |
| Non-Traumatic Abdominal Pain | 40 | 74.1% |
| Poisoning: Overdose | | |
| ** Dystonic Reaction: Diphenhydramine | 40 | 74.1% |
| Poisoning: Activated Charcoal | 38 | 70.4% |
| Poisoning: Cyanide | 31 | 57.4% |
| * Isolated Cyanide: Cyanokit | 30 | 55.6% |
| Poisoning: Nerve Agents and Organophosphates | 36 | 66.7% |
| * Atropine, Pralidoxime | 36 | 66.7% |
| * Diazepam, lorazepam or midazolam | 35 | 64.8% |
| Poisoning: Radiation Injuries | 36 | 66.7% |
| Fever | 38 | 70.4% |
| * Cooling, BSI (respiratory protection) | 37 | 68.5% |
| * Temp > 101.5 admin Acetaminophen then ibuprofen if refractory | 38 | 70.4% |
| Children with Special Health Care Needs | 39 | 72.2% |
| Adult Trauma Protocols | | |
| Head Trauma | | |
| * Consider 1 mg/kg Lidocaine before intubation | 40 | 74.1% |
| * Ventilate to maintain ETCO2 30-35 | 41 | 75.9% |
| Eye and Dental Trauma | | |
| * Proparacaine Drops | 40 | 74.1% |

| Table 1. Compliance of service protocols to Kentucky State Wide Treatment Protocol (continued) | | |
|---|---------------------------------|------------|
| Below 75% compliance to the KY statewide per protocol | Average Compliance per protocol | |
| | Compliant | Percentage |
| * Morgan Lens | 39 | 72.2% |
| | | |
| Pediatric Trauma Protocols | | |
| | | |
| Advanced Spinal Assessment | 39 | 72.2% |
| Head Trauma | | |
| * Consider 1 mg/kg Lidocaine before intubation | 39 | 72.2% |
| * Ventilate to maintain ETCO2 30-35 | 39 | 72.2% |
| Abdominal Trauma | 40 | 74.1% |
| Pelvic Trauma | 40 | 74.1% |
| Eye and Dental Trauma | 40 | 74.1% |
| * Proparacaine Drops | 39 | 72.2% |
| * Morgan Lens | 40 | 74.1% |
| | | |
| Environmental Protocols | | |
| | | |
| Electrical / Lightening Injuries | | |
| * If Rhabdomyolysis is a risk, consider 1 amp Sodium Bicarb | 39 | 72.2% |
| | | |
| Airway and Ventilation Management | 40 | 74.1% |
| | | |
| RSI / DAI | 10 | 18.5% |
| Airway management - Pediatric | 41 | 75.9% |
| Mechanical Ventilation | 22 | 40.7% |
| CPAP/BIPAP Use | 42 | 77.8% |
| Combitube | 36 | 66.7% |
| LMA | 27 | 50.0% |
| Digital Intubation | 36 | 66.7% |
| Melker Percutaneous Cricothyrotomy | 28 | 51.9% |

| Table 1. Compliance of service protocols to Kentucky State Wide Treatment Protocol (continued) | | |
|---|---------------------------------|------------|
| Below 75% compliance to the KY statewide per protocol | Average Compliance per protocol | |
| | Compliant | Percentage |
| Surgical Cricothyrotomy | 12 | 22.2% |
| Tracheostomy Care | 41 | 75.9% |
| Advanced Suctioning | 40 | 74.1% |
| Esophageal Intubation Detector Device | 38 | 70.4% |
| | | |
| Procedure Protocols | | |
| | | |
| Mark I / Duodote Auto injector Administration | 32 | 59.3% |
| Umbilical Vein Cannulation | 38 | 70.4% |
| Vascular Access via Central Catheter | 34 | 63.0% |
| | | |
| Specialized Protocols | 39 | 72.2% |
| | | |
| Strenuous Activity / Firefighter Rehabilitation | 35 | 64.8% |
| STARTBand Emergency Response Tag System | 32 | 59.3% |
| START System of Triage | 33 | 61.1% |
| MCI | 37 | 68.5% |
| * Levels of MCI | 37 | 68.5% |
| * ICS roles for EMS | 37 | 68.5% |
| EMS Plan for responding to Pandemic Influenza | 34 | 63.0% |
| | | |
| Toxmedic Emergency Care Protocols | 27 | 50.0% |

