

Prehospital Evidence-Based Guideline Implementation Toolkit

V 3.0



This prehospital evidence-based guideline implementation toolkit was initially created in collaboration with representatives from the [National Association of State EMS Officials](#) and has been updated by representatives of the [Prehospital Guidelines Consortium](#). This toolkit draws from the prior Statewide Implementation of a Prehospital Care Guideline Toolkit v2.1 funded by a cooperative agreement through the U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Emergency Medical Services (DTNH22-12-H-00386) with supplemental funding from the Emergency Medical Services for Children Program (Health Resources and Services Administration).

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1. Introduction to Evidence-Based Guidelines

Background and Significance

This Prehospital Evidence-Based Guideline Implementation Toolkit provides an update to the previous [Statewide Implementation of a Prehospital Care Guideline Toolkit v2.1](#) created by the National Association of State EMS Officials (NASEMSO) in concert with the Evidence-based Guideline for Prehospital Analgesia in Trauma.¹ This update was performed by the Prehospital Guidelines Consortium, comprised at the time of this version of stakeholders representing 36 national organizations dedicated to the clinical care and operations of Emergency Medical Services, and the promotion of evidence-based guidelines (EBGs) for prehospital care. This update was performed in continued collaboration with the National Association of State EMS Officials.

Medical oversight of EMS systems in the United States includes the use of standardized patient care protocols or treatment guidelines, which often vary by location. While 21 (42%) states have been identified as having mandatory statewide EMS protocols at either the BLS or ALS levels and 17 (34%) states had model protocols, 12 (24%) had neither.² Differences in legal statutes or regulations that address the creation of EMS protocols at the local, county, regional, or state level result in variability in patient care guidelines across regions for identical clinical conditions.

Evidence-based guidelines have been promoted by multiple national medical and EMS organizations, along with Federal entities, as a means of increasing the scientific evidence available to guide patient care delivered by EMS, provide consistency in practice, and facilitate standardized evaluation methods through which EMS systems can measure their performance. Specific recommendations that have led to an increased emphasis for the development and implementation of prehospital EBGs are outlined below.

[IOM Recommendation:](#)

In 2007 the Institute of Medicine’s Committee on the Future of Emergency Care recommended that “the National Highway Traffic Safety Administration, in partnership with professional organizations, convene a panel of individuals with multidisciplinary expertise to develop evidence-based model prehospital care protocols for the treatment, triage, and transport of patients” (page 6).

[2011 National EMS Assessment Recommendations:](#)

The 2011 National EMS Assessment included recommendations from an expert panel selected in consultation with the National Association of State EMS Officials. The panel recommended that, “Statewide protocol implementations should be a goal for the future to standardize education, training, care, and evaluation.”

National EMS Advisory Council (NEMSAC) Recommendation:

In May 2012, NEMSAC recommended to NHTSA that “organizations developing evidence-based guidelines (EBGs) should form partnerships with EMS organizations, State and local EMS agencies, as well as EMS agencies in order to assist in decreasing the time to implementing EBGs in the field. Such organizations should also develop implementation toolkits or training curricula to ensure that the EBG is incorporated into clinical practice.”

Federal Interagency Committee on Emergency Medical Services (FICEMS) Recommendation:

In December 2013, FICEMS published a Five-Year Strategic Plan that included a recommendation to “Support the development, implementation, and evaluation of evidence-based guidelines (EBGs) according to the National Prehospital EBG Model Process.”

In 2012, FICEMS and NEMSAC sponsored the development of a model process for the development and implementation of EBGs for prehospital care.³ A short history of the EBG Model Process, including a schematic diagram, can be found [here](#). The National Highway Traffic Safety Administration (NHTSA), following recommendations of FICEMS and NEMSAC, has provided technical and financial support for the development of multiple guidelines using the National EBG Model Process. While not prescriptive, the EBG Model Process is intended to provide a framework for the comprehensive integration of the highest quality medical evidence into the everyday practice of prehospital care and personnel education.

