



A National Strategy to Promote Prehospital Evidence-Based Guideline Development, Implementation, and Evaluation

MISSION

Engage EMS stakeholder organizations, institutions, agencies, and leaders in a sustainable process that promotes the development, implementation, and evaluation of evidence-based guidelines for prehospital care in the United States.

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TABLE OF CONTENTS

	Page Number
Executive Summary	4-8
Introduction	9-10
Methods	
Overview	11
Strategy Steering Committee	11
Strategy Objectives	11-12
Stakeholder Engagement and Strategy Development	12-13
Discussion	
Action Item #1: Create a Prehospital Guidelines Consortium (PGC)	13-15
Action Item #2: Promote Research Supporting the Development, Implementation, and Evaluation of Prehospital Evidence-Based Guidelines	16-17
Action Item #3: Promote Development of Prehospital Evidence-Based Guidelines	17-19
Action Item #4: Promote Education Related to Prehospital Evidence-Based Guidelines	19-20
Action Item #5: Promote the Implementation of Prehospital Evidence-Based Guidelines	20-22
Action Item #6: Promote Standardized Evaluation Methods for Prehospital Evidence-Based Guidelines	22
Action Item #7: Promote Funding for the Development, Implementation, and Evaluation of Prehospital Evidence-Based Guidelines	22-23
Evaluation Plan	23-24
Conclusion	24-25
References	26-28
Appendices	
Appendix A – The National Prehospital Evidence-Based Guideline Strategy	29-43
Appendix B – The Steering Committee for the National Prehospital Evidence-Based Guidelines Strategy	44
Appendix C – EMS Stakeholder Organizations	45-47
Appendix D – Stakeholder Meeting Presentations and Small Group Sessions	48
Appendix E – Proposed Annual Operating Budget for the Prehospital Guidelines Consortium	49
Appendix F – Disclosures of Potential Conflicts of Interest	50

EXECUTIVE SUMMARY

Introduction

The National Emergency Medical Services (EMS) Research Agenda (2001) and Institute of Medicine report “Emergency Medicine at the Crossroads” (2006) recommended a national investment in EMS research infrastructure and the development of evidence-based protocols for EMS treatment.^{1,2} In support of these recommendations, the National Highway Traffic Safety Administration (NHTSA) was charged with a leading role in this effort and in partnership with the Health Resources and Services Administration’s EMS for Children (EMSC) Program, provided funding for several efforts to develop and implement evidence-based guidelines for prehospital care. Following the subsequent development and initial application of a Model Process for the development of prehospital evidence-based guidelines (EBGs),³ the National EMS Advisory Council (NEMSAC) published recommendations to further the progress of the use of EBGs in EMS.⁴ These recommendations included forming relationships among stakeholders, incorporating EBGs into national EMS education, promoting training and funding for EMS research, and making the process for developing EBGs more efficient. The Federal Interagency Committee on EMS’s Strategic Plan (2014) similarly supported the development, implementation, and evaluation of prehospital EBGs.⁵ In further support of these recommendations, NHTSA, with supplemental funding from EMSC, competitively awarded a cooperative agreement to the National Association of EMS Physicians (NAEMSP) to develop a National Strategy that engages EMS stakeholders and identifies sustainable approaches to promote the development, implementation, and evaluation of prehospital EBGs. This report describes the Strategy that was developed by an expert working group from NAEMSP in collaboration with representatives of 57 other EMS organizations and institutions representing all aspects of prehospital care.

Methods

NAEMSP convened a steering committee that represented physicians, researchers, and field providers from the United States and Canada, with support of a representative from NHTSA, to engage EMS stakeholders and develop the Strategy. The following 7 objectives were identified to promote sustainable mechanisms to develop, implement, and evaluate EMS EBGs:

1. Identify and develop mechanisms to build and sustain relationships among EMS stakeholder organizations, and encourage their participation in the development, implementation, and evaluation of prehospital EBGs;
2. Expand existing opportunities to conduct scientific research supporting the development, implementation, and evaluation of EBGs;
3. Identify ways to promote interest in EBG development;

4. Identify pathways to promote the incorporation of newly developed EBGs into EMS education standards, the National Scope of Practice Model, and continued competency training;
5. Promote the dissemination and implementation of EBGs;
6. Identify ways to promote standardized evaluation methods to assess the effectiveness of EBGs; and
7. Promote funding for the development, implementation, and evaluation of EBGs.

Utilizing an iterative process that engaged a wide range of organizations, agencies, and institutions involved in EMS, 57 organizations participated with NAEMSP in developing the Strategy beginning in August, 2013. A stakeholder meeting and conference calls with organizational representatives facilitated a needs assessment and the subsequent development of action items with defined roles for stakeholders in the Strategy. A draft National Prehospital Evidence-Based Guidelines Strategy was distributed and published online for public comment between August and October, 2014. Comments on the draft Strategy were received and reviewed by the steering committee, then incorporated into the final Strategy (Appendix A).

Discussion

Action Item #1: Create a Prehospital Guidelines Consortium (PGC)

With the goals of improving communication among independent groups working on prehospital EBG-related projects, facilitating contact with relevant stakeholders, improving cohesiveness and efficiency of EBG efforts, and facilitating the fulfillment of other actions in this Strategy in a sustainable fashion, we propose the creation of a Prehospital Guidelines Consortium of representatives from national EMS and medical organizations. Consortium members will include an Executive Committee of representatives from key organizations that are most closely and actively involved in prehospital EBG efforts. These members will lead the work of the Consortium's workgroups and support a modest budget to fund the meetings and administration of the Consortium. Other members of the Consortium and liaisons from research institutions and Federal agencies will also participate in meetings and other activities of the Consortium, which will include:

- Facilitating improved communication related to EBG development projects, research, and education efforts among all stakeholders;
- Developing and maintaining documents detailing ongoing gaps in EBG knowledge to inform directions in EBG-related research and EBG development projects;
- Reviewing EBG-related project plans and draft documents, with the ability to provide the Consortium's endorsement of projects submitted for its review;
- Providing endorsement of individual prehospital evidence-based guidelines to promote their implementation;
- Disseminating newly-created prehospital EBGs widely to EMS stakeholders;

- Maintaining a repository of existing prehospital EBGs and facilitating access by end-users;
- Liaising with international groups also involved in prehospital EBG activities; and
- Carrying out other items of this Strategy as outlined in its other action items.

Action Item #2: Promote Research Supporting the Development and Implementation of Prehospital Evidence-Based Guidelines

The development of prehospital EBGs is dependent on the availability of scientific evidence on which to base recommendations, yet limited research in prehospital care exists. In addition to promoting clinical research that can be utilized to develop new evidence-based guidelines, there is a need for research that evaluates the effectiveness of existing EBGs, including its impact on improving health, reducing costs, increasing patient satisfaction, and maximizing EMS system resource utilization. Through a research workgroup of the Prehospital Guidelines Consortium, a research gap document will be created focusing on promoting research related to the development, implementation, use and evaluation of prehospital EBGs, while supporting other National efforts aimed at identifying knowledge gaps and priorities for research in EMS medicine.

Action Item #3: Promote Development of Prehospital Evidence-Based Guidelines

The creation of the National Prehospital EBG Model Process provided a structured process that has been successfully utilized to create several EMS EBGs. This is a resource-intensive process that has typically been performed independently for each guideline. We propose mechanisms to streamline and facilitate this process, including identifying best practices for guideline development as recommended by stakeholders and other experts. We further recommend utilizing elements of one guideline development effort to expedite the creation of other EBGs, such as shared use of current literature reviews on similar topics or sharing of sample educational content among guideline development projects. Promoting EBG development should emphasize use of rigorous methodology that identifies the quality of research and strength of recommendations. The PGC should create and maintain a guidance document that identifies stakeholder contacts and content experts for specific EBG topics, experts who can teach necessary methodological concepts, and outside organizations that can assist with primary literature reviews or other components of guideline development.

Action Item #4: Promote Education Related to Prehospital Evidence-Based Guidelines

To foster the use of EBGs, the basic principles of research and EBG methodology should be incorporated into initial education of EMS providers at all levels. Organizations that have a leading role in EMS education should teach and encourage EMS educators to incorporate this content into their curricula and recertification requirements. EBG concepts should similarly be incorporated into continuing education for EMS providers of all levels by all organizations that provide EMS education. As a means of facilitating education upon publication of new EBGs,

educational content developed by the project team could be reviewed by the PGC and distributed to EMS stakeholders. The Consortium should also develop a resource document on model educational methods, resources, and sample content that can be utilized to educate providers about new EBGs.

Action Item #5: Promote the Implementation of Prehospital Evidence-Based Guidelines

In the United States, various models exist for how protocols are developed and implemented, resulting in wide variability of protocols and challenges to implementation of EBGs. Creation of the PGC could facilitate a structured process for review and vetting of guidelines by EMS stakeholders that would be in a position to support, disseminate, and aid in the implementation of guidelines. A structured mechanism for guideline dissemination to ensure the widest distribution and potential for implementation should also be created. Additional research is needed on best practices for implementation, which may include the creation of toolkits for implementation and the incorporation of statements about the evidence-base of guideline components to facilitate implementation of the most impactful elements.

Action Item #6: Promote Standardized Evaluation Methods for Prehospital Evidence-Based Guidelines

Evaluation of effectiveness and outcomes is an essential part of EBG development and implementation. All guideline development projects should incorporate a set of standard outcome and quality measures to facilitate evaluation of the EBG. Evaluation components should include if the implementation was successful; if the EBG is associated with improved outcomes, reduced costs, and a better patient experience; and if the EBG is being continuously updated as new evidence is generated. Funders of EBG projects should consider incorporating these outcome and quality measures as part of an evaluation component for funding guideline projects.

