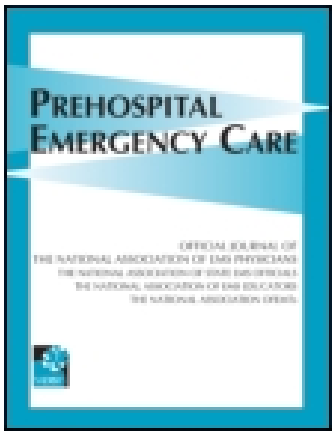

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Douglas F. Kupas MD, Ellen Schenk MPH, J. Matthew Sholl MD & Richard Kamin MD

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Abstract

Objective. We sought to categorize and characterize the utilization of statewide emergency medical services (EMS) protocols as well as state recognition of specialty receiving facilities for trauma and time-sensitive conditions in the United States. **Methods.** A survey of all state EMS offices was conducted to determine which states use mandatory or model statewide EMS protocols and to characterize these protocols based on the process for authorizing such protocols. The survey also inquired as to which states formally recognize specialty receiving facilities for trauma, STEMI, stroke, cardiac arrest, and burn as well as whether or not states have mandatory or model statewide destination protocols for these specialty centers. **Results.** Thirty-eight states were found to have either mandatory or model statewide EMS protocols. Twenty-one states had mandatory statewide EMS protocols at either the basic life support (BLS) or advanced life support (ALS) level, and in 16 of these states, mandatory protocols covered both BLS and ALS levels of care. Seventeen states had model statewide protocols at either the BLS or ALS level, and in 14 of these states, the model protocols covered both BLS and ALS levels of care. Twenty states had separate protocols for the care of pediatric patients, while 18 states combined pediatric and adult care within the same protocols. When identified, the median age used to consider a patient for pediatric care was ≤14 years (range ≤8 to ≤17 years). Three states' protocols used a child's height based on a length-based dosage tool as the threshold for identifying a pediatric patient for care using their pediatric protocols. States varied in recognition of receiving centers for EMS patients with special medical needs: 46 recognized trauma centers, 25 recognized burn centers, 22 recognized stroke centers, 11 recognized centers capable of percutaneous coronary intervention for ST-elevation myocardial infarction, and 3 recognized centers for patients surviving cardiac arrest. **Conclusion.** Statewide mandated EMS treatment protocols exist in 21 states, and optional model protocol guidelines are provided by 17 states. There is wide variation in the format and characteristics of these protocols and the recognition of specialty receiving centers for patients with time-sensitive illnesses. **Key words:** protocols; emergency medical services; prehospital; regionalization; standardization; evidence-based; regulation

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Introduction

In 2009, the National Emergency Medical Services (EMS) Assessment was published, which consisted of a survey of state EMS agencies in order to portray a snapshot of EMS systems across the United States.[1] The Assessment found that for 20 states, the development of statewide EMS protocols falls under the responsibility of the state EMS medical director. Eleven states had protocols developed at the state level that were unchanged by local agencies, 14 states had protocols developed at the state level that served as guidelines for local agencies, and in 23 states the protocols were developed locally with minimal to no state requirements. In regards to facility recognition, the Assessment determined that 39 states had implemented EMS triage and destination plans for trauma; one-third had implemented triage and destination plans for burns, stroke, and STEMI; while 10% had implemented plans for cardiac arrest. However, there is a dearth of knowledge in the peer-reviewed literature regarding the characteristics of these statewide protocols for prehospital emergency care in relation to the level of state mandate as well as state recognition of specialty receiving facilities for trauma and time-sensitive conditions.

To the authors' knowledge, no collective knowledge repository exists describing the current status of statewide EMS protocol implementation or statewide specialty facility recognition across the United States. An understanding of the current frequency of use and characteristics of statewide EMS protocols and specialty center recognition for trauma and time-sensitive conditions across the nation can serve as

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Address correspondence to Douglas F. Kupas, MD, Department of Emergency Medicine, Geisinger Health System, 100 N. Academy Ave., Danville, PA 17822-2005, USA. E-mail: dkupas@geisinger.edu

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supplemental and updated information to the National EMS Assessment in aiding national organizations and federal agencies in supporting state, regional, and local EMS agencies in developing standardized or regionalized models of prehospital emergency care.

In this description, we sought to provide a categorization of the prevalence and characteristics of statewide EMS protocols in the United States and to serve as a reference to statewide protocols that are published on websites. Additionally, we sought to describe which states regionalize EMS care by formally recognizing specialty care facilities for time-sensitive illnesses and which states have protocols that direct patients with time-sensitive conditions to these specialty care facilities.

METHODS

Survey Design

This was a survey of state EMS officials that described the prevalence and characteristics of statewide EMS protocols as well as statewide recognition of specialty receiving centers. The survey questionnaire was developed by several state EMS medical directors with the goal of using a priori definitions to describe each state's approach to the use of protocols, legal authority related to protocols, state recognition of specialty receiving centers, and characteristics of statewide protocols or clinical guidelines when they existed. This study was reviewed and approved for exemption by the Geisinger Health System institutional review board.