Since the EBG Model Process was introduced, various projects have aimed to test the dissemination and implementation phases of the EBG Model Process and to provide evidence to support further evaluation and refinement of the model. Implementation of evidence-based guidelines remains a challenging aspect of adapting new knowledge into prehospital care.⁴ NHTSA’s Office of EMS has provided technical and financial support for several projects aimed to improve our understanding of these implementation challenges, including the original version of this toolkit. Additional projects have aimed to implement EBGs in various states, including those with or without statewide protocols.⁵ A systematic review of the literature related to implementation of evidence-based guidelines further outlined many of the challenges encountered in prior efforts to implement guidelines across EMS systems.⁴ Barriers to implementation include a lack of detailed implementation methods included with published guidelines, lengthy times between guideline publication and implementation, and heterogeneity of EMS systems leading to different needs for guideline implementation with variable impacts on finances, equipment purchasing, and coordination between out-of-hospital and in-hospital care. While the optimal practices for implementing guidelines in EMS systems is unknown, successful implementation is benefitted through a combination of knowledge about implementation techniques, optimized education about the guideline topic and guidelines in general, and the availability of resources that can be used by leaders and EMS personnel to best understand and use guidelines within their EMS systems.

Purpose of this Toolkit

This toolkit provides practical information about the development and use of evidence-based guidelines for prehospital care. Adapted from the prior toolkit created by NASEMSO through support of NHTSA for the Evidence-based Guidelines for Prehospital Analgesia in Trauma,¹ this updated version was adapted to further address the implementation of guidelines related to any clinical or operational topic relevant to EMS. Resources contained herein include tips on education of EMS personnel as part of guideline implementation and methods for evaluating whether a guideline was successfully implemented and improved patient care. Additional resources on the evaluation of EBG implementation are included.

Additional Information

- [Progress of Evidence-Based Guidelines for Prehospital Emergency Care](#) (prepared by the National Highway Traffic Safety Administration Office of EMS).
- [The Next Steps for Prehospital Care Evidence-Based Guidelines](#) (a draft advisory from NEMSAC's Medical Oversight and Research Committee).
- [Prehospital Evidence-Based Guidelines Fact Sheet](#) (created by the original NASEMSO Statewide Implementation Toolkit project team).
- [The National Prehospital Evidence-Based Guidelines Strategy](#) (created through a cooperative agreement between NHTSA and the National Association of EMS Physicians can be found here).
- [National Prehospital Evidence-Based Guidelines Strategy: A Summary for EMS Stakeholders](#) (a peer-reviewed summary of the Strategy published in Prehospital Emergency Care).
- [Repository of EMS Evidence-Based Guidelines](#) (created by the Prehospital Guidelines Consortium based on a systematic review of the literature by Turner et al.).⁶
- [Other EBG Resources](#) (compiled by the Prehospital Guidelines Consortium).

References

1. Gausche-Hill M, Brown KM, Oliver ZJ, Sasson C, Dayan PS. [An Evidence-based Guideline for Prehospital Analgesia in Trauma](#). *Prehosp Emerg Care* 2014;18 Sup 1:25-34.
2. Kupas DF, Schenk E, Sholl JM, Kamin R. [Characteristics of Statewide Protocols for Emergency Medical Services in the United States](#). *Prehop Emerg Care* 2015;19(2):292-301.
3. Lang ES, Sapite DW, Oliver ZJ, Gotschall C, Swor RA, Sawson DE, Hunt RC. [A National Model for Developing, Implementing, and Evaluating Evidence-based Guidelines for Prehospital Care](#). *Acad Emerg Med* 2012;19:201-209.

4. Fishe JN, Crowe RP, Cash RE, Nudell NG, Martin-Gill C, Richards CT. [Implementing Prehospital Evidence-based Guidelines: A Systematic Literature Review](#). *Prehosp Emerg Care* 2018;22:511-519.
5. Adalgais KM, Sholl JM, Alter R, Gurley KL, Broadwater-Hollifield C, Taillac P. [Challenges in Statewide Implementation of a Prehospital Evidence-based Guideline: An Assessment of Barriers and Enablers in Five States](#). *Prehosp Emerg Care* 2019;23(2):167-178.
6. Turner S, Lang ES, Brown K, Franke J, Workun-Hill M, Jackson C, Roberts L, Leyton C, Bulger EM, Censullo EM, Martin-Gill C. [Systematic Review of Evidence-Based Guidelines for Prehospital Care](#). *Prehosp Emerg Care* 2021;25(2):221-234.