Action Item #7: Promote Funding for the Development, Implementation, and Evaluation of Prehospital Evidence-Based Guidelines

Continued funding for evidence-based guideline development is essential and will dictate the speed by which we are able to advance to having a comprehensive set of prehospital evidence-based guidelines. We recommend continued support from Federal partners and other EMS and medical organizations to fund new projects to develop, implement, and evaluate prehospital evidence-based guidelines, with the eventual goal of creating Center(s) of Excellence for EMS EBG development.

Evaluation

Implementation of this Strategy should be evaluated at regular intervals and may include the following evaluation components:

1. *Context* – Aspects of the social, political, and economic environment that may influence implementation of the Strategy;
2. *Recruitment* – The methods by which organizations were included in the implementation of the Strategy;
3. *Reach* – Identifying the target audience of EMS stakeholders and the degree to which the Strategy reached those it was intended to affect;
4. *Dose Delivered* – The amount of the Strategy interventions that were implemented;
5. *Dose Received* – The extent to which the target audience (who is being asked to develop, utilize, or evaluate prehospital EBGs) actively engage with, interact with, are receptive to, and/or use materials or recommended resources; and
6. *Fidelity* – The extent to which the Strategy was carried out as planned.

Next Steps

Following the distribution and communication of this Strategy to a broad EMS audience, EMS stakeholders should work together to form the Prehospital Guidelines Consortium and begin carrying out the other items of this Strategy. An inaugural meeting of the PGC is planned for January, 2016.

Conclusion

Recent recommendations from the NEMSAC and from the FICEMS Strategic Plan support the creation of a sustainable National Strategy for the development, implementation, and evaluation of prehospital evidence-based guidelines. Creation of a Prehospital Guidelines Consortium would improve communication among stakeholders and EBG project groups, improve efficiency of EBG development, and support more widespread adoption of prehospital EBGs. Other elements of this Strategy promote EMS research that supports EBG development and education of EMS providers in evidence-based medicine, one of several components that may lead to improved implementation of EBGs.

INTRODUCTION

In 2001, the National Emergency Medical Services (EMS) Research Agenda identified a need for a national investment in EMS research infrastructure and the application of scientific evidence to improve patient care.¹ In the 2006 report “Emergency Medicine at the Crossroads,” the Institute of Medicine’s Committee on the Future of Emergency Care in the United States Health System recommended the development of evidence-based protocols for the treatment of emergency medical systems (EMS) patients, and charged the National Highway Traffic Safety Administration with a role in this effort.² Following this report, NHTSA, in partnership with the Health Resources and Services Administration’s (HRSA) EMS for Children (EMSC) Program, provided funding for several efforts to develop and implement evidence-based guidelines for prehospital care.^{6,7}

In 2008, through funding from NHTSA, the Federal Interagency Committee on EMS (FICEMS) and the National EMS Advisory Council (NEMSAC) cosponsored a meeting, *From Evidence to EMS Practice, Building the National Model*, to identify a process for developing evidence-based guidelines (EBGs) for EMS. This effort culminated in the publication of the National Prehospital Evidence-Based Guideline Model Process, which includes a comprehensive, systems-based approach that incorporates collaboration of EMS and medical professionals from many disciplines.³ With funding from NHTSA and EMSC, this model was subsequently used to develop guidelines for pediatric seizures, prehospital pain management, and the use of air ambulances to transport trauma patients from the scene of injury.⁷⁻¹¹ In 2012, a cooperative agreement was awarded by NHTSA, with supplemental funding from the EMSC Program, to the National Association of State EMS Officials (NASEMSO) to examine the development, dissemination, implementation, and evaluation of EBGs at the state level.

The NEMSAC reviewed these and other efforts and, in 2012, published a list of recommendations to further the progress of the use of EBGs in EMS.⁴ These recommendations included:

1. Forming relationships with stakeholder organizations and academic journals to hasten the process of publishing EBGs;
2. Making efforts to incorporate EBGs into national EMS education;
3. Further implementing the strategies presented in the National EMS Research Agenda, including defining prehospital patient outcome measures, promoting training of EMS researchers, and creating funding sources specifically for EMS research, in order to support the development of EBGs;
4. Creating Center(s) of Excellence for EMS EBG development;
5. Making the process of developing EBGs more efficient by creating supporting mechanisms, such as a registry of current EBG efforts with prehospital relevance worldwide;

6. Incorporating into Federal grant guidance language that qualified EBG processes be used for grants; and
7. Sponsoring a regular EBG Scientific Assembly that brings together practitioners and academic EMS professionals to prioritize future EBG development and determine best practices for developing and implementing EBGs.

More recently, FICEMS released a Strategic Plan to ensure coordination among Federal agencies to support improving the delivery of EMS and 911 systems throughout the nation. Presented at its March 2014 meeting, one of six strategic goals stated in the plan is to support data-driven and evidence-based EMS systems that promote improved patient care quality. Within this goal, the first strategic objective is to “support the development, implementation and evaluation of [EBGs] according to the National Prehospital EBG Model Process.”⁵

The creation and implementation of prehospital EBGs provides a unique opportunity to improve prehospital patient care and health outcomes of persons injured in motor vehicle crashes or who have other health emergencies, and to optimize resource utilization by EMS systems. For example, recent EBGs on air medical transport of prehospital trauma patients,¹¹ prehospital pain management,⁹ and external hemorrhage control,¹² have demonstrated the utility of the National Prehospital EBG Model Process to help standardize and improve the care of these patients, leading to improvements in crash outcomes and overall highway safety. Similarly, prehospital evidence-based guidelines can enhance the out-of-hospital medical care of patients with a wide variety of medical and other traumatic complaints, highlighting the need for a sustainable strategy to promote the development, implementation, and evaluation of prehospital EBGs.

In an effort to support the FICEMS Strategic Plan, and acting on the recommendations of the NEMSAC, in August 2013 NHTSA, with supplemental funding from the Emergency Medical Services for Children (EMSC) program of the Health Resources and Services Administration, competitively awarded to the National Association of EMS Physicians (NAEMSP) a cooperative agreement to support the development of this National Strategy by engaging EMS stakeholders at all levels to help identify sustainable approaches to promote the development, implementation, and evaluation of prehospital EBGs. This report describes the Strategy that was developed by an expert working group from NAEMSP in collaboration with representatives of 57 other EMS organizations and institutions representing all aspects of prehospital care.

METHODS

Overview

In August 2013, NHTSA, with supplemental funding from the EMSC program, competitively awarded a cooperative agreement to NAEMSP to support the development of a National Prehospital EBG Strategy (Appendix A). NAEMSP identified a project lead and steering committee to facilitate this effort and began contacting EMS stakeholder organizations to participate in development of the Strategy. A meeting with broad participation was held to perform a needs assessment and seek input and collaboration for determining the best practices and approach for EBG development and implementation. Stakeholders were engaged through subsequent conference calls to further develop and revise elements of the Strategy. This document was written by members of the steering committee with input from many of the process participants.

Strategy Steering Committee

A steering committee was convened by NAEMSP that represented physicians, researchers, and field providers from the United States and Canada (Appendix B). Representatives included state and local EMS medical directors, a prior participant in the development of the National Prehospital Evidence-Based Guideline Model Process,³ a representative of the NAEMSP Board of Directors, and an experienced EMS researcher and paramedic. A representative from NHTSA with experience in multiple prior prehospital EBG efforts provided technical support to the steering committee, as needed. The steering committee provided input on identifying stakeholders, facilitated discussion among participants during an in-person meeting and several conference calls, and provided input on addressing the Strategy objectives. Throughout the process, steering committee members facilitated the incorporation of stakeholder input into individual Strategy objectives and the development of action items that formed the core of the Strategy.

Strategy Objectives

The process described above led to the development of a set of broad objectives. These objectives aimed to promote sustainable mechanisms to develop, implement, and evaluate EMS EBGs.

1. Identify national, state, tribal, and local stakeholder organizations whose missions include improving prehospital clinical care; develop mechanisms to build and sustain relationships among the identified organizations and encourage their participation in the development, implementation, and evaluation of prehospital EBGs;

2. Expand existing opportunities to conduct scientific research supporting the development, implementation, and evaluation of EBGs and develop opportunities to present research findings to diverse audiences;
3. Identify ways to promote interest in EBG development among researchers, emergency physicians, prehospital care providers, and EMS officials;
4. Identify pathways to promote the incorporation of newly developed EBGs into EMS education standards, the National Scope of Practice Model, and continued competency training; as well as stimulate the development of educational and training resources for use by EMS educators and by state and local EMS agencies;
5. Promote the dissemination and implementation of EBGs;
6. Identify ways to promote standardized evaluation methods to assess the effectiveness of EBGs, both by determining their ability to be implemented and their impact on patient-centered outcomes and EMS resource utilization; and
7. Promote funding for the development, implementation, and evaluation of EBGs.

Stakeholder Engagement and Strategy Development

The initial objective for Strategy development included identifying national, state, tribal, and local organizations whose missions include improving prehospital clinical care. Organizations that have previously been involved in the development of national EMS EBGs were identified. An initial list of potential organizations, agencies, and institutions was obtained through review of participants involved in the National Prehospital Evidence-Based Guideline Model Process.³ This prior effort identified 41 organizations, including national medical organizations, EMS organizations, research institutions, and federal partners. Snowball sampling¹³ was then used as part of an iterative process of contacting and identifying additional stakeholders to be included in development of the Strategy.