Survey Instrument

Data were collected using a structured survey that was reviewed through personal contact with either each state's EMS director or EMS medical director between September 15, 2013 and December 31, 2013. States were recognized for protocols that were in use as of October 1, 2013. When websites were provided for statewide protocols or model protocols guidelines, these were verified to ensure that they matched the reported date of the most recent protocols.

Systems for designating protocols were categorized by type using the following a priori definitions:

- *Mandatory A* – a state has statewide protocols that must be used by all EMS providers within the state
- *Mandatory B* – a state has statewide protocols that must be used by all EMS providers within the state, but there is a process for services to petition the state to alter some of the protocols
- *Mandatory C* – a state has statewide protocols that must be used by all EMS providers within the state, but there is a process for services to petition the state to develop and use their own protocols
- *Model* – a state has model statewide protocols for providers, but each service or region may choose to use these protocols or may develop their own protocols
- *Regional* – a state has regional protocols that must be followed by all services within the region and cover a geographic area that includes multiple services (for example, county or multicounty regions)
- *Local* – a state in which each EMS service or agency develops its own protocols

States were considered to have statewide protocols only if the protocols comprehensively covered the treatments for a range of commonly encountered clinical conditions in both adult and pediatric patients. Certain illnesses or injuries that had to be covered in statewide protocols were not specified, but the definition did not give credit for statewide protocols to a state with only one or two isolated protocols, such as just a statewide trauma triage scheme without medical protocols to cover multisystem trauma and other conditions. The type of protocol for each state was further categorized by basic life support (BLS) for EMTs and first responders and advanced life support (ALS) for paramedics and other advanced-level providers (e.g., prehospital nurses). Protocols for intermediate-level personnel were not considered due to the wide variation in titles and scopes of practice for intermediate providers across states.

Data were also collected on the year of the latest version of the statewide protocols; whether the state had separate statewide protocols for children, including the age cutoff defining pediatric patients; and whether the authority for the statewide protocols was statutory or regulatory. In regards to regionalization, the survey questioned participants as to whether or not the state recognized specialty receiving centers for trauma, STEMI, stroke, cardiac arrest, and burn patients. The survey inquired as to whether or not the state had statewide destination protocols addressing the process for identifying patients requiring care at a trauma, STEMI, stroke, cardiac arrest, and burn specialty centers as well as the process for diverting patients to these facilities. If the state did have statewide destination protocols, the aforementioned definitions for mandatory and model were used to categorize the protocols. Websites to state EMS protocol information were also catalogued (Appendix A, available online).

RESULTS

Data were collected and validated from all 50 states. Twenty-one states had one of the forms of mandatory protocols at either the BLS or ALS levels (9 with either BLS or ALS mandatory A, 7 with mandatory B, and 4