Below are some highlighted deficiencies identified in Table 1, along with discussion on the applicable protocol. Topics that are either considered controversial or had additional information that may be useful in updating the current statewide protocol were expanded upon. The topics below are included in the KBEMS protocol, the

background information is provided in support of the KBEMS protocol. This process removes controversy about an individual protocol by supporting its alignment with national best practices and available medical research. This further demonstrates why a mandated statewide protocol is necessary to ensure proper evidence-based treatment protocols to provide high quality and consistent patient care. Some protocols below provide possible explanation for non-compliance and possible alternatives to suit Kentucky EMS provider needs.

Use of lights and sirens (72.2% compliance)

The National Highway Traffic Safety Administration reported that of all ambulance crashes that occurred between 1999 and 2011, 59% of injuries resulted from accidents where lights and sirens were activated while 34% of accidents resulted from operation without lights and sirens (National Highway Traffic Safety Administration, 2014). Hunt et al. reports that the use of lights and sirens only saves an average of 43.5 seconds compared to non-emergency transport. They further conclude that, "Although the mean difference is statistically significant, it is not clinically significant, except in rare circumstances" (Hunt et al, 1995). Given that there is a high possibility of accidents, injuries and fatalities in regards to the utilization of lights and sirens while responding to and transporting from emergency medical scenes, it is recommended that KBEMS enforce their current protocol utilizing lights and sirens when, "medically necessary for

the patient to be rapidly transported,” and include in a mandated statewide protocol. Many services chose not to adopt this specific protocol into their custom or amended protocols. This is a prime example where KBEMS would be able to ensure quality of care and safety of EMS workers and citizens alike through a mandated state protocol.

Trauma Triage Algorithm - ACS (74.1% compliance)

Several services have left this protocol out (85.2% include it), or are using an algorithm inconsistent with the American College of Surgeons. A universal triage algorithm will allow for better interoperability and will efficiently facilitate transport of trauma patients to the appropriate level center without overloading any one hospital. A map illustrating receiving facilities and capabilities would be of great use to all providers. The Kentucky statewide protocol includes all of this information, but many services chose not to adopt it. This is another example where a mandated statewide protocol would ensure high quality patient care as well as efficient use of available health care facilities.

Magnesium Sulfate for severe Asthma (68.5% compliance)

Rowe and Alter state in their studies that Magnesium Sulfate benefits patients with severe asthma attacks. Both studies go on to state that the benefits, coupled with no noted side effects and minimal cost of the medication warrant its use in severe and

moderate cases, especially those refractory to bronchodilators (Rowe, 2000;Alter, 2000). Many services did not adopt the use of Magnesium Sulfate, dropping below the KBEMS recommended standard of care, which is aligned with this national research.

Fever (72.2% compliance)

There was not any clinical trial or peer reviewed information supporting or refuting the treatment of fevers in the prehospital setting, however in both the pediatric and adult medical protocols, compliance fell below 70%. This may be related to the lack of a perceived need, and/or the additional medication required to be stocked with low frequency of calls and added benefit. It is recommended that KBEMS conduct a review of this protocol to decide if it is still currently aligned with best treatments and feasible for prehospital use by Kentucky EMS systems.

Poisoning / Overdose- Cyanide (55.6% protocol, 51.9% Cyanokit compliance)

The high cost of Cyanokits, ranging from \$600 - \$1,000 and up depending on the manufacturer combined with a short shelf life of 36 months is the likely reason that many services are not utilizing this protocol. Other regions have placed kits on air medical helicopters and have them available in emergency departments as an alternative to having EMS carry the kit. (Wiehe, 2014) It is recommended that KBEMS conduct a review of this protocol to decide if it is feasible for prehospital use by Kentucky EMS providers.

Poisoning / Overdose – Organophosphates (72.2% compliance)

Many services are not carrying auto injectors or do not have a protocol for organophosphate overdoses, likely for the same reasons as cyanide poisonings: lack of perceived application and cost of additional medications. Between the prevalent farming community and presence of the Blue Grass Army Depot, the protocol for atropine and treating subsequent seizures should universally be utilized. A recommendation is to have an option of utilizing the commercial auto injectors or utilizing commonly available medications as a substitute.