The leadership from each of the identified organizations was invited to identify a representative to participate in the development of the Strategy, review the existing list of stakeholders, and provide recommendations for additional stakeholders. Organizations were engaged by identifying a specific contact person. All identified stakeholder organizations that agreed to participate in and have defined roles in this Strategy are listed in Appendix C. Additionally, representatives from a large corporate EMS agency (American Medical Response) and EMS publications (EMS World, Journal of Emergency Medical Services, and Prehospital Emergency Care) were engaged to also provide input on development of the Strategy.

A meeting was held that brought together 48 participants representing 40 EMS stakeholder organizations. Presentations were provided including: a primer on EBG development, recent and ongoing EBG-related efforts, and the identification of various challenges to development and implementation of prehospital EBGs (Appendix D). Stakeholders were engaged in a needs

assessment to further national efforts for prehospital EBGs. Breakout group sessions were utilized to develop action items tied to the objectives of the Strategy. Summaries of these action items were discussed further by the entire stakeholder group to gain consensus on specific objectives and tasks. Finally, the meeting served to identify additional stakeholders, who were subsequently engaged in the Strategy development through direct communication. In total, 58 stakeholder groups were engaged to provide input on development and revision of the Strategy.

Over the ensuing months, several conference calls were held to obtain additional input from stakeholders and to refine the strategies. All input received from stakeholders was summarized, collated, and reviewed by the steering committee, then used to develop the recommended action items of the Strategy. Recommended responsibilities of specific organizations were identified utilizing a RACI matrix,¹⁴ a responsibility assignment matrix identifying entities that should be responsible, accountable, consulted, or informed in carrying out each action item of the Strategy (Appendix A).

A draft National Prehospital Evidence-Based Guidelines Strategy was distributed to all stakeholders and posted online at www.naemsp.org on August 20, 2014 for a 2 month open comment period. During this open comment period an additional stakeholder conference call was held to receive and discuss comments on the draft Strategy document. All comments on the draft Strategy were collated and reviewed by the steering committee, which performed revisions to the Strategy document. Additional conference calls with stakeholders were held during the revision period to address specific comments and feedback that was provided. All comments and feedback were addressed in preparing the revised Strategy.

DISCUSSION

Refer to Appendix A – the National Prehospital EBG Strategy

Action Item #1: Create a Prehospital Guidelines Consortium (PGC)

A needs assessment for this Strategy identified several key elements that are needed to improve the quality and efficiency of prehospital EBG development and implementation efforts:

- Improved communication among independent groups working on prehospital EBG-related projects, from development through completion;
- Facilitated contact with relevant stakeholders;
- Improved cohesiveness and efficiency of EBG efforts, including avoidance of effort duplication;
- Mechanisms for vetting of EBGs by researchers, stakeholders and end-users;
- Promotion of funding mechanisms for EBG projects; and

- Fulfilment of other actions in this Strategy in a sustainable fashion through widespread involvement of stakeholders.

We propose the creation of a Consortium of representatives from national EMS and medical organizations with the mission of providing enhanced communication, collaboration, and synergism of efforts among organizations involved in EMS to promote the development, implementation, and evaluation of prehospital EBGs. Through participation in this Prehospital Guidelines Consortium (PGC), Consortium members will be better able to ensure that their organizations are briefed and have the opportunity to be involved in relevant evidence-based guideline efforts. We propose the following structure and function of the PGC to facilitate a sustainable approach to enhancing prehospital EBG efforts:

Structure, Membership, and Leadership of the PGC

Representatives from key organizations that are most closely and actively involved in prehospital EBG efforts will form an Executive Committee of voting members, marked as “Responsible” for creation of the PGC in the Strategy (see Appendix A). Members of the Executive Committee will be expected to attend PGC meetings and conference calls, will lead workgroups of the Consortium, and their represented organizations will be responsible for supporting funding of a modest budget (Appendix E). Non-voting members of the PGC will include representatives of other EMS stakeholder organizations, as determined by the Executive Committee, with all members encouraged to participate in meetings and conference calls of the PGC. Research institutions, Federal agencies, and other relevant organizations may designate a non-voting liaison to interact with the PGC, and these will also be invited to attend meetings and conference calls of the PGC.

The PGC will hold at least one annual in-person meeting and three quarterly conference calls, or otherwise meet as frequently as determined by the Executive Committee. Leadership and management of the PGC will be derived from its Executive Committee, which will elect a chair to serve a 2-year term. Administrative support for the PGC will be provided through the member organizations of the Executive Committee and a single organization will act as the host for the Consortium’s meetings and coordinate this administrative support. The Executive Committee will establish standing workgroups with a chair who is a PGC member and co-chairs or other members who do not need to be PGC members, but are appointed by the chair of the workgroup. Recommended initial workgroups include:

- Research
- Development
- Education
- Implementation and Evaluation
- Funding

Activities of the Consortium

Activities of the Consortium will include:

- Facilitating improved communication related to EBG development projects, research, and education efforts among all stakeholders;
- Developing and maintaining documents detailing ongoing gaps in EBG knowledge to inform directions in EBG-related research and EBG development projects;
- Reviewing EBG-related project plans and draft documents, with the ability to provide the Consortium's endorsement of projects submitted for its review;
- Providing endorsement of individual prehospital evidence-based guidelines to promote their implementation;
- Disseminating newly-created prehospital EBGs widely to EMS stakeholders;
- Maintaining a repository of existing prehospital EBGs and facilitating access by end-users;
- Liaising with international groups also involved in prehospital EBG activities; and
- Carrying out other items of this Strategy as outlined in its other action items.

The Consortium will not be tasked with the development or implementation of individual EBGs, which should remain the activity of independent groups through separate funding mechanisms. These groups may be optimally led by national medical or EMS organizations with interests directly related to the guideline topic. Similarly, the Consortium will not be performing primary research in EMS medicine or performing evaluations of individual guidelines. Instead, the Consortium's role will be to provide a mechanism for all groups working on these individual efforts to communicate, synergize efforts, and become more involved in a manner that promotes prehospital EBGs and facilitates their widespread use in a sustainable manner. As the Consortium matures, its activities may evolve to better support and advance prehospital EBG efforts.

Funding of the Consortium

All member organization of the PGC will fund travel and other costs related to attending meetings of the PGC for its representatives. Voting member organizations that are represented in the Executive Committee will fund meeting and administrative costs of the Consortium as determined by an annual budget (refer to Appendix E for a proposed annual budget). The final annual budget will be developed and approved by the Executive Committee.

Action Item #2: Promote Research Supporting the Development and Implementation of Prehospital Evidence-Based Guidelines

The development of prehospital EBGs is dependent on the availability of scientific evidence on which to base recommendations. Unfortunately, limited research exists that can guide medical practice in the prehospital setting. Research is needed to identify current knowledge gaps in EMS medicine and expand the knowledge base available to create EBGs, including the performance of prehospital randomized controlled trials, comparative effectiveness studies, and systematic reviews. Therefore, a necessary aspect of promoting the creation of new prehospital EBGs must be to facilitate the creation of new scientific evidence, to disseminate that knowledge, and to facilitate comprehensive ongoing evaluation of scientific evidence as part of the guideline development process.

Prior efforts have identified areas of EMS that need further research, and include the National EMS Research Agenda¹ and the Gap Analysis of EMS-Related Research,¹⁵ among others.¹⁶⁻¹⁹ Additionally, the Proceedings of the Implementation Symposium of the National EMS Research Agenda²⁰ provided specific methods to move the recommendations forward. These included improving training opportunities for EMS researchers, increasing funding sources for EMS research, facilitating the integration of research into practice, and crafting alterations within the regulatory environment. We support these prior recommendations and recommend the development of a research agenda that focuses on research related to the development, implementation and evaluation of prehospital EBGs, thus addressing specific knowledge gaps that impact the creation and use of prehospital EBGs. Consensus conferences such as those developed by the Society for Academic Emergency Medicine could be utilized as part of an iterative process identifying where research gaps exist on a particular topic or for the development of prehospital EBGs in general.

In addition to promoting clinical research that can be utilized to develop new evidence-based guidelines, there is a need for research that evaluates the effectiveness of existing EBGs. This research should include an assessment of the impact of specific guidelines on patient-centered outcomes, including improvements in health, reduced costs, and increased patient satisfaction, as well as outcomes relating to EMS system resource utilization. Furthermore, translational medicine research should be performed that identifies evidence-based processes for implementing EBGs into practice, focusing on implementation science (the interface between science and the clinical environment where it can be applied), knowledge translation (achieving awareness and agreement on use of evidence-based guidelines by prehospital and related providers), behavioral change theory (evaluation of the science on behavior and change management as it relates to EMS and other health care providers' implementation of prehospital guidelines), and use of best practices (as determined through consensus of an expert panel, such as implementation "toolkits" and other standardized implementation techniques).

A Prehospital Guidelines Consortium would facilitate the creation of a workgroup to create a prehospital EBG-related research gap document that focuses on promoting research related to the development, implementation, use, and evaluation of prehospital EBGs. This document would supplement, but not substitute or duplicate other efforts aimed at more broadly promoting EMS-related research, such as the EMS Research Agenda,¹ EMS Outcomes Project,^{17,18} and EMS Cost Analysis Project.²¹ As part of scheduled revisions of the prehospital EBG-related research gap analysis, the Consortium should determine if its prior recommendations have resulted in completion of research in the desired topic areas, or changes in how prehospital EBG projects are carried out. Through its meetings, the Consortium and its member representatives would be able to provide letters of support for EBG-related research projects that are best poised to advance the development and implementation of prehospital EBGs, including efforts carried out by global organizations, small organizations, and individual agencies.