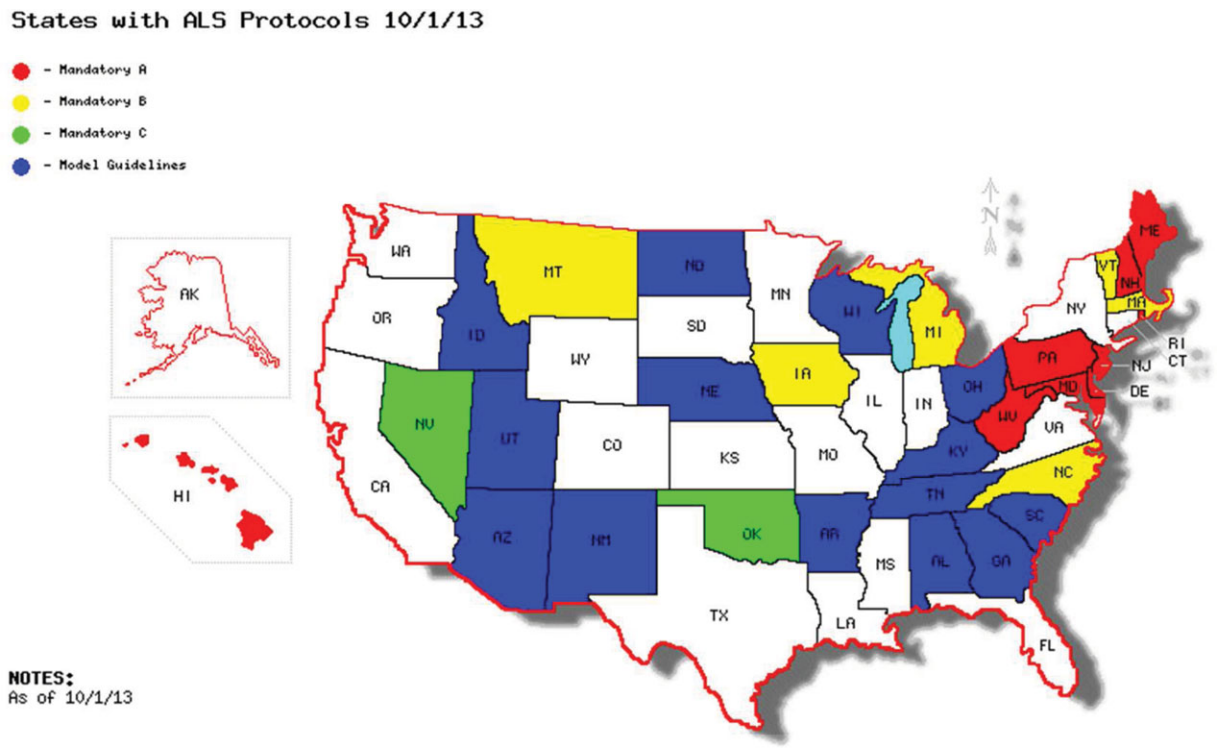

FIGURE 1. States with mandatory or model statewide ALS protocols as of October 1, 2013. Types of protocols used by each state are indicated by colors (see key). For states that are white on the map, no statewide protocols or model guidelines exist.

with mandatory C). Seventeen states had model protocols at the BLS or ALS levels (Figures 1 and 2).

Almost half of states (24/50) reported having legal statutes or regulations that permit the state to develop or require the use of statewide EMS protocols (Table 1). Fifty-three percent (20/38) of states that reported having statewide protocols had separate protocols for pediatric care, while 47% (17/38) of states combined recommendations for pediatric care with those for adult care. The median age distinction used to identify a patient for care using the pediatric protocols was ≤14 years of age, but ranged from ≤8 to ≤17 years, and several states used varying age definitions for pediatric patients with various illnesses or injuries. Three states defined this distinction by using pediatric protocols for any individual shorter in length than a length-based pediatric dosing instrument. The two states that defined a pediatric patient by weight rather than age used thresholds of <36 and <55 kg to identify pediatric patients.

The following were recognized as specialty care receiving facilities: 46 states recognized trauma centers, 25 states recognized burn centers, 22 states recognized stroke centers, 11 states recognized centers capable of PCI/STEMI, and 3 states recognized centers for patients surviving cardiac arrest (Table 2). The majority of states had model or mandatory statewide destination protocols for trauma patients, while most states did not have model or mandatory statewide destination protocols for patients with STEMI, stroke, cardiac arrest, or burns (Table 3).

DISCUSSION

Providing patient care in the out-of-hospital setting presents a number of complexities and disparities. Emergency medical services systems have been described as fragmented, which is believed to have an impact on patient care and health outcomes.[2–9] There has been documentation of wide variations in care provided by EMS. For example, Woolard et al. described applying clinical effectiveness recommendations to 9 ambulance services and found that these organizations varied from 15 to 74% in compliance with providing aspirin to those with suspected acute coronary syndromes.[10] Similarly, wide variations have been described in procedures performed by EMS. Newgard and colleagues compared the types of prehospital airway procedures used among 10 EMS services and found significant variation in the type, rate, and selection of airway procedures among injured children and adults.[11]

Statewide EMS protocols provide an opportunity to standardize and regionalize the care delivered by EMS personnel. The potential benefits of statewide EMS protocols include 1) uniform care that is consistent with the state's provider scope of practice; 2) the ability to update protocols on a regular basis at the same