2. Guideline Development

About Evidence-Based Guidelines

What is an evidence-based guideline (EBG)?

In the context of EMS, evidence-based guidelines (EBG) are systematically developed statements developed to assist EMS systems, medical directors, and field personnel in making decisions about appropriate health care for patients in specific clinical situations. Multidisciplinary teams develop EBGs by using rigorous methods to appraise clinical evidence. The EBG approach emerged from the discipline of evidence-based medicine, which involves conscientiously, explicitly, and judiciously using current best evidence in making decisions about patient care, combining individual clinical expertise with the best available clinical evidence from published research. EBGs are an important element for providing an expert synthesis of the evidence and improving the quality of EMS, where practice often varies among locations. Because they promote a consistent approach by prehospital personnel for a given clinical scenario, EBGs can facilitate creation of standards for measuring the quality of prehospital care.

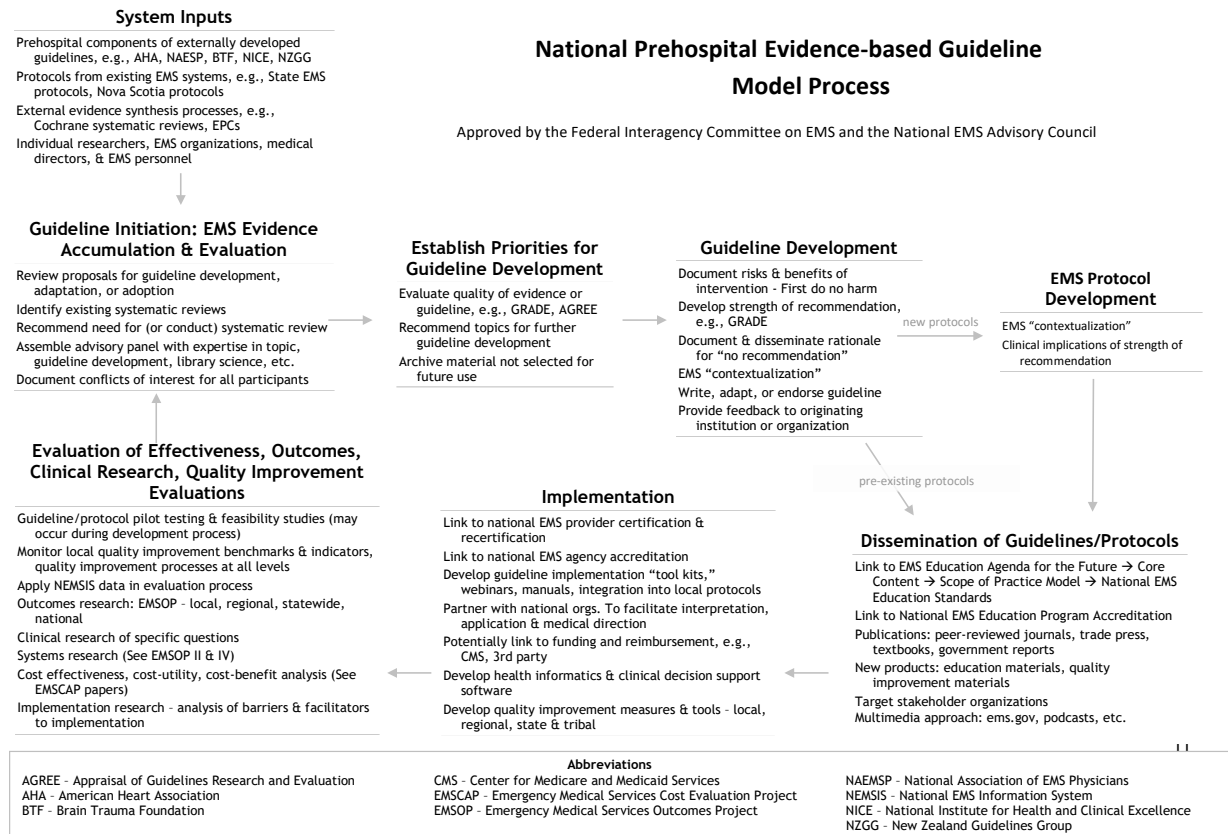
(Taken from the [National Emergency Medical Services Advisory Council Summary Report \[2010-2012\]](#), pages 12 & 14).