Action Item #3: Promote Development of Prehospital Evidence-Based Guidelines

The creation of the National Prehospital EBG Model Process³ provided a structured process that has been successfully utilized to create EMS EBGs for seizure management, pain management, air medical transport, and hemorrhage control.^{8,10-12,22} The development process requires several distinct steps, including:

1. Assembling the expert panel and providing Grading of Recommendations, Assessment, Development and Evaluation (GRADE)^{23,24} or similar methodology training;
2. Defining the EBG content area and questions to address;
3. Performing systematic literature searches;
4. Applying the literature review to each question;
5. Vetting and endorsing draft recommendations; and
6. Synthesizing recommendations into a usable EMS protocol or algorithm.¹⁰

This is a resource-intensive process that has typically been performed independently for each guideline. We propose mechanisms to streamline and facilitate this process, including identifying best practices for guideline development as recommended by stakeholders and other experts. We further recommend utilizing elements of one guideline development effort to expedite the creation of other EBGs, such as shared use of current literature reviews on similar topics or sharing of sample educational content among guideline development projects. Sharing of resources and work products among EBG projects should ensure each product is of high quality, seeking new information specific to a guideline whenever appropriate.

An initial step to promote guideline development is to perform a gap analysis that identifies areas of EMS that would most benefit from EBGs, leading to the development of a mechanism for

prioritizing EBG topics. While not detracting from individuals who want to develop guidelines to meet specific needs, this would focus efforts of the PGC to promote the development of new guidelines based on a structured methodology. As a starting point for this document, the NASEMSO Model Clinical Guidelines document²⁵ and similar efforts should be analyzed to distinguish existing evidence-based guidelines (based on robust analysis of available research) from consensus-based recommendations (based on the guidance of an expert panel) to identify topics for future EBGs. Rigorous tools such as the GRADE grid²⁶ and the guidelines checklist of Schunemann, et al.,²⁷ should be utilized in planning for new EBGs and for determining when it is appropriate to proceed with guideline development on a particular topic. Similarly, the National EMS Information System (NEMSIS)²⁸ and the Practice Analysis being performed by the National Registry of Emergency Medical Technicians could be utilized as sources of information on the most common conditions and procedures encountered in the prehospital setting, as well as information on variations in practice that can help identify what aspects could be best impacted by new EBGs. Identifying topics for EBGs should also take into account how much research is available on the topic, what EBGs are most likely to be utilized and benefit the greatest number of patients and providers, what EBG projects are likely to get funded, and additional specific input from stakeholders of all provider levels. Attention to vulnerable populations should also be considered, such as pediatric patients and other patient groups where variability in care may be greatest.

Evidence-based guidelines should be developed using processes consistent with the Institute of Medicine Standards for Developing Trustworthy Clinical Practice Guidelines,²⁹ the National Prehospital EBG Model Process,^{3,6} and rigorous methodology, such as GRADE,^{23,24,26} which identifies the quality of the research basis and the strength of the recommendations. Prehospital EBGs should ideally have consistent structuring and formatting to facilitate interpretation and implementation. Other recommendations include the funding and establishment of Evidence-Based Practice Centers (EPCs) or similar institutions to perform systematic reviews as part of guideline development, avoiding the time-consuming process of teaching a content expert panel about scientific literature review for each individual EBG effort. As an example, Bulger, et al. used a systematic review of the literature that was funded by NHTSA and EMSC and was performed by the ECRI Institute, one of eleven EPCs designated by the U.S. Agency for Healthcare Research, to facilitate the creation of an EBG on external hemorrhage control.¹² Other components of model EBG projects can be utilized by new EBG project groups to streamline the process of creating EBGs and incorporate lessons learned from prior efforts. Additionally, an open process for conflict of interest management should be incorporated into all guideline development efforts.

The Prehospital Guidelines Consortium should create and maintain a guidance document that identifies stakeholder contacts and content experts for specific EBG topics, experts who can teach GRADE and other necessary methodological concepts, and outside organizations that can

assist with primary literature reviews or other components of guideline development. This document should identify for project groups a standardized process for guideline review and support by the Consortium's representative members and recommend a standardized process and timeline for guideline revisions. The Consortium should also identify methods to include patient/consumer input during the guideline development process, such as by locating patients/consumers who are willing to serve on guideline development panels and connecting guideline development groups with these panels.

Action Item #4: Promote Education Related to Prehospital Evidence-Based Guidelines

In addition to the limited quantity and quality of research in prehospital care,³⁰ there has been a limited emphasis on education of EMS providers in evidence-based medicine principles. Students in EMS education may latch on to information without understanding that healthcare is constantly evolving and that changing evidence may alter the information they are taught in the future. Due to a lack of routine training in the importance of prehospital research, EMS providers may be reluctant to participate in research projects and are less likely to inquire about the evidence-base supporting their protocols. However, there exists support for a paradigm shift on the performance of prehospital research and use of EBGs for prehospital care.^{4,6} An essential step is the improvement of education of EMS providers on evidence-based medicine. This includes the incorporation of EBGs into national EMS education standards, as well as initial and continuing education curricula.⁴ Furthermore, there should be concurrent education of EMS educators, physicians, and affiliated staff who interact with EMS providers and are in a position to impact the implementation and use of EBGs during prehospital care.

To foster the use of EBGs, the basic principles of research and EBG methodology should be incorporated into initial education of EMS providers at all levels. EBG principles and content should be specifically incorporated into the National EMS Core Content,³¹ National EMS Education Standards,³² and textbook and online EMS educational content. Organizations that have a leading role in EMS education should teach and encourage EMS educators to incorporate this content into their curricula and recertification requirements. EBG concepts should be incorporated into continuing education for EMS providers of all levels by all organizations that provide EMS education. EBG concepts should then be incorporated into national and state-based EMS provider initial certification and recertification examinations, as well as by accrediting bodies for EMS education. Medical organizations should disseminate information to EMS affiliated providers (physicians, nurses, physician assistants, etc.) on the use of evidence-based medicine in EMS and encouraging the use of existing prehospital EBGs as allowed by local regulations and protocols.

Upon publication of new EBGs, educational content developed by the project team could be reviewed by the Prehospital Guidelines Consortium and distributed to state EMS offices through NASEMSO. The Consortium should develop a resource document on model educational methods, resources, and sample content that can be utilized to educate providers about new EBGs, including the use of a diverse set of educational mechanisms such as standard presentations, online interactive content, virtual classrooms, podcasts, online videos, and social media.

Educational resources should be created that support individuals who will create EBGs. This may include the creation of an educational material development resource center, educational material development workshops, and graduate programs for EMS and related healthcare providers.

Action Item #5: Promote the Implementation of Prehospital Evidence-Based Guidelines

In the United States, various models exist for how protocols are developed and implemented, with implementation occurring at the local, county, regional, or state level. This results in wide variability of protocols and notable challenges to implementation of new evidence-based protocols in EMS systems.^{9,33,34} The challenge of implementing new guidelines is not limited to the EMS setting and occurs in other healthcare settings.³⁵⁻³⁸ A key component of new guideline acceptance is review, input, and vetting by stakeholders who will be in a position to implement the guideline and whose effort will be needed to support its use.³⁹ Additionally, there is a lack of information on what tools are successful for implementation of guidelines in EMS systems at the local, regional, state, or national levels.

A structured process for review and vetting of guidelines by EMS stakeholder organizations that would be in a position to support, disseminate, and aid in the implementation of guidelines among its members throughout various EMS systems should be developed. Creation of a Prehospital Guidelines Consortium would provide an opportunity for independent project groups to engage stakeholders at all stages of guideline development and implementation. Review of guidelines for implementation would be informed by the use of structured evaluation tools that identify challenges to and feasibility of implementation, such as the Appraisal of Guidelines, Research and Evaluation (AGREE) and the Guideline Implementability Appraisal (GLIA) tool.^{40,41}

Perceptions of bias or conflict of interest have the potential to negatively impact the implementation of guidelines. Review of guidelines by the Consortium and all relevant stakeholders would be well informed if guideline development projects include clear reporting of any conflict of interest by those participating in their development and implementation. These

conflicts of interest should be clearly stated in the publication of guidelines and implementation recommendations.

A structured mechanism for guideline dissemination to ensure the widest distribution and potential for implementation should be created. Upon publication, guidelines should be distributed to each member of the Consortium. NASEMSO should be the lead organization to disseminate published evidence-based guidelines through state EMS offices for incorporation into state-based protocols or further distribution at the regional and local level. NAEMSP should disseminate guidelines through its membership, including EMS medical directors who are in a position to implement those recommendations in local and state-based protocols. CoAEMSP and NAEMSE should ensure that guidelines are distributed to training centers for incorporation in EMS educational curricula. The proposed Prehospital Guidelines Consortium should maintain an easily accessible online repository of prehospital guidelines and facilitate guidelines being forwarded for publication to the National Guidelines Clearinghouse (www.guideline.gov).

Each guideline development project should include clinical tools that aid in implementation, such as sample protocols and educational content related to the guideline, ensuring guidelines are available in a format that is easy to understand by end-users. Multiple strategies that are flexible and can be incorporated across various EMS systems should be considered. A training packet that is published or made available with the guideline's publication could be used directly by local groups as part of their implementation. Educational materials including a clinical guidelines synopsis⁴² should be created for EMS medical directors, educators, and end-users, and may incorporate education on the background of the guideline's development, thus facilitating training of individuals who will be asked to implement these guidelines.