ACLS / PALS

There is a consistent lack of charts and formats consistent with American Heart Association (AHA) recommendations amongst Kentucky EMS providers. AHA consistent information and charts are used in the Kentucky statewide protocol, but many services reinvent ways to present this material. The universal use of this consensus standard to certify Paramedics to provide Advanced Cardiac Life Support and Pediatric Advanced Life Support should be reflected in the protocols. Also explicit stress of high quality CPR and what constitutes high quality CPR was lacking in several protocols. Another AHA guideline constantly left out of protocols was the titration of oxygen therapy to maintain O₂ saturation levels of at least 94%. Other AHA recommended information such as thrombolytic checklists and applicable vital sign charts in PALS

sections are also missing from several protocols. Lastly, a specific part of the protocol stating that Paramedics shall provide care according to their current level of ACLS / PALS certification could eliminate a lot of paperwork filing / processing for EMS systems and KBEMS when AHA guidelines are updated.

Head trauma – Administration of Lidocaine prior to intubation (74.1% compliance)

“The authors could find no evidence that in acute traumatic head injury pretreatment with IV lignocaine/lidocaine before a RSI reduces ICP or improves neurological outcome . . . The administration of IV lignocaine/lidocaine as a pretreatment in patients with acute head injury undergoing RSI should only occur in clinical trials.”(Robinson, 2001) It is recommended that KBEMS review this protocol to ensure that it is aligned with current best practices.

CPAP (77.8% compliance)

CPAP is a standard of care in respiratory / cardiac patients, and has drastically improved the prognosis of many patients. These units can now be purchased in single use, disposable units that attach directly to an oxygen regulator already installed in ambulances. It is recommended that KBEMS make alternative cost effective CPAP devices know to services and include CPAP use in a mandated statewide protocol.

The above protocols were selected to illustrate the benefits of having a statewide mandated protocol that would alleviate deviations from standards of care, while also showing the need for an update to evidence-based guidelines. When formulating a statewide protocol it is also important to consider input from local EMS providers and ensuring their needs are met. This would allow for production of a statewide patient treatment protocol that was not only aligned with best practices and based on clinical evidence as recommended by the NAEMSP while satisfying the necessities of local services. This would also reduce resistance to a mandated statewide protocol if the vast majority of services do not have any objections to its content.

In addition to the quantitative data gathered on each service's protocol, some qualitative information was recorded that may be of use while considering the development of the statewide protocols. Services included the information below in their independent protocols, and the evaluation of these protocols for inclusion in the statewide protocol by KBEMS would again provide a protocol aligned with local needs and reduce opposition for a new mandated state protocol.

- No return of spontaneous circulation (ROSC) was noted in the statewide treatment protocols. The American Heart Association recommends ROSC care for all applicable patients.

- Many services have implemented a behavioral emergencies protocol including the use of Haldol or Ketamine as a sedative to prevent a patient from injuring themselves or providers
- Many services have a protocol that describes how to manage a patient who has a Ventricular Assist Device (VAD)
- Several services do not use the state recommended Mass Casualty Incident (MCI) protocol. It is recommended that the state mandate a universal MCI protocol / system so that all agencies have interoperability while responding to a MCI.
- Often times medications fall under a national shortage and lead to services not having any available medications. In addition to a possible program to allow exchange of supplies between services or facilities that have a surplus of medications and those that have depleted their supply, a list of approved substitution medications should be included in the statewide protocol. This would alleviate the need for EMS providers and KBEMS from having to process paperwork for every medication substitution as a protocol amendment.
- Procedural sedation protocols to be used in treating pediatric patients.

- Several services are utilizing the following pieces of equipment that are not currently in the statewide protocol:

- 1) Bougie endotracheal tube introducer
- 2) Impedance Threshold Devices
- 3) Combat Application Tourniquet (CAT)
- 4) Mucosal Atomizer Devices for Intranasal Administration of medications such as Versed, Fentanyl, Narcan and Glucagon.
- 5) Hypertension crisis
- 6) Dispatch response chute times
- 7) Nasogastric / Orogastric tubes

The above information would be of great benefit to take into consideration when developing a revised statewide protocol. The inclusion / exclusion of the above protocols or treatments may have led to services choosing not to adapt the Kentucky statewide protocol. By aligning with the needs of various different EMS provider's needs, the statewide protocol will be much better received by EMS providers across the state.