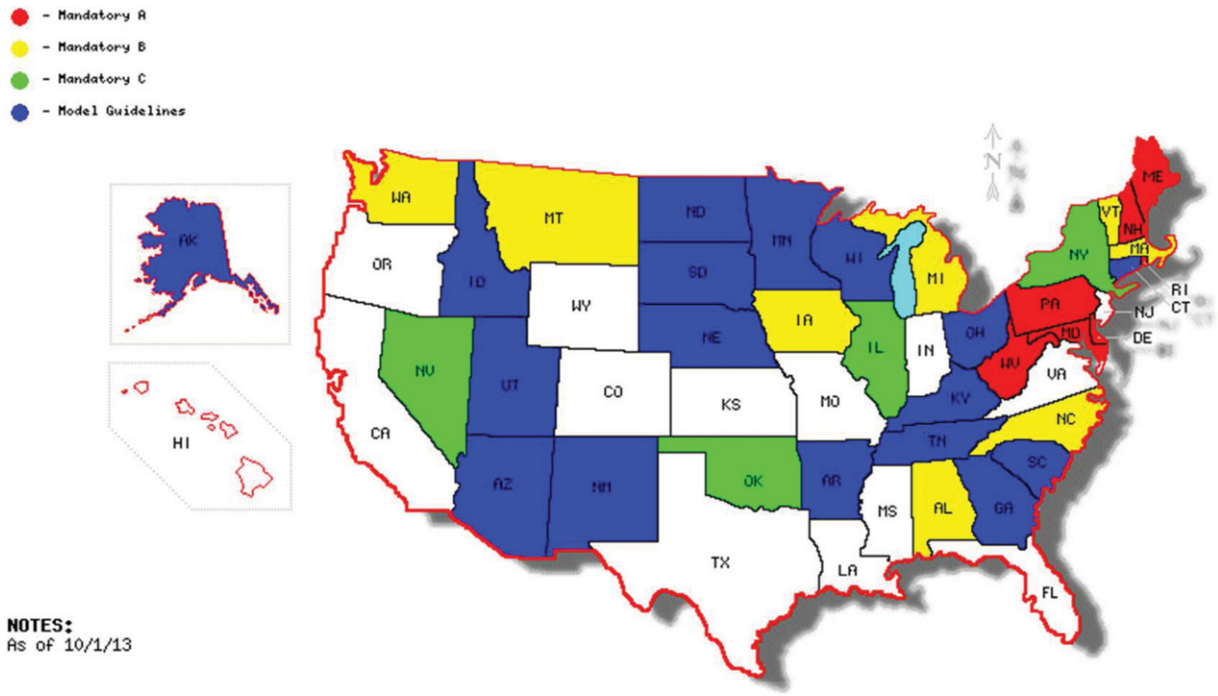

FIGURE 2. States with mandatory or model statewide BLS protocols as of October 1, 2013. Types of protocols used by each state are represented by colors (see key). For states that are white on the map, no statewide protocols or model guidelines exist.

time across an entire state; 3) access to a larger and more diverse group of experts when incorporating best practice and evidence-based care into protocols; 4) uniformity of care when EMS services from various agencies or regions respond to disasters or for mutual aid to other areas; 5) standard expectations for performance measures, quality improvement processes, and complaint investigations; 6) an ability to more easily educate EMS providers based upon standard expectations for care within a state; and 7) more consistent collection and comparison of quality improvement data. Furthermore, studies have shown that the prehospital care provided in systems that do not have standardized protocols is based less on scientific evidence,[12] suggesting that EMS systems with statewide protocols take into consideration the scientific evidence available for prehospital care.

On the other hand, the presence of statewide protocols does not automatically lead to improved patient care. Poorly designed statewide protocols may be associated with the reverse of the potential benefits listed above. For example, 1) protocols designed to the lowest level of equipment resources may not require devices like waveform capnography or intravenous infusion pumps if all agencies can't afford them, 2) protocols may become outdated if statewide groups do not have the structure to continually update these resources, 3) protocols that are written too narrowly may not adequately serve patients with both short and long transport times, 4) innovation may be impeded if there are not processes for pilot projects and research, and 5) local EMS medical directors may become less engaged in provider education if they are not responsible for protocol development. It is important to recognize the critical role of the protocol development process, whether it's local, regional, or statewide. If the process to develop statewide protocols is flawed or does not include a process to maintain the currency of the protocols, statewide protocols may amplify quality issues across a larger geography.

Another means of standardizing prehospital care is by establishing regionalized systems of emergency care. In 2007, the Institute of Medicine published the report, *The Future of Emergency Care in the United States,* which recommended the promotion of regionalized, coordinated, and accountable emergency care systems throughout the country.[13] A system of regionalization intends to link the correct care to the correct patient at the correct time, by either coordinating the movement of patients throughout the medical system or bringing resources to the patient. States are in a unique position to assist in the oversight of regionalized systems of care and to coordinate EMS care with hospitals and health-care systems through the recognition of specialty care receiving centers, particularly for time-sensitive illnesses and injuries.[14]

Several studies have highlighted the importance of protocols in prehospital care as well as the concept of regionalizing emergency care,[2–9] but the variability of EMS protocols and regionalized systems of care

TABLE 1. Characteristics of statewide EMS protocol use by state, as of October 1, 2013