Additional research is needed on best practices for implementation. Such practices may include the creation of toolkits for implementation and the incorporation of statements about the evidence-base of guideline components to facilitate implementation of the most impactful elements. National organizations such as NAEMSP and NASEMSO should be engaged in knowledge-sharing that identifies when individual groups encounter challenges or barriers to implementation, as well as how those challenges were overcome, thus informing implementers in other EMS systems. Upon publication of individual guidelines, a timeline should be established by the project group that identifies when the guideline would be reasonably expected to be implemented in EMS systems (on average anticipated to take 1-2 years from publication) and when the guideline should be reviewed and revised. Revisions of guidelines should be planned at the time of guideline development, occur on average at least every 3-5 years, and incorporate a phased approach where the availability of new data can prompt the earlier revision of a guideline. Planned timelines for implementation and revision should be informed by the available evidence, knowledge of additional research expected in the subject area, and the

strength of existing recommendations. National organizations that sponsor the development of specific guidelines should ensure that revisions are performed in a consistent manner.

Action Item #6: Promote Standardized Evaluation Methods for Prehospital Evidence-Based Guidelines

Evaluation of effectiveness and outcomes is an essential part of EBG development and implementation, and a component of the National Prehospital Evidence-Based Guideline Model Process.³ Monitoring of pertinent quality improvement indicators and comparison to benchmarks can help inform the effectiveness of implementation techniques and the clinical impact of guidelines that are implemented. Use of uniform data definitions and repositories, including the National Emergency Medical Services Information System (NEMSIS) must be central to any system evaluation.^{28,43,44}

All guideline development projects should incorporate a set of standard outcome and quality measures to facilitate evaluation of the EBG. Evaluation components should include if the implementation was successful; if the EBG is associated with improved outcomes, reduced costs, and a better patient experience; and if the EBG is being continuously updated as new evidence is generated. These can be utilized by end-users and administrators in assessing the impact of guidelines after implementation and lead to additional improvements as a continual process. Funders of EBG projects should consider incorporating these outcome and quality measures as part of an evaluation component for funding guideline projects. Impact analysis findings should be disseminated to funding agencies and guideline developers so that funding and further research can refine future guideline development efforts.

Action Item #7: Promote Funding for the Development, Implementation, and Evaluation of Prehospital Evidence-Based Guidelines

Continued funding for evidence-based guideline development is essential and will dictate the speed by which we are able to advance to having a comprehensive set of prehospital evidence-based guidelines. In its 2012 Summary Recommendations, NEMSAC recommended that FICEMS work with NHTSA, the National Institutes of Health (NIH), the National Quality Forum (NQF), and the Agency for Healthcare Research and Quality (AHRQ) to create funding sources specifically for EMS research in order to support the development of EBGs.⁴ Furthermore, NEMSAC recommended that FICEMS work with NHTSA, AHRQ, and other member agencies to create Center(s) of Excellence for EMS EBG development. Our stakeholder representatives have widely supported these recommendations as the optimal mechanism to advance the development of prehospital EBG, yet the creation of Center(s) of Excellence for

EMS EBG development requires a level of funding that has not yet been realized. In the short term, we recommend continued support from Federal partners and other EMS and medical organizations to fund new projects to develop, implement, and evaluate prehospital evidence-based guidelines.

Essential to maximizing the effectiveness of funded EBG development efforts is ensuring that projects are efficient in the use of resources and have the greatest reach in implementation. The proposed Prehospital Guidelines Consortium would support more efficient guideline development through improved communication and structured mechanisms for stakeholders to review and support new guidelines. This includes supporting standards for guideline development that are supported by stakeholders, including the EBG Model Process,³ The Consortium would facilitate the development and distribution of tools for education and implementation of guidelines, potentially maximizing the adoption of those guidelines. Evidence-based practice centers for guideline development could help facilitate the EBG process as well. These uniform processes and improved collaboration among stakeholders have the potential to result in long-term cost-savings not realized by the perpetual recreation of all components of guideline development and implementation by individual project teams.

EVALUATION PLAN

Implementation of this Strategy should be evaluated at regular intervals by the National Association of EMS Physicians as lead organization, initially recommended at 3 and 5 years from publication of the Strategy. This evaluation should incorporate structured evaluation components as outlined below,⁴⁵ and identify the completion of performance measures in each action item of the Strategy. The evaluation may include the following elements:

1. *Context* – Aspects of the social, political, and economic environment that may influence implementation of the Strategy. Measures should include:
 - a. Changes in organizations that impact their recommended role and involvement in various action items of the Strategy.
 - b. Identification of new stakeholders that should be involved in the Strategy.
 - c. Changes in funding availability that may impact prehospital EBGs projects.
2. *Recruitment* – The methods by which organizations were included in the implementation of the Strategy. Measures should include:
 - a. Recruitment measures performed to encourage organizations to participate in the first meeting of the Prehospital Guidelines Consortium.
 - b. Recruitment measures delivered to encourage stakeholder representatives to be involved in working groups of the Consortium, which will lead the completion of other elements of the Strategy.

3. *Reach* – Identifying the target audience of EMS stakeholders and the degree to which the Strategy reached those it was intended to affect. Measures should include:
 - a. The number of organizations listed as “Responsible” in Action Item #1 that participate in the formation of the Prehospital Guidelines Consortium.
 - b. The number of organizations listed as “Consulted” in Action Item #1 that collaborate and provide input in formation of the Consortium.
 - c. Delivery of communication to EMS stakeholders on the performance of the Strategy’s other action items.
4. *Dose Delivered* – The amount of the Strategy interventions that were implemented. Dose delivered is a function of efforts of those who are promoting prehospital evidence-based guidelines. Measures should include:
 - a. Formation of the Prehospital Guidelines Consortium within the specified timeline.
 - b. Formation of workgroups within the Consortium within the specified timeline.
 - c. Creation and distribution of resource documents as specified in the Strategy.
5. *Dose Received* – The extent to which the target audience (who is being asked to develop, utilize, or evaluate prehospital EBGs) actively engage with, interact with, are receptive to, and/or use materials or recommended resources. Measures should include:
 - a. Use of work products of the Prehospital Guidelines Consortium (such as its resource documents) by EMS stakeholders, including incorporation of recommendations into future EBG proposals.
 - b. Incorporation of evidence-based medicine into initial and continuing EMS education curricula and standards.
 - c. Incorporation of an evaluation component in published prehospital evidence-based guidelines.
6. *Fidelity* – The extent to which the Strategy was carried out as planned. Measures should include:
 - a. The extent to which the action items were carried out as planned by the writers of the Strategy and participating stakeholder groups.

CONCLUSION

Recent recommendations from the NEMSAC and from the FICEMS Strategic Plan support the creation of a sustainable national Strategy for the development, implementation, and evaluation of prehospital evidence-based guidelines. This Strategy must be built on a strong foundation of stakeholder involvement with close collaboration and synergism of efforts among organizations and institutions that are actively involved in all aspects of prehospital care. Creation of a Prehospital Guidelines Consortium would improve communication among stakeholders and EBG project groups, improve efficiency of EBG development, and support more widespread

adoption of prehospital EBGs. Other elements of this Strategy promote EMS research that supports EBG development and education of EMS providers in evidence-based medicine, one of several components that may lead to improved implementation of EBGs.

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Appendix A – The National Prehospital Evidence-Based Guideline Strategy

RACI Matrix Overview

A RACI Matrix is a project management tool that depicts the functions of specific parties or roles in the performance of particular actions or tasks. Use of a RACI matrix can help ensure that all parties both have input into and are aware of the duties expected of them. For each action, an organization may be assigned one of the positions shown in the table below:

Responsible	Accountable	Consulted	Informed
The role or roles that actually perform the action required by the task.	The role that is finally answerable for the task.	The role or roles whose inputs are solicited prior to the task.	The role or roles to which the outcome is communicated following completion.
<i>Who has the action on this activity?</i>	<i>Who is “on the hook” for this activity?</i>	<i>From whom do we have to obtain input?</i>	<i>Who needs to know about this?</i>

Accountable – One organization will be accountable for each of the items of this Strategy. For creation of the Prehospital Guidelines Consortium (PGC), a single organization (NAEMSP) is accountable for the initial establishment of this entity. The Consortium will then choose what organization provides continued administrative and logistical support for its operations, including managing its budget. For other action items in the Strategy, the PGC is accountable to ensure each of the stated objectives is carried out through involvement of its workgroups and appropriate stakeholders.

Responsible – For action item #1 (formation of the Consortium), Responsible organizations are proposed to lead the core work of the PGC and form an Executive Committee of the Consortium. For other action items, “Responsible” organizations are proposed to lead the related workgroups of the PGC and have leadership roles in carrying out related objectives.

Consulted – Input will be solicited from stakeholders identified as “Consulted” for each of the action items of the Strategy. These organizations are anticipated to have an active role in the workgroups of the PGC and facilitate carrying out related objectives.

Informed – Stakeholders identified as “Informed” for each of the action items of the Strategy will receive specific communication about the activities performed under specific strategies and the completion of stated objectives. These stakeholders will be invited to have an active role in the PGC, including participation in its workgroups.

The roles as identified in this Strategy may be modified as needed during implementation of the Strategy and as the needs and involvement of specific organizations change.

Action Item 1: Create a Prehospital Guidelines Consortium (PGC)

Objective: To create a Consortium of representatives from stakeholder organizations to facilitate and promote prehospital EBG development, implementation, and evaluation.