What is the evidence supporting the concept of EBGs and more standardized prehospital care?

There is considerable evidence in the scientific literature that the implementation of statewide guidelines and protocols results in improved patient outcomes and in the more equitable provision of specialty care to women, minorities and the elderly. The evidence is strongest for the adoption of Statewide transport protocols for STEMI and severe trauma, but there is additional evidence supporting Statewide protocols for the prehospital treatment of brain trauma and the use of AEDs. Similarly, there is evidence that the implementation of Statewide protocols for spinal immobilization can safely reduce the number of spinal immobilizations performed in the field without jeopardizing patient safety. Finally, significant cost savings from widespread protocol implementation have also been demonstrated. An advantage of using a methodology that provides separate appraisals for the quality of the evidence and the strength of the recommendation, as recommended in the EBG Model Process, is that it provides latitude for policymakers to revise and contextualize the guidelines without altering their fundamental intent.

National EBG Model Process

The National Prehospital EBG Model Process was developed with input from national EMS stakeholder organizations and endorsed by both the Federal Interagency Committee on EMS (FICEMS) and the National EMS Advisory Council (NEMSAC). It is an 8-step process designed to bring a “systems approach” to the development, implementation, and evaluation of EBGs. Full information on the Model Process is available [here](#).



The GRADE Process

The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system is a standardized method for summarizing and evaluating the quality of evidence and strength of a given recommendation on two distinct rating scales. High quality evidence does not necessarily imply strong recommendations, and strong recommendations can arise from low quality evidence. The quality of evidence rating is based on whether future research is likely to change the recommendation. The strength of the recommendation considers the quality of evidence, but also considers contextual factors, such as the balance between desirable and undesirable effects, the variability in values and preferences, and whether the intervention represents a wise use of resources.

(From the National EMS Advisory Council Medical Oversight and Research Committee: "[The Next Steps for Prehospital Care Evidence-Based Guidelines](#)". May 30, 2012)

The GRADE process is an increasingly important mechanism to review and rate the medical literature and is gaining popularity due to its many benefits, including transparency with its process and definitions.

The first part of this process includes searching and appraising the evidence. Clinical questions are typically framed in **PICO** (patient, intervention, comparison, outcome) format, and are used to guide a systematic review of the literature. GRADE methodology is used to appraise the available literature to assess the certainty in evidence (i.e., quality of evidence) and the strength of recommendation that can be made based on the available literature. The core-working group creating a guideline is then able to draft recommendations that address each PICO question, including a statement relating the strength of the recommendation (strong or weak) and strength of evidence supporting the recommendation (high, moderate, low, or very low).

The weight of the evidence is ONE of the factors leading to the strength of recommendations. Another factor is the estimation of risk and benefit of a given intervention based on the incidence of the illness and the preferences and values delineated in the first steps of the process. Currently, evidence-based guidelines may often reflect "low quality evidence", but as mentioned above, this does not mean that there is not any evidence to support the recommendation. Because of this rigorous process, and the fact that there are so few randomized clinical trials related to EMS medicine, findings will frequently be rated as "low quality."

GRADE Resources

[*Grading Quality of Evidence and Strength of Recommendations.*](#)

GRADE Working Group. BMJ 2004;328:1490-4.

[*GRADE Working Group.*](#) The GRADE working group began in the year 2000 as an informal collaboration of people with an interest in addressing the shortcomings of present grading systems in health care. This website has a wealth of useful information on GRADE.

[*Reviewing Evidence Using GRADE, Version 3.0 \(2016\).*](#) A thorough summary of reviewing evidence using the GRADE methodology created by the Cochrane Consumers and Communication Group.