State	BLS type	ALS type	Year of latest version	Pediatrics (combined/separate and age cutoff for pediatric care, in years)	Authority for statewide protocols
Alabama	Mandatory B	Mandatory B	2011	Separate ≤15	Statute
Alaska	Model	Model	2003 (2007 Trauma)	Separate NAEMSP Model Pediatric Protocols (1998 version)	None
Arizona	Model	Model	2012	Combined ≤14	None
Arkansas	Model	Model	2013	Combined Varies by protocol	None
California	Regional/ county	Regional/ county	N/A	N/A	None
Colorado	Local	Local	N/A	N/A	None
Connecticut	Model	Local	1995	Combined ≤14	None
Delaware	Mandatory A	Mandatory A	2012	Separate ≤12	Statute
Florida	Local	Local	N/A	N/A	None
Georgia	Model	Model	2013	Separate Varies by protocol	None
Hawaii	Local	Mandatory A	2013	Separate ≤12	Statute
Idaho	Model	Model	2013	Separate ≤12	Statute
Illinois	Mandatory C	Local	2010 Adult (Pediatrics 2008)	Separate ≤15	None
Indiana	Local	Local	N/A	N/A	None
Iowa	Mandatory B (minimum required components, but local service may add to protocols without state approval)	Mandatory B (minimum required components, but local service may add to protocols without state approval)	2013	Combined Age not defined	Regulations
Kansas	Local	Local	N/A	N/A	None
Kentucky	Model	Model	2010	Separate ≤17	None
Louisiana	Local (parish)	Local (parish)	N/A	N/A	None
Maine	Mandatory A	Mandatory A	2011	Separate "Prepubertal (without pubic, axillary, or facial hair)"	Statute
Maryland	Mandatory A	Mandatory A	2013	Combined Medical: ≤11 or <50 kg Trauma: ≤14	Regulation
Massachusetts	Mandatory B	Mandatory B	2013	Separate ≤12	Statute
Michigan	Mandatory B	Mandatory B	2012	Separate ≤14 or physical signs of puberty	Statute
Minnesota	Model	Local	2013	Separate ≤17	None
Mississippi	Local	Local	N/A	N/A	None
Missouri	Local	Local	N/A	N/A	None
Montana	Mandatory B	Mandatory B	2013	Combined Age not defined	Regulation
Nebraska	Model	Model	2012	Combined Varies in protocols	Statute
Nevada	Mandatory C	Mandatory C	2005	Separate ≤12	Regulations
New Hampshire	Mandatory A	Mandatory A	2013	Combined ≤ length-based tape	Statute
New Jersey	Local	Mandatory A	2012	Separate ≤12	Regulations
New Mexico	Model	Model	2013	Combined ≤15	None
New York	Mandatory C	Regional	2011	Combined Age not defined	Regulations
North Carolina	Mandatory B	Mandatory B	2013	Separate ≤ length-based tape	Statute
North Dakota	Model	Model	2013	Separate Age not defined	None
Ohio	Model	Model	2012	Separate Trauma: ≤16	None
Oklahoma	Mandatory C	Mandatory C	2013	Combined	Regulations
Oregon	Local	Local	N/A	N/A	None
Pennsylvania	Mandatory A	Mandatory A	2013	Combined ≤14 or physical signs of puberty	Statute
Rhode Island	Mandatory A	Mandatory A	2013	Combined ≤16	Regulations
South Carolina	Model	Model	2012	Combined < 55 kg	None
South Dakota	Model	Local	2012	Separate ≤8	None
Tennessee	Model	Model	2012	Combined Varies in protocols	Regulations
Texas	Local	Local	N/A	N/A	None
Utah	Model	Model	2013	Combined ≤14	None
Vermont	Mandatory B	Mandatory B	2013	Combined < 36 kg or 145 cm	Regulations
Virginia	Local	Local	N/A	N/A	None
Washington	Mandatory B	Regional/ county	2005	Combined Varies in protocols	Regulations
West Virginia	Mandatory A	Mandatory A	2013	Separate ≤ length-based tape	Statute
Wisconsin	Model	Model	2010	Separate Age not defined	Statute
Wyoming	Local	Local	N/A	N/A	None

Mandatory A – a state has statewide protocols that must be used by all EMS providers within the state; Mandatory B – a state has statewide protocols that must be used by all EMS providers within the state, but there is a process for services to petition the state to alter some of the protocols; Mandatory C – a state has statewide protocols that must be used by all EMS providers within the state, but there is a process for services to petition the state to develop and use their own protocols; Model – a state has model statewide protocols for providers, but each service or region may choose to use these protocols or may develop their own protocols; Regional – a state has regional protocols that must be followed by all services within the region and cover a geographic area that includes multiple services (for example county or multicounty regions); or Local – a state in which each EMS service or agency develops its own protocols.

TABLE 2. State recognition of trauma, STEMI, stroke, cardiac arrest, and burn specialty receiving centers, as of October 1, 2013

	Specialty receiving center type State recognition of				
State	Trauma	STEMI	Stroke	Cardiac arrest	Burn
Alabama	Yes	No	Yes	No	Yes
Alaska	Yes	Yes	Yes	No	No
Arizona	Yes	Yes	No	Yes	Yes
Arkansas	Yes	No	No	No	No
California	Yes	No	No	No	No
Colorado	Yes	No	No	No	Yes
Connecticut	Yes	No	Yes	No	No
Delaware	Yes	Yes	Yes	Yes	No
Florida	Yes	No	Yes	No	Yes
Georgia	Yes	No	Yes	No	Yes
Hawaii	Yes	Yes	No	No	Yes
Idaho	No	No	No	No	No
Illinois	Yes	No	Yes	No	Yes
Indiana	Yes	No	No	No	Yes
Iowa	Yes	No	Yes	No	No
Kansas	Yes	No	No	No	No
Kentucky	Yes	No	Yes	No	Yes
Louisiana	Yes	No	No	No	Yes
Maine	Yes	No	No	No	No
Maryland	Yes	Yes	Yes	Yes	Yes
Massachusetts	Yes	Yes	Yes	No	Yes
Michigan	No	No	No	No	Yes
Minnesota	Yes	No	No	No	No
Mississippi	Yes	No	No	No	No
Missouri	Yes	No	No	No	No
Montana	Yes	No	No	No	No
Nebraska	Yes	No	No	No	Yes
Nevada	Yes	No	No	No	Yes
New Hampshire	Yes	No	No	No	No
New Jersey	Yes	Yes	Yes	No	Yes
New Mexico	Yes	No	No	No	Yes
New York	Yes	No	Yes	No	Yes
North Carolina	Yes	Yes	Yes	No	Yes
North Dakota	Yes	No	Yes	No	No
Ohio	Yes	No	Yes	No	Yes
Oklahoma	Yes	No	Yes	No	Yes
Oregon	Yes	No	No	No	No
Pennsylvania	Yes	No	Yes	No	No
Rhode Island	Yes	Yes	Yes	No	Yes
South Carolina	Yes	No	No	No	No
South Dakota	No	No	No	No	No
Tennessee	Yes	No	No	No	No
Texas	Yes	No	No	No	No
Utah	Yes	Yes	Yes	No	Yes
Vermont	No	No	No	No	No
Virginia	Yes	No	Yes	No	Yes
Washington	Yes	Yes	Yes	No	Yes
West Virginia	Yes	No	No	No	No
Wisconsin	Yes	No	No	No	No
Wyoming	Yes	No	No	No	No