Value: The implementation of evidence-based guidelines has been shown to improve processes of care and patient outcomes. Deriving scientific evidence and synthesizing literature is complex work. A PGC can help to increase the amount and quality of guidelines applicable to EMS.

Organizations Supported by this Action Item: EMS and medical organizations that are currently, or are in a position to be, involved in activities related to EBG development, implementation, and evaluation. The Consortium would also facilitate liaison relationships with research institutions and Federal agencies involved in prehospital EBG-related projects.

Resources Required:

- Funding to support the operations of the Consortium, provided by the core organizations forming the Consortium’s Executive Committee (refer to proposed annual budget in Appendix E)
- Financial support for individuals to participate in the Consortium, including its workgroups (at a minimum, organizations should support travel and other costs for their representatives to participate in the Consortium’s annual meeting and relevant workgroup activities)
- At the first meeting of the Consortium, the Executive Committee must determine the member organization(s) that will manage the budget and provide administrative support

Barriers to Completion:

- Securing a reliable, consistent source of funding for the operation of the Consortium (members of the Consortium Executive Committee capable of providing this support should be identified very early and agree to a minimum shared level of support)
- Need for administrative support for operations of the Consortium (NAEMSP has offered to coordinate the initial formation and meeting of the Consortium; following the initial meeting of the Consortium and designation of Executive Committee members through consultation with stakeholders, a lead organization should be selected by the Consortium to provide continued administrative support and coordination of the budget)

Performance Measures and Timetable for Completion:

Performance Measures:

1. Formation of the Prehospital Guidelines Consortium
2. Meetings of the Prehospital Guidelines Consortium

Timetable for Completion:

- Formation within 1 year of publication of the Strategy
- One annual meeting and at least three quarterly conference calls

Action Item 2: Promote Research Related to Prehospital Evidence-Based Guidelines

Objectives: To promote research related to prehospital EBGs through an open, consensus process, including:

1. Promoting research that can be utilized to create or update prehospital guidelines, that evaluates the effectiveness of guidelines, or that identifies evidence-based processes for implementing EBGs into practice
2. Creating and maintaining a research gap document related to prehospital EBGs
3. Providing support for EBG-related research projects

Value: Vast efforts go into the science that leads to a guideline. While EMS organizations value prehospital research, many lack the local expertise or resources to execute large, high-quality scientific endeavors. Further, partnership with research institutions, hospitals, and community providers may require expertise and relationships between these stakeholders, and can be challenging to establish. The Prehospital Guidelines consortium can assist to coordinate and promote research, partnerships, and opportunities to develop and execute EMS research, as well as provide support for funding opportunities for research institutions, national organizations, and individual EMS agencies.

Organizations Supported by this Action Item: Research institutions, medical organizations, EMS organizations, EMS agencies and individuals that participate in the performance or evaluation of research related to prehospital EBGs, and Federal agencies that fund and otherwise support prehospital research.

Resources Required:

- Workgroup within the PGC to work on research components of this Strategy with participation of scientists and leaders in the field of EMS research and EBG development
- Maintenance of a database of research related to EMS EBGs

Barriers to Completion:

- Potential limited acceptance of research recommendations of the Consortium by those who will actually conduct the research (being addressed by the inclusive and iterative nature of the current process)
- Sufficient research funding is needed to attract researchers and fill the gaps that exist, allowing the creation of additional prehospital EBGs

Performance Measures and Timetable for Completion:

Performance Measures:

1. Creation of a research-related workgroup and meeting schedule
2. Creation of a prehospital EBG-related research gap document
3. Review and support of EBG-related research projects

Timetable for Completion:

- Performed during the first meeting of the PGC
- Performed by the PGC within 3 years of publication of the Strategy and updated on a regular, scheduled basis
- Performed by the PGC on a regular, scheduled basis

Action Item 2: Promote Research Related to Prehospital Evidence-Based Guidelines (Continued)

Responsibility Assignment:

R = Responsible		A = Accountable		C = Consulted		I = Informed																																								
NATIONAL MEDICAL ORGANIZATIONS				EMERGENCY MEDICAL SERVICES ORGANIZATIONS				RESEARCH INSTITUTIONS	FEDERAL PARTNERS																																					
PGC	AMPA	AAEM	AAP	ACEP	ACOEP	ACS-COT	AHA		ARC	ASA	ENA	NAEMSP	MDMA	SAEM	SEMPA	STN	AAA	CAAS	CAMTS	CoAEMSP	CFSI	CECBEMS	IAED	IAEMSC	IAFC	IAFF	IAFCCP	ITLS	NAEMSE	NAEMT	NAEMSO	NCEMSF	NEMSAC	NEMSMA	NREMT	NVFC	AHRQ/COE	HRSA/EMSC	HRSA/ORHP	ASPR	OHA	NHTSA	HIS/DCCS	NIH/OECR		
A	R	R	R	R	R	R	R	C	R	I	R	I	R	I	I	I	I	I	I	I	I	C	C	C	C	C	R	R	R	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	R	R

Action Item 3: Promote Development of Prehospital Evidence-Based Guidelines

Objectives: To promote and streamline processes for guideline development by:

1. Developing a topic agenda for prehospital EBG development using a structured methodology
2. Create a guidance document that identifies individuals and institutions and that can assist with the guideline development process, best practices in guideline development, and a suggested process and timeline for guideline revisions

Value: The EMS industry is a maturing field. While evidence-based medicine (EBM) is a valued philosophy, many EMS organizations lack the local resources or expertise to evaluate scientific evidence and create guidelines. Further, there are often many stakeholders impacted by guidelines. A Prehospital Guidelines Consortium can help to promote funding and coordinate development of high-quality EBM in EMS by acting as a liaison between stakeholders involved in these efforts.

Organizations Supported by this Action Item: Medical and EMS organizations that develop or are in a position to develop prehospital evidence-based guidelines, as well as research institutions and Federal partners that develop, fund, or assist in the development of prehospital EBGs.

Resources Required:

- Guideline development-related workgroup within the PGC with participation of leaders, content experts, and other stakeholders involved in EBG development

Barriers to Completion:

- There may be challenges in reaching consensus on the priority of new individual EBGs (focus should be on common medical conditions associated with high patient acuity and those conditions that are most likely to be improved by a structured EBG approach to treatment)

Performance Measures and Timetable for Completion:

Performance Measures:

1. Creation and maintenance of a guidance document that identifies:
 - a. Stakeholders, content experts, methodology experts, and institutions that can assist in the guideline development process
 - b. Best practices for guideline development
 - c. A standardized process for individual guideline review and support by stakeholder organizations
2. Development of a gap analysis and topic agenda for prehospital guideline development

Timetable for Completion:

- Performed by the PGC within 3 years of publication of the Strategy and updated on a regular, scheduled basis
- Performed by the PGC within 5 years of publication of the Strategy and updated on a regular, scheduled basis

Action Item 3: Promote Development of Prehospital Evidence-Based Guidelines (Continued)

Responsibility Assignment:

R = Responsible		A = Accountable		C = Consulted		I = Informed																																					
NATIONAL MEDICAL ORGANIZATIONS				EMERGENCY MEDICAL SERVICES ORGANIZATIONS				RESEARCH INSTITUTIONS	FEDERAL PARTNERS																																		
PGC	AMPA	AAEM	AAP	ACEP	ACOEP	ACS-COT	AHA		ARC	ASA	ENA	NAEMSP	MDMA	SAEM	SEMPA	STN	AAA	CAAS	CAMTS	CoAEMSP	CFSI	CECBEMS	IAED	IAEMSC	IAFC	IAFF	IAFCCP	ITLS	NAEMSE	NAEMT	NAEMSO	NCEMSF	NEMSAC	NEMSMA	NREMT	NVFC	AHRQ/COE	HRSA/EMSC	HRSA/ORHP	ASPR	OHA	NHTSA	HIS/DCCS
A	R	R	R	R	R	R	R	C	R	I	R	I	R	I	I	C	C	C	C	I	C	C	C	C	C	C	C	R	C	C	C	C	C	C	C	R	C	C	R	C	C		

Action Item 4: Promote Education Related to Prehospital Evidence-Based Guidelines

Objectives: To incorporate EBG concepts into education for EMS providers, educators, managers, regulators, physicians, and EMS-affiliated staff by:

1. Incorporating the basic principles of evidence-based medicine (EBM), as well as individual prehospital EBG content, into initial and continuing EMS provider education and certification examinations for EMS providers of all levels
2. Streamline the process for distribution of educational content upon publication of the individual EBGs to EMS and affiliated providers
3. Promote the creation of educational resources for individuals and organizations that will create guidelines

Value: EMS providers, managers, regulators and medical directors have specialized knowledge, but may lack strong understanding of scientific principles such as critical appraisal, epidemiology, research methods and biostatistics. A PGC can help coordinate multiple media (such as web resources or toolkits) that address research literacy, research design, project management and research analytics at a variety of levels, from field providers to legislators.

Organizations Supported by this Action Item: EMS organizations and medical organization affiliated with EMS, especially those that are most directly involved in the initial and continuing education of EMS providers.