Guideline Key Elements

An EBG is designed to be just that: a guideline, rather than a detailed protocol. This allows the individual state, region, or agency to modify or contextualize the guideline to meet their local needs and preferences. However, each guideline should provide the “key” or essential elements that are considered critical by the guideline authors to maintain consistency with the guideline. Although the formatting and presentation may change, any protocol developed from the EBG must contain these elements.

An example of these Key Elements is presented below. The Key Elements were derived from the *Prehospital Protocol for the Management of Acute Traumatic Pain Guideline* to serve as a guide to the critical aspects of this EBG.

Example: Key Elements of the Management of Acute Traumatic Pain Guideline

1. Documentation of pain score
2. Identification of contraindications
3. Administration of narcotic pain medication to patients in moderate to severe pain
4. Reassessment of pain score every 5 minutes
5. Re-dosing medication if still in significant pain

These elements are considered critical to the integrity of the protocol. It is understood that a State or an individual EMS agency may insert this EBG verbatim in their protocol for use, or they may choose to change its formatting and presentation to fit their existing protocol set. If such formatting changes are made, all five of these key elements must still be included to preserve the clinical and evidence-based integrity of the protocol.

These elements also may be used to highlight the most important teaching points during EMS personnel training on the protocol, or as quality assurance and performance improvement measures for monitoring the use of the protocol.

Guideline Data Elements

An EBG should ideally list the relevant NEMSIS data elements based on the most recent NEMSIS data dictionary. This allows a consistency in interpretation of the guideline and facilitates the process of quality assurance and performance improvement by the state or agency to ensure that the guideline is implemented properly in the field.

Listed below are an example of the NEMSIS data elements (both V2.2.1 and V3) that may be relevant to an individual guideline. These data elements may be used to assist in the

monitoring of implementation of the guideline, and as quality assurance and performance improvement measures of the essential elements of the EBG.

NEMESIS Version 3

- **Transport Time:**
 - eTimes.06 “Unit Arrived on Scene Date/Time”
 - eTimes.11 “Patient Arrived at Destination Date/Time”
- **Age**
 - ePatient.15 “Age”
 - ePatient.16 “Age Units”
- **Provider Impression / Cause of Injury / Possible Injury**
 - eSituation.11 or eSituation.12 “Provider’s Impression”
 - eInjury.01 “Cause of Injury”
 - eSituation.02 “Possible Injury”
- **Weight**
 - eExam.01 “Estimated Body Weight in Kilograms”
 - eExam.02 “Length Based Tape Measure”
- **Pain Score**
 - eVitals.01 “Date/Time Vital Signs Taken”
 - eVitals.27 “Pain Score”
 - eVitals.28 “Pain Scale Type”
- **Vital Signs**
 - eVitals.01 “Date/Time Vital Signs Taken”
 - eVitals.06 “SBP (Systolic Blood Pressure)”
 - eVitals.07 “DBP (Diastolic Blood Pressure)”
 - eVitals.10 “Heart Rate”
 - eVitals.12 “Pulse Oximetry”
 - eVitals.14 “Respiratory Rate”
- **Medication Information**
 - eMedications.01 “Date/Time Medication Administered”
 - eMedications.03 “Medication Given”
 - **eMedications.04 “Medication Administered Route”
 - **eMedications.05 “Medication Dosage”
 - **eMedications.06 “Medication Dosage Units”
 - **eMedications.08 “Medication Complication”
 - **eMedications.11 “Medication Authorization”
- **Destination Information**
 - eDisposition.01 “Destination/Transferred To, Name”
- **Location**
 - eScene.19 “Incident ZIP Code”
- **Medical Direction**

- eProtocols.01 “Protocols Used”
- **Procedure Information**
 - eProcedures.02 “Procedure Performed Prior to this Unit’s EMS Care”

Sample Protocol Based on a Guideline

The authors of an EBG may wish to include an example protocol that is based on the EBG and includes all key elements. Such an example will facilitate the development of state or agency protocols and may be adopted verbatim or modified as needed to conform to the formatting used by the state or agency.

An example of such a protocol is presented below. This protocol was created based on the [Pain Management Guideline](#). The final Guideline was submitted to the Maryland Institute for Emergency Medical Services Systems (MIEMSS) Protocol Review Committee. Based on the evidence-based guideline, the Maryland Pain Management Protocol (see below) was modified to include pain scale assessment, increased dosing, removal of online medical consult requirements to administer narcotics, and focused on the use of morphine (fentanyl was added a year later). After adoption, all Maryland EMS personnel were educated and tested on the new protocol over a five-month period.