limits the ability to make generalized statements about their effectiveness. This description sought to provide such a characterization of statewide EMS protocols and recognition of specialty receiving facilities across the United States. An understanding of the current frequency of use and characteristics of statewide EMS protocols may be valuable to states and other EMS entities that are exploring future models for EMS protocols.

Many states have mandated either statewide EMS protocols or model clinical guidelines. Compared to the findings of the National EMS Assessment,[1] this survey found a similar number of states to have mandatory statewide protocols for both BLS and ALS. Discrepancies in the findings between this description and that of the National EMS Assessment can be attributed to the categorization utilized in this survey, which elucidates further details as to the types of statewide EMS protocols.

This description presented a potential conceptual model for categorizing statewide protocols, which adds further descriptive information to that provided

TABLE 3. State utilization of statewide destination protocols for specialty centers, as of October 1, 2013

State	Type of specialty receiving center				
	Trauma	STEMI	Stroke	Cardiac arrest	Burn
Alabama	Mandatory B	No	No	No	Mandatory B
Alaska	Model	No	No	No	No
Arizona	Model	No	No	Model	Model
Arkansas	Mandatory A	No	No	No	No
California	No	No	No	No	No
Colorado	Mandatory A	No	No	No	No
Connecticut	Mandatory A	No	No	No	No
Delaware	Mandatory A	Mandatory A	Mandatory A	Mandatory A	No
Florida	Mandatory B	No	Mandatory B	No	Mandatory B
Georgia	Model	No	Model	No	No
Hawaii	Mandatory A	Mandatory A	No	No	Mandatory A
Idaho	No	No	No	No	No
Illinois	Model	No	No	No	No
Indiana	Mandatory A	No	No	No	No
Iowa	Mandatory A	Mandatory B	Mandatory B	No	Mandatory A
Kansas	No	No	No	No	No
Kentucky	Model	Model	Model	Model	Model
Louisiana	No	No	No	No	No
Maine	Mandatory A	No	No	No	No
Maryland	Mandatory A	Mandatory A	Mandatory A	Mandatory A	Mandatory A
Massachusetts	Mandatory A	Mandatory A	Mandatory A	No	Mandatory A
Michigan	Regional	No	No	No	No
Minnesota	Mandatory B	No	No	No	No
Mississippi	Mandatory A	No	No	No	No
Missouri	No	No	No	No	No
Montana	No	No	No	No	No
Nebraska	Model	Model	No	No	No
Nevada	Mandatory C	No	No	No	No
New Hampshire	Mandatory A	No	No	No	No
New Jersey	Model	Model	Model	No	No
New Mexico	Model	No	No	No	Model
New York	Mandatory C	No	Mandatory C	No	No
North Carolina	Mandatory B	Mandatory B	Mandatory B	No	Mandatory B
North Dakota	Model	No	No	No	No
Ohio	Mandatory A	No	No	No	Mandatory A
Oklahoma	Mandatory C	No	Mandatory C	No	Mandatory C
Oregon	Mandatory A	No	No	No	No
Pennsylvania	Mandatory A	Mandatory A	Mandatory A	Mandatory A	Mandatory A
Rhode Island	Mandatory A	Mandatory A	Mandatory A	No	Mandatory A
South Carolina	Mandatory A	No	No	No	No
South Dakota	No	No	No	No	No
Tennessee	Mandatory A	Model	Model	Model	Model
Texas	No	No	No	No	No
Utah	Model	Model	Model	Model	Model
Vermont	Mandatory B	Mandatory B	Mandatory B	No	No
Virginia	Model	No	Model	No	Model
Washington	Mandatory B	No	No	No	No
West Virginia	Mandatory A	No	No	No	No
Wisconsin	Model	No	No	No	No
Wyoming	No	No	No	No	No

Mandatory A – a state has statewide protocols that must be used by all EMS providers within the state; Mandatory B – a state has statewide protocols that must be used by all EMS providers within the state, but there is a process for services to petition the state to alter some of the protocols; Mandatory C – a state has statewide protocols that must be used by all EMS providers within the state, but there is a process for services to petition the state to develop and use their own protocols; Model – a state has model statewide protocols for providers, but each service or region may choose to use these protocols or may develop their own protocols; Regional – a state has regional protocols that must be followed by all services within the region and cover a geographic area that includes multiple services (for example county or multicounty regions); or Local – a state in which each EMS service or agency develops its own protocols.

in the National EMS Assessment. There were many nuances related to the use of statewide EMS protocols and variations across states. For example, Nebraska did not have the legal authority to mandate that all EMS services use the state's model EMS protocols, but any EMS agency and its medical director that used these protocols without alteration received additional liability protection that is not provided to those using their own protocols. Therefore, Nebraska operated similar to a Mandatory A protocol categorization, but could only be listed as having Model protocols. The categorization method utilized in this survey simplifies the complexities to produce prevalence rates. While these idiosyncrasies to our categorization definitions

are common, we believe that this grouping of states by Mandatory or Model statewide EMS protocols is valuable in providing an overall view of the prevalence of the use of statewide EMS protocols in the United States.