Resources Required:

- Education-related workgroup within the PGC
- Online and print communication tools to disseminate educational content related to EBGs in an efficient manner

Barriers to Completion:

- Local EMS agencies and agency medical directors may be hesitant to adopt evidence-based medicine principles and EBG content into their current protocols, which may be thought to better apply to their local jurisdiction
- Incorporation of EBGs into provider training material, testing, and field protocols will require broad acceptance of EBGs by all levels of providers (this may be supported by the existence of a PGC with representatives from EMS professional and subspecialty organizations)

Performance Measures and Timetable for Completion:

Performance Measures:

1. Incorporation of EBM principles into new publications of national curricula, core content, educational standards, and standardized examinations in EMS
2. Creation of an education-related guidance document providing awareness of prehospital EBGs, encouraging their use, and providing model educational methods, resources, and sample content to educate providers about new EBGs
3. Creation of a process for dissemination of educational content on newly published EBGs to medical/EMS organizations and EMS agencies

Timetable for Completion:

- Performed by responsible organizations below within 3 years of publication of the Strategy
- Performed by the PGC within 3 years of publication of the Strategy and updated on a regular, scheduled basis
- Performed by the PGC, NAEMSP, NASEMSO, and state EMS offices within 3 years of publication of the Strategy

Action Item 4: Promote Education Related to Prehospital Evidence-Based Guidelines (Continued)

Responsibility Assignment:

R = Responsible		A = Accountable		C = Consulted		I = Informed																																					
NATIONAL MEDICAL ORGANIZATIONS				EMERGENCY MEDICAL SERVICES ORGANIZATIONS				RESEARCH INSTITUTIONS	FEDERAL PARTNERS																																		
PGC	AMPA	AAEM	AAP	ACEP	ACOEP	ACS-COT	AHA		ARC	ASA	ENA	NAEMSP	MDMA	SAEM	SEMPA	STN	AAA	CAAS	CAMTS	CoAEMSP	CFSI	CECBEMS	IAED	IAEMSC	IAFC	IAFF	IAFCCP	ITLS	NAEMSE	NAEMT	NAEMSO	NCEMSF	NEMSAC	NEMSMA	NREMT	NVFC	AHRQ/COE	HRSA/EMSC	HRSA/ORHP	ASPR	OHA	NHTSA	HIS/DCCS
A	C	C	C	C	C	C	C	C	C	C	R	I	C	I	I	I	C	C	C	I	R	C	C	C	C	C	R	R	R	C	C	C	C	C	I	C	I	I	I	C	I	I	

Action Item 5: Promote the Implementation of Prehospital Evidence-Based Guidelines

Objectives: To promote the implementation of prehospital EBGs by:

1. Providing a mechanism for review and vetting of guidelines through a Prehospital Guidelines Consortium and its member stakeholder organizations
2. Promoting the incorporation of tools that facilitate implementation as part of each guideline development project
3. Supporting the development of implementation science to identify best practices for implementation
4. Developing mechanisms for widespread and structured distribution of guidelines upon publication
5. Developing a recommended timeline for implementation and revision in guideline development projects

Value: Implementation of guidelines is essential for benefit to be realized. A Prehospital Guidelines Consortium can promote guideline implementation through early engagement, endorsement and promotion to a variety of stakeholders. A PGC can facilitate multiple dissemination mechanism to shorten the gap between “what we know and what we do”. Enhanced efforts to facilitate EBG implementation will help maximize the efforts of national organizations, research institutions, and individual leaders who develop prehospital EBGs.

Organizations Supported by this Action Item: EMS organizations, medical organizations, research institutions, EMS agencies and EMS leaders that are currently involved in or are in a position to be involved in activities related to EBG development and implementation, and Federal agencies that are in a position to fund or implement EBG efforts.

Resources Required:

- Implementation-related workgroup within the PGC
- Updated contact information and methods of distributing EBGs to state EMS offices (could incorporate NASEMSO in this process)

Barriers to Completion:

- Obtaining support from stakeholders for individual guidelines may be a continual barrier to implementation (strong communication with and participation of stakeholders throughout development and implementation may facilitate widespread acceptance and adoption)
- Perceptions of bias or conflict of interest could adversely impact implementation (this should be explicitly addressed in all EBG publications)

Performance Measures and Timetable for Completion:

Performance Measures:

1. Creation of a prehospital EBG implementation resource document that identifies:
 - a. A structured process for review and vetting of EBGs by the Prehospital Guidelines Consortium and its members
 - b. A structured process to distribute new EBGs to state EMS offices, EMS medical directors, and EMS training centers
 - c. Identified best practices for prehospital evidence-based guideline implementation

Timetable for Completion:

- Performed by the PGC in collaboration with NAEMSP, NASEMSO, and state EMS offices within 3 years of publication of the Strategy.

Action Item 6: Promote Standardized Evaluation Methods for Prehospital Evidence-Based Guidelines

Objectives: To promote standardized evaluation methods for prehospital EBGs by:

1. Identifying evidence-based quality improvement and impact analysis methods for use by guideline developers, EMS administrators, and government regulators to aid in efforts that evaluate guideline impact
2. Promoting the use of outcome and quality measures as part of guideline development and implementation
3. Promoting dissemination of impact analysis findings

Value: As our knowledge of medicine and science advances, so do the standards to which guidelines are held. By engaging experts and stakeholders, a Prehospital Guidelines Consortium can promote quality through the development of standardized evaluation methods for guidelines. Many tools to assess guideline quality currently exist, and through consultation could be modified slightly to account for special circumstances faced by the EMS industry.

Organizations Supported by this Action Item: EMS organizations, medical organizations, and research institutions that develop or implement EBGs, and Federal agencies that are in a position to fund, implement, or evaluate EBG efforts.

Resources Required:

- Funding for an evaluation component to all EBG projects, which should be specified in the general budget for all EBG development projects
- Cooperation with hospitals, health care systems, or public health organizations to provide outcome data for patients cared for by EMS providers using EBG-derived protocols

Barriers to Completion:

- Difficulty and expense of linking patient outcome data with primary EMS data (development of a common data entry system that would allow NEMSIS data to be correlated with billing data, trauma data, or other large repositories of patient outcome data would improve the likelihood of evaluating the effect of EBG implementation)

Performance Measures and Timetable for Completion:

Performance Measures:

1. Inclusion of an evaluation component in all national prehospital EBG development and implementation projects (including standard outcome and quality measures, and optimally utilizing data available from NEMSIS, supplemented by other uniform data repositories)

Timetable for Completion:

- Performed by any new EBG project groups within 5 years of publication of the Strategy

Action Item 7: Promote Funding for the Development, Implementation, and Evaluation of Prehospital Evidence-Based Guidelines

Objectives: To promote additional funding for the development, implementation, and evaluation of EBGs by:

1. Identifying funding sources that can support future development, implementation, and evaluation of EBGs
2. Identifying resources that can be accessed by EBG development groups to assist with evidence collection and review
3. Providing a mechanism for individuals and organizations seeking funding for EBG development projects to receive support from EMS stakeholders who will be in a position to implement those guidelines

Value: Development, implementation, and evaluation of EBGs requires continued funding of research institutions, organizations, EMS agencies and individuals to invest the time and resources required for robust products that positively impact patient care. A Prehospital Guidelines Consortium can promote funding for prehospital EBG-related projects and connect independent groups carrying out these efforts with funders and other stakeholders in a manner that increases efficiency and cost-effectiveness of individual projects.

Organizations Supported by this Action Item: EMS organizations, medical organizations, and research institutions that develop or implement EBGs, and Federal agencies that are in a position to fund, implement, or evaluate EBG efforts.

Resources Required:

- Funding-related workgroup within the PGC that can identify funding agencies and facilitate contact with medical and EMS organizations, research institutions, and other groups that are interested in developing EBGs
- In the long term, creation of Center(s) of Excellence for EMS EBG development as previously recommended by the NEMSAC

Barriers to Completion:

- Limited availability of funding for continued efforts to develop and implement prehospital evidence-based guidelines
- Availability of funding for Center(s) of Excellence for EMS EBG development

Performance Measures and Timetable for Completion:

Performance Measures:

1. Provision of additional financial support in the form of grants for efforts related to the development, implementation, or evaluation of prehospital EBGs
2. Creation of a workgroup to identify funding sources, as well as facilitate contacts between funders and organizations, research institutions, and other groups that are interested in developing EBGs

Timetable for Completion:

- Performed by Federal agencies such as NHTSA and HRSA/EMSC on a continual basis
- Performed by the PGC within 2 years of publication of the Strategy

Action Item 7: Promote Funding for the Development, Implementation, and Evaluation of Prehospital Evidence-Based Guidelines (Continued)

Responsibility Assignment:

R = Responsible		A = Accountable		C = Consulted		I = Informed																																					
NATIONAL MEDICAL ORGANIZATIONS				EMERGENCY MEDICAL SERVICES ORGANIZATIONS				RESEARCH INSTITUTIONS	FEDERAL PARTNERS																																		
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A	C	C	C	C	C	C	C	C	C	I	R	I	C	I	I	C	C	C	C	C	I	C	C	C	C	C	I	I	C	R	C	C	C	C	C	C	R	C	C	R	C	R	

Appendix B

The Steering Committee for the National Prehospital Evidence-Based Guidelines Strategy

Role	Name	Affiliation
Principal Investigator	Christian Martin-Gill, MD, MPH	University of Pittsburgh
Writing Team Members	Blair Bigham, MSc, ACPf Joshua B. Gaither, MD Douglas F. Kupas, MD J. Brent Myers, MD, MPH Daniel W. Spaite, MD	St. Michael's Hospital University of Arizona Geisinger Health System Wake County Department of Emergency Medical Services University of Arizona
Contracting Office Technical Representative	Catherine S. Gotschall, ScD	National Highway Traffic Safety Administration
Project Manager	Stephanie Newman	National Association of EMS Physicians