Interview Results

The interview participant panel was composed of 5 Paramedic providers from the state of Kentucky ranging in years of experience of 2 years to 31 years with an average of 15.4 years of experience. The panel consisted of two females and three males. Titles were: Director, assistant director, training coordinator, shift commander and two Firefighter Paramedics. All participants worked only in Kentucky and three have worked for multiple services in Kentucky. The services that the participants represent were small, medium and large EMS providers, private, municipal, fire-based, flight services and populations served consisting of rural, suburban and urban. Despite the interview panel's size, a significant amount of diverse experience representative of a large portion of the state of Kentucky was present. The interview participants discussed their respective Paramedic protocols and the development / implementation process. All participants described a similar process of a committee comprised of EMS administrators and in some cases base level Paramedics, producing a document either alongside the medical director, or for the medical director's review and approval. Of the participants, two worked for services that utilized the Kentucky Statewide protocol, and three worked for services that utilized a custom protocol. Four of the five participants described deficiencies in the protocols they utilized while working and according to their education, training and applicable national standards, those participants felt that the deficiencies had a negative

impact on patient care and outcome. The participants listed deficiencies including lack of a pain management protocol, lack of ability to give proper breathing treatments to COPD / Asthma patients, lack of procedural sedation especially in pediatric patients, as well as a failure to align with new evidence (e.g. selective spinal immobilization). General areas for improvement on patient care protocols from participants include: mobile phone app support, evidence-based protocols, a more user-friendly format and a more thorough review / update process. Four of the five participants identified difficulties for themselves or observed other employees having difficulty working for multiple services with different protocols. Only one participant felt there was a minor impact on patient outcome, but not clinically significant. All participants agreed that this frustration was mostly limited to the provider and made their job more difficult, but did not negatively impact patient outcome. The participants were unanimous in their opinions that a mandated statewide protocol as a minimum standard for all ALS providers in the state of Kentucky would have a positive impact on patient outcome by ensuring a standard of care is met across all agencies. The participants also agreed that the mandated protocol requires EMS services to provide a baseline of treatments to be considered ALS but should have the ability to go above and beyond the protocol to try new treatments, or provide advanced skills necessary for their service district. The participants also identified a possible issue of compliance for services that have less funding for equipment and supplies but also stated that all services should have to meet the standard

or not provide ALS. A possible solution provided by the participants was that a state fund could be established to help grant funds to agencies that require assistance in obtaining new equipment or supplies to meet a new standard of care. Overall the participants felt that a mandated standard of care protocol for all Kentucky EMS providers would be of benefit to the state and have a positive impact on patient outcome.

Discussion of Results

As demonstrated above in Table 1, there is a substantial difference in what the Kentucky Board of EMS has put forth as the standard of prehospital treatment and transport of patients and what EMS providers in Kentucky are providing to their citizens. This is especially true when an EMS provider develops and uses a custom treatment protocol. The non-compliance areas span several different areas of frequency and impact when considering quality of patient care. This is illustrated in table 2 to depict the frequency that EMS providing services are exposed to one of the protocols above that were found to be out of compliance and the associated impact if an incident arose from non-compliance with the state standard. Table 2 is a simple demonstration that some protocols have greater potential for impacting patient care or the safety of personnel / patients based on frequency or impact.

Table 2. Frequency v Impact

| | | Impact | | |
|-----------|--------|------------------------|----------------------------|-----------------------|
| | | Low | Medium | High |
| Frequency | Low | Fever | Poisoning / Overdose | MCI / Triage |
| | Medium | Mag Sulfate for Asthma | Advanced Spinal Assessment | ACLS / PALS |
| | High | Blood Borne Pathogens | CPAP Use | Lights and Sirens Use |

The key issue identified by this research is a lack of conformity with the Kentucky Board of EMS’ standard of patient care. This translates in a lack of consistent and quality patient care as seen in both tables 1 and 2. Some of these differences could have severe consequences, especially if they have a high frequency in exposure such as responding / transporting utilizing lights and sirens. It is important to utilize tools such as a frequency v impact matrix when developing a standardized protocol so that proper emphasis can be placed on protocols identified as high risk for safety and quality patient care issues.