There are some striking differences in the principles of care across the states. The approach to pediatric care is one significant example. There was almost equal use of states addressing pediatric care and medication dosages under a single combined protocol with adult patients or via separate pediatric and adult protocols. There is almost equal use of each of these two approaches when states develop pediatric EMS protocols. Additionally, where definitions existed, there was wide variation in the age threshold that states used to determine which patients are treated with care and dosages using their pediatric versus adult protocols. The median age for identifying a patient for pediatric protocol care was $\leq$14 years, but ranged from $\leq$8 to $\leq$17 years. Several states with pediatric-specific protocol care do not have any definition for what constitutes a pediatric patient for care using these protocols. This finding highlights the need for developing a standard method for defining the medical scenarios under which pediatric-specific protocols would be recommended, the age threshold for identifying pediatric patients when patient age is known, and alternate guidelines (e.g., signs of puberty) for determining the appropriate protocol when age is not known.

In regards to the role of EMS in regionalizing care, the trends found in this survey were consistent with the findings of the National EMS Assessment that most states had destination plans for trauma, but few had destination plans for cardiac arrest. While regionalized systems of care have been widely implemented across the United States and formally recognized by most states in the country, the dearth of state recognition of specialty receiving centers for time-sensitive conditions highlights an opportunity for state EMS offices and governments to enhance regionalized systems of emergency care. Through prehospital detection of injury or diagnosis of disease, the EMS system is able to either alert hospitals of critically ill incoming patients or activate hospital resources for these patients and therefore reduce time to therapy for these patients.

Scene triage, destination decision-making, and early hospital notification are only a sample of the efforts EMS providers offer that aid in the process of regionalization. A truly integrated system of care for time-sensitive conditions must include EMS partners in order to maximize these systems of care. Many states that did not use comprehensive protocols still have isolated protocols or rules that defined which trauma patients should or must be transported to these designated trauma centers. The recognition of other specialty centers related to regionalization of care for other time-sensitive illnesses is not as well defined across the states, but during the collection of information for this publication, many states suggested that the process for recognition of centers for STEMI, stroke, and/or cardiac arrest care is in progress.

This survey has a number of implications for policymaking and EMS practice. Written protocols alone are not sufficient to ensure compliance with the expected treatment. A number of gaps have been documented in the literature between protocols and treatment in the field of EMS.[11,15,16] Optimally, a process should be in place to ensure that provider education, protocol compliance measures, and quality improvement processes are in place to maximize compliance with protocols to the capability of each state's statutory and regulatory authority. There are many examples in the literature of improved compliance with target benchmarks when using protocols to drive patient care.

In terms of future research, while this description focuses on some important time-sensitive illnesses, there are many other aspects of regionalized interaction between EMS and specialty receiving centers that could be the subject of further study. For example, the state of New Jersey recognizes pediatric centers as destinations for EMS patients. Further research could also focus on assessing the level of scientific evidence within statewide EMS protocols as well as the extent to which the protocols are implemented or utilized across states.

There are a number of limitations to this survey. Copies of each state's guidelines, regulations, and statues could not be obtained, so the data from this description rely on the accuracy of those within each state's government agency that completed the survey and verified the information. However, to mitigate any potential bias due to this limitation, the survey data were validated through multiple sources: information on the state EMS offices' websites, calls to the state EMS offices, and review by each of the state EMS directors or medical directors.

Second, the information presented provides a snapshot of the current use of statewide protocols and recognition of specialty centers at the time of the data collection. Regionalization of care is a timely topic in EMS, and states are updating EMS protocols on an ongoing basis, potentially causing the information to quickly become out of date. Third, each state's method of using statewide protocols was best matched into one of the four predefined categories of Mandatory (A, B, or C) or Model for ease of measuring the prevalence of statewide protocol usage in this survey. These simplified categories may have limitations in capturing the complex variations in protocol use that exists across states. Additionally, a state was considered to have statewide mandatory or model EMS protocols only if the protocols covered a broad range of conditions. The number and type of medical conditions covered under statewide protocols likely varied widely – this survey was limited in capturing that information.

Lastly, this description did not attempt to identify processes used by states to assure that the statewide protocols used were evidence-based, limiting any inferences from the results that statewide protocols should be recommended.