Appendix C
EMS Stakeholder Organizations

Stakeholder Organizations	Strategy Action Item Roles						
	#1	#2	#3	#4	#5	#6	#7
Lead Organization							
National Association of EMS Physicians (NAEMSP)	A	R	R	R	R	R	R
Strategy Sponsors							
Department of Transportation, National Highway Traffic Safety Administration, Office of Emergency Medical Services (NHTSA/OEMS)	C	R	R	C	R	R	R
Department of Health and Human Services, Health Resources and Services Administration, EMS for Children Program (HRSA/EMSC)	C	R	R	C	R	R	R
National Medical Organizations							
Air Medical Physicians Association (AMPA)	R	R	R	C	R	R	C
American Academy of Emergency Medicine (AAEM)	R	R	R	C	R	R	C
American Academy of Pediatrics (AAP)	R	R	R	C	R	R	C
American College of Emergency Physicians (ACEP)	R	R	R	C	R	R	C
American College of Osteopathic Emergency Physicians (ACOEP)	R	R	R	C	R	R	C
American College of Surgeons Committee on Trauma (ACS-COT)	R	R	R	C	R	R	C
American Heart Association (AHA)	R	R	R	C	R	R	C
American Red Cross (ARC)	C	C	C	C	C	C	C
American Stroke Association (ASA)	C	R	R	C	R	R	C
Emergency Nurses Association (ENA)	C	I	I	C	C	I	I
Medical Device Manufacturers Association (MDMA)	I	I	I	I	I	I	I
Society for Academic Emergency Medicine (SAEM)	R	R	R	C	R	R	C
Society of Emergency Medicine Physician Assistants (SEMPA)	I	I	I	I	I	I	I
Society of Trauma Nurses (STN)	I	I	I	I	I	I	I

Stakeholder Organizations (continued)	Strategy Action Item Roles						
	#1	#2	#3	#4	#5	#6	#7
Emergency Medical Services Organizations							
American Ambulance Association (AAA)	C	I	C	I	C	C	C
Commission on Accreditation of Ambulance Services (CAAS)	C	I	C	C	R	C	C
Commission on Accreditation of Medical Transport Services (CAMTS)	C	I	C	C	R	C	C
Committee on Accreditation of Educational Programs for the Emergency Medical Services Professionals (CoAEMSP)	C	I	C	C	C	C	C
Congressional Fire Services Institute (CFSI)	I	I	I	I	I	I	C
Continuing Education Coordinating Board for EMS (CECBEMS)	C	I	C	R	C	C	I
International Academies of Emergency Dispatch (IAED)	C	C	C	C	R	C	C
International Association of EMS Chiefs (IAEMSC)	C	C	C	C	R	C	C
International Association of Fire Chiefs (IAFC)	C	C	C	C	R	C	C
International Association of Fire Fighters (IAFF)	C	C	C	C	R	C	C
International Association of Flight and Critical Care Paramedics (IAFCCP)	C	C	C	C	R	C	C
International Trauma Life Support (ITLS)	I	I	C	C	R	I	I
National Association of EMS Educators (NAEMSE)	R	C	C	R	R	C	I
National Association of EMTs (NAEMT)	R	R	C	R	R	R	C
National Association of State EMS Officials (NASEMSO)	R	R	R	R	R	R	R
National Collegiate Emergency Medical Services Foundation (NCEMSF)	C	C	C	C	R	C	C
National EMS Advisory Council (NEMSAC)	C	C	C	C	C	C	C
National EMS Management Association (NEMSMA)	C	C	C	C	R	R	C
National Registry of EMTs (NREMT)	R	R	C	R	R	R	C
National Volunteer Fire Council (NVFC)	C	C	C	C	R	C	C

Stakeholder Organizations (continued)	Strategy Action Item Roles						
	#1	#2	#3	#4	#5	#6	#7
Research Institutions*	I	C	C	C	C	C	C
Baylor College of Medicine							
Children's National Health System							
Dalhousie University							
EMSC National Resource Center							
Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group							
International Liaison Committee on Resuscitation (ILCOR)							
Johns Hopkins University							
Resuscitation Outcomes Consortium (ROC)							
University of Maryland, National Center for the Study of Trauma and EMS							
University of North Carolina							
University of Pittsburgh							
Federal Partners							
Department of Health and Human Services, Agency for Healthcare Research and Quality Center for Outcomes and Evidence (AHRQ/COE)	C	C	C	I	C	C	C
Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy (HRSA/ORHP)	C	C	C	I	C	C	C
Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response (ASPR)	C	C	C	I	C	C	C
Department of Homeland Security, Office of Health Affairs (OHA)	C	C	C	I	C	C	C
Indian Health Service, Division of Clinical and Community Services (IHS/DCCS)	C	C	C	I	C	C	C
National Institute of Health, Office of Emergency Care Research (NIH/OECR)	C	R	C	I	C	C	R

*Listed research institutions include a representative group engaged in the development of the National Prehospital Evidence-Based Guidelines Strategy and is not inclusive of all research institutions involved in prehospital EBG-related efforts. Involvement and consultation of research institutions as part of this Strategy should continue to involve a representative group, which may differ from this list.

Appendix D
Stakeholder Meeting Presentations and Small-Group Sessions

Session	Presenter/Lead Discussant
EBG Strategy Project Overview	Christian Martin-Gill, MD
Critical Concepts in EBG Development	Eddy Lang, MD
Recent Prehospital EBG Efforts	
Characteristics of Statewide Protocols for Emergency Medical Services in the United States	Douglas F. Kupas, MD
The Development of Evidence-based Prehospital Guidelines Using a GRADE-based Methodology	Kathleen Brown, MD
Statewide Implementation of a Prehospital Care Guideline Project	Matthew Sholl, MD & Peter Taillac, MD
Integrating Evidence-Based Pediatric Prehospital Protocols Into Practice	Manish Shah, MD
Pediatric Evidence-Based Guidelines: Assessment of EMS Systems Utilization in States (PEGASUS)	Manish Shah, MD
An Evidence-based Guideline for External Hemorrhage Control in the Prehospital Setting	Eileen Bulger, MD
Evaluation of the Statewide Implementation of the EMS TBI Guidelines in Arizona	Daniel Spaite, MD
Evaluation of OHCA/AHA EBGs for CPR Quality and for Dispatcher-Assisted CPR in Arizona	Bentley Bobrow, MD
National Association of State EMS Officials Model EMS Clinical Guidelines	Carol Cunningham, MD
Challenges to Development and Implementation of Prehospital EBGs	Daniel W. Spaite, MD
Development of an EBG Strategy	Christian Martin-Gill, MD
Next Steps for EBG Development and Implementation (Small Group Sessions)	
Promotion of Research Supporting EBG Development and Implementation	Blair Bigham, MSc, ACPf
Promotion of EBG Development Among Emergency Physicians, Prehospital Care Providers, and EMS Officials	Douglas F. Kupas, MD
Incorporation of Newly Developed EBGs into EMS Education Standards and Continued Competency Training	Joshua B. Gaither, MD
Best Practices for EBG Implementation in States with Statewide Protocols	Douglas F. Kupas, MD
Best practices for EBG Implementation in States with Regional or Locally-Developed Protocols	J. Brent Myers, MD
Use of Evidence-Based Guidelines by Individual Providers	Blair Bigham, MSc, ACPf
Summary of Next Steps for EBG Development and Implementation	EBG Steering Committee

Appendix E

Proposed Annual Operating Budget for the Prehospital Guidelines Consortium

Item	Unit Cost	Units	Total	Notes
Annual Meeting				
Meeting Room	\$ 0.00	1.00	\$ 0.00	Incorporated in annual meeting of host stakeholder organization (no additional cost)
Meals/Breaks	\$ 86.00	80.00	\$6,880.00	
Audio/Visual	\$1,000.00	1.00	\$ 1,000.00	
Conference Calls	\$30.00	20.00	\$ 600.00	Includes general Consortium and individual workgroup conference calls
Supplies				
Photocopies	\$50.00	1.00	\$50.00	
Postage/Shipping	\$75.00	1.00	\$75.00	
Website	\$ 0.00	1.00	\$ 0.00	Incorporated in host stakeholder organization website (no additional cost)
Other Supplies	\$100.00	1.00	\$100.00	
Administrative Support				
Misc. Administrative Support	\$90.00	48.00	\$4,320.00	
Accounting	\$90.00	12.00	\$1,080.00	
Meeting Planning	\$90.00	5.00	\$450.00	
Total Expenses			\$ 14,555.00	

Appendix F
Disclosures of Potential Conflicts of Interest

Writing Group	Employment	Research Grant	Other Research Support	Speakers' Bureau/ Honoraria	Ownership Interest	Consultant/ Advisory Board	Other
Blair Bigham, MSc, ACPf	Ornge Transport Medicine	None	None	None	None	MedicAlert Foundation of Canada	None
Joshua B. Gaither, MD	University of Arizona	NIH/NINDS: (Traumatic Brain Injury); Philips Corporation & Zoll Medical (Real-Time Audio-Visual Feedback in CPR)	None	None	None	None	None
Douglas F. Kupas, MD	Geisinger Health System; Pennsylvania Department of Health	None	None	None	None	None	None
Christian Martin-Gill, MD, MPH	University of Pittsburgh; University of Pittsburgh Medical Center	None	None	None	None	None	None
J. Brent Myers, MD, MPH	University of North Carolina; Wake County Department of EMS	None	None	None	None	None	None
Daniel W. Spaitte, MD	University of Arizona	NIH/NINDS: EPIC Study, Implementing the EMS EBGs statewide in Arizona	Medtronic Foundation, Implementing OHCA EBGs statewide in Arizona	None			