The lack of Kentucky EMS providers to deliver consistent patient care treatments aligned with the KBEMS statewide protocol demonstrates a lack of oversight in the patient care provided to Kentucky citizens. While the KBEMS has the regulatory ability to approve protocols and recommend alterations, they cannot dictate what an EMS system delivers to its constituents. This lack of mandated oversight has resulted in the inconsistencies in patient care delivered. This current model also results in a lack of efficiency while managing Kentucky EMS providers. If KBEMS was able to produce and

mandate one document of patient treatment protocols, they would be able to eliminate the arduous task of reviewing, approving, storing and updating an individual treatment protocol for each EMS provider in Kentucky. Additionally, whenever there is a national change in care such as an ACLS update, this entire process must be repeated for every agency. Current data shows that there are currently 335 separate licensed EMS providers in the state of Kentucky. Valuable resources are exhausted in the individual protocol process that could be alternatively utilized in many other areas of KBEMS such as training, education, continued development of evidence-based guidelines, national advocacy of EMS, ambulance inspections, development of a community based EMS system, as well as several other important areas that KBEMS manages.

An additional benefit of a mandated statewide protocol would be mobility amongst service providers both within Kentucky as well as nationally. A single protocol would allow Kentucky providers to work for multiple EMS providers, or transfer from one to another, with ease while reducing protocol confusion related errors. On a national level, if the Kentucky protocol is aligned with other states, this makes the process of transferring to a Kentucky EMS provider easier on the individual. Step one of this process was aligning with the national scope of practice model, step two of providing a uniform patient treatment protocol would drastically improve national mobility of prehospital health care providers. This would also reduce a hurdle for EMS providers that

are trying to recruit new and experienced providers from out of state, or providers that obtained their education in Kentucky but are from out of state.

Research Limitations

The records for EMS provider treatment protocols at the Kentucky Board of EMS were incomplete at the time of data collection. The Kentucky Board of EMS is in the beginning stages of moving to an electronic record keeping system and expects to have all protocols for every service available within by 2017. However, the hard copy protocols were largely fragmented and several services' protocols were missing from the files or the protocols on file were outdated. As a result, the convenience sample was comprised of all complete and up to date protocols available at the Kentucky Board of EMS and a limited amount that were available online or in electronic format; except those excluded as noted above (n=?). Despite this limitation, the sample is still representative of Kentucky EMS providers. A list of providers that utilize the statewide protocol (or an amended version) versus custom protocols would be extremely useful to provide a more complete demographic summary for this research, but no such list existed.

Chapter 5: Recommendations

Based on the above research of the literature review and the quantitative data from the review of Kentucky EMS treatment protocols, the following recommendations are made. First, the development of a new Kentucky Statewide Patient Treatment Protocol In order to provide the highest quality of patient care to Kentucky's citizens while simultaneously bolstering support by Kentucky EMS providers for a state mandated protocol, the Kentucky Board of EMS should review information in section 2 of the results section and section 2 of the literature review. This provides information on what Kentucky EMS providers are currently using and not using in their protocols, as well as research on alignment with current national best practices for evidence-based guidelines. The protocols should also be available in a user-centered format as outlined in section 3 of the literature review. This type of protocol allows for rapid and efficient access to information pertinent to patient care. This model also reduces redundant and obvious information. By not including basic and obvious information such as, 'place patient on cardiac monitor and obtain vital signs,' on each page of the protocol, not only will immense amount of trees be spared, the process for confirming a medication dose prior to administration is much less cumbersome. A large portion of these ideas are available in the current statewide format and should be included in future formats. If the board feels that the teaching information provided in many conventional protocol formats

such as the current evidence-based guideline model produced by the National Association of EMS Physicians is information that should be included, then perhaps it could be provided in a supplemental expanded information protocol. This would still allow quick access to information in the field, while allowing a separate document for refreshment on certain topics as needed. This research combined with the Kentucky Board of EMS' existing protocol review process and information from current EMS providers will produce the best possible treatment protocol to utilize throughout the state. A quality comprehensive protocol that fulfills the needs of individual agencies will minimize any opposition of a mandated state-wide treatment protocol. Second, support a change of Statute requiring the use of the Kentucky Statewide Patient Treatment Protocol as a minimum standard by all Emergency Medical Service providers. One of the most prominent findings in this review of data was that EMS providers that formulated their own protocols largely failed to meet the treatment standard set forth by the Kentucky Board of EMS. This compliance level of 41.9% not only results in possible lapse of high quality patient care and provider safety, but also produces a challenge for care providers working for multiple services. Providers working for multiple services with separate protocols have more information to memorize and have greater exposure to the opportunity of protocol specific treatment errors. By mandating the use of a state approved treatment protocol, many of the issues identified by the *Survey and Research Highlight Disparity in EMS Pay and Rules* article as well as the *EMS: at a Crossroads*

report will be eliminated. Improvements in those mentioned areas would include:

Maximization of quality assurance for all EMS providers in the state, an increase in health care provider portability while reducing subsequent protocol-confusion related errors, all while allowing the Kentucky Board of EMS to have efficient and effective control over the care provided to its constituents. Labeling the new protocol as a minimum standard would still allow medical directors the freedom to explore new treatment options within their EMS systems. A provision under the Kentucky Board of EMS should provide oversight for such programs to ensure proper patient care and simultaneously support research, development and implantation of new patient care standards. While such legislation is new to the state of Kentucky, similar statewide EMS systems have been demonstrated to be effective. Such is the case presented by Gelder, who laws that govern all EMS systems. Future research should evaluate the effectiveness of a mandated statewide protocol and its impact on the quality of prehospital care provided as well as associated impact on patient outcomes. This process should be part of a statewide quality assurance and continued improvement program that constantly evaluates and updates the statewide protocol. Kentucky EMS providers should support these recommendations as well because quality and consistent levels of care will result in better recruiting of employees, ease of transfer of employees to work in their service as well as the potential of meeting future requirements for federal funding if the Field EMS Quality, Innovation, and Cost Effectiveness Bill passes. The Kentucky Board of EMS has

an excellent opportunity to continue their successful operations by becoming both an example of and catalyst for national improvement of the Emergency Medical Services.

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APPENDIX A

Section 1: Demographics

1. Where do you currently work as a Paramedic
2. How many years have you worked with this service / How long have you been a Paramedic
3. Have you held any supervisory or administrative positions, if so what title and for how long
4. Have you previously worked for any EMS services (If so repeat questions 2 and 3)
5. Have you ever worked for multiple services at the same time in Kentucky
6. Have you ever worked outside of the state of Kentucky (If so repeat questions 2 and 3)

Section 2: Protocol Use

The following questions should be repeated for each service a participant has worked for:

1. Did your service utilize the Kentucky statewide protocol or a custom, service specific protocol
2. If yes to Service Specific:
 - a. Please describe your knowledge of how the protocol was implemented and updated.
 - b. According to your education, training and applicable national standards: do you feel that your protocols allowed for complete treatment of your patients
 - c. If there were any deficiencies, what were they
 - d. Do you believe these deficiencies had an impact on patient care / outcome
 - e. In your opinion, are there any areas for improvement of this protocol, or how it was implemented and/or updated
3. If yes to Statewide:
 - a. According to your education, training and applicable national standards: do you feel that the statewide protocol allowed for complete treatment of your patients
 - b. If there were any deficiencies, what were they
 - c. Do you believe these deficiencies had an impact on patient care / outcome
 - d. In your opinion, are there any areas for improvement of this protocol, or how it was implemented and/or updated
4. If Participant indicated that they worked for multiple services in Kentucky
 - a. In working for different services in Kentucky, did your services utilize different protocols

- b. Were there any challenges while working under multiple protocols
- c. Do you believe this could have an impact on patient care / outcome

Section 3: General questions

1. What are your thoughts on requiring a mandatory statewide protocol for all services
 - a. Potential benefits v costs
 - b. Do you believe a universal protocol will impact patient care / outcome
2. What are your thoughts on services utilizing their own protocols
 - a. Potential benefits v costs
 - b. Do you believe a lack of oversight beyond the current model (Local medical director producing protocol for state approval) can have an impact on patient care / outcome.
 - c. Do you believe a universal protocol will impact patient care / outcome

Clarification: “Impact on patient care / outcome” In your opinion, according to your education, training and experience, does the qualifying item (e.g. protocol) have an effect on the treatment of a patient, and would the effect on that treatment translate to a clinically significant change in outcome.