CONCLUSION

This survey showed that statewide EMS treatment protocol use is required in 21 states, and optional model protocol guidelines are provided by 17 states. However, this descriptive categorization reveals wide variation in the format and characteristics of prehospital care protocols. While trauma centers are formally recognized by most states, fewer recognize specialty receiving facilities for STEMI, stroke, cardiac arrest, and burn patients, representing an opportunity for state EMS offices and governments to take a role in regionalizing emergency care for time-sensitive conditions. Knowledge on the types of state recognition of protocols for prehospital care as well as destination protocols for specialty receiving facilities is critical for national efforts to understand and support the standardization of EMS systems.

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SUPPLEMENTARY MATERIAL AVAILABLE ONLINE

Appendix A – Links to State EMS Protocol Information (accessed on 9/29/14)

APPENDIX A: Links to State EMS Protocol Information (accessed on 9/29/14)

State	Online statewide protocol reference
Alabama	adph.org/ems/assets/6thEditionProtocolsFinal051412.pdf
Alaska	dhss.alaska.gov/dph/Emergency/Pages/ems/downloads/treatment.aspx
Arizona	www.azdhs.gov/ops/oacr/rules/documents/guidance/gd-097-phs-ems.pdf
Arkansas	www.healthy.arkansas.gov/programsServices/hsLicensingRegulation/EmsandTraumaSystems/FormsManualsMemos/Documents/Manuals/BasicLifeSupportProtocols.pdf
California	Not applicable (N/A)
Colorado	N/A
Connecticut	N/A
Delaware	dhss.delaware.gov/dhss/dph/ems/medicaldirection.html
Florida	N/A
Georgia	dph.georgia.gov/adult-and-pediatric-emergency-pre-hospital-protocols
Hawaii	http://health.hawaii.gov/ems/files/2013/10/SO2013.pdf
Idaho	healthandwelfare.idaho.gov/Portals/0/Medical/EMS/EMSPC_protocols.pdf
Illinois	Adult protocols distributed to agencies, but not online. Pediatric protocols at: www.luhs.org/depts/emsc/stndrd-prehospital.htm
Indiana	N/A
Iowa	www.idph.state.ia.us/ems/protocols.asp
Kansas	N/A
Kentucky	kbems.kctcs.edu/Medical_Direction/Protocols.aspx
Louisiana	N/A
Maine	www.maine.gov/ems/documents/2011MaineEMSProtocols.pdf
Maryland	www.miemss.org/home/EMSProviders/EMSproviderProtocols/tabid/106/Default.aspx
Massachusetts	www.mass.gov/eohhs/provider/guidelines-resources/clinical-treatment/public-health-oems-treatment-protocols.html
Michigan	www.michigan.gov/mdch/0,4612,7-132-2946_5093_28508-132260–,00.html#mca_protocols
Minnesota	mn.gov/health-licensing-boards/emsrb/ambulanceservices/patientcareguidelines.jsp
Mississippi	N/A
Missouri	N/A
Montana	www.emt.mt.gov
Nebraska	dhhs.ne.gov/publichealth/Licensure/Documents/EMSmodelProtocols2012.pdf
Nevada	N/A
New Hampshire	www.nh.gov/safety/divisions/fstems/ems/advlifesup/documents/ptprotocols.pdf
New Jersey	www.state.nj.us/health/ems/regs.shtml
New Mexico	archive.nmems.org/treatment-guidelines.shtml
New York	www.health.state.ny.us/nysdoh/ems/protocolsnew.htm
North Carolina	www.ncems.org/nccepstandards/protocols/protocols.pdf
North Dakota	www.ndhealth.gov/ems/Protocol.htm
Ohio	publicsafety.ohio.gov/links/2012%20State%20of%20Ohio%20EMS%20Guidelines%20for%20Emergency%20Medical%20Responders.pdf
Oklahoma	www.ok.gov/health/Protective_Health/Emergency_Systems/EMS_Division/Protocols/index.html
Oregon	N/A
Pennsylvania	www.portal.health.state.pa.us/portal/server.pt/community/emergency_medical_services/14138/ems_statewide_protocols/625966
Rhode Island	www.health.ri.gov/publications/protocols/EMSProtocols_Feb2014.pdf
South Carolina	http://www.scdhec.gov/health/ems/protocols_and_forms.htm
South Dakota	dps.sd.gov/emergency_services/emergency_medical_services/documents/2010_EMT_Basic_SouthDakotaGuidelines.pdf
Tennessee	health.state.tn.us/EMS/medicaldirector.htm
Texas	N/A
Utah	www.health.utah.gov/ems/emsc/pediatric_protocol_guidelines.pdf
Vermont	healthvermont.gov/hc/ems/protocol.aspx
Virginia	N/A
Washington	www.doh.wa.gov/ForPublicHealthandHealthcareProviders/EmergencyMedicalServicesEMSSystems/TraumaSystem/EMSandTraumaCareClinicalGuidelines.aspx
West Virginia	www.wvoems.org/medical-direction/protocols
Wisconsin	www.dhs.wisconsin.gov/ems/EMSUnit/Protocols/Treatment_protocols.htm
Wyoming	www.health.wyo.gov/Media.aspx?mediaId=12843