A [study of before and after implementation](#) highlighted that patients meeting trauma criteria had increase in likelihood of receiving morphine and increased weight-based dosing (mg/kg). The initial pain scale documentation was slightly improved but not statistically significant.

Sample Protocol

PAIN MANAGEMENT



- 1) Initiate General Patient Care.
- 2) Presentation

Pain may be present in many different conditions. Management of pain in the field can help to reduce suffering, make transport easier, and allow the emergency department personnel to initiate specific treatment sooner.

- 3) Treatment Indications

- a) Measure level of pain. Ask adults to rate their pain on a scale from 0 (no pain) to 10 (worst pain imaginable). Young children can be asked to rate their pain using the **FACES** scale, which provides 5 levels of pain perception.
- b) Allow patient to remain in position of comfort unless contraindicated.
- c) Monitor airway and vitals signs every 5 minutes for unstable patients
- d) Mild pain

Indications for pain management

- (a) Isolated musculoskeletal injuries such as sprains and strains
- (b) Pain related to childhood illnesses such as headache, ear infection, and pharyngitis

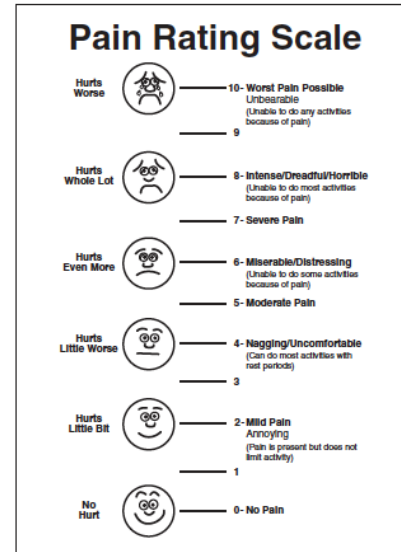
- (2) Contraindications for pain management with acetaminophen

- (a) Head injury
- (b) Hypotension
- (c) Administration of acetaminophen or medications containing acetaminophen within the previous four hours
- (d) Inability to swallow or take medications by mouth
- (e) Respiratory distress
- (f) Persistent vomiting
- (g) Known or suspected liver disease
- (h) Allergy to acetaminophen

- (3) Administer acetaminophen to patients ages 3 years and above judged to be in mild to moderate discomfort (2-5 on **FACES** scale) by child or parent.

- (a) Standard unit dosing of liquid preparation:

- (i) Less than 3 years of age: Not indicated
- (ii) 3-5 years: Unit dose 160 mg/5 mL
- (iii) 6-9 years: TWO unit doses of 160 mg/5 mL each for a total of 320



mg/10 mL

(iv) 10 years and above: FOUR unit doses of 160 mg/5 mL each for a total of 640 mg/20 mL

(b) Obtain on-line medical direction for appropriate dosing for patients who are significantly underweight or overweight



ADMINISTRATION OF ACETAMINOPHEN FOR MILD TO MODERATE PAIN DOES NOT ELIMINATE THE NEED FOR TRANSPORT OF THE PATIENT TO THE HOSPITAL TO RECEIVE A COMPREHENSIVE EVALUATION OF THE CAUSE OF HIS/HER PAIN AND APPROPRIATE DEFINITIVE TREATMENT.

e) Moderate to severe pain

(1) Indications for pain management

(a) The patient reports moderate to severe pain

(b) In the provider's judgment, the patient will benefit from treatment with an opioid analgesic, including patients that are MOLST and/or EMS/DNR patients

(2) Contraindications for Pain management

(a) Hypersensitivity or known allergy to the medication (morphine or fentanyl)

(b) Uncorrected respiratory distress or hypoxemia refractory to supplemental oxygen

(c) Uncorrected hypotension, defined as a persistent systolic pressure < 90 mmHg.

(3) Administer agent

(a) Morphine IV/IM

(i) Administer 0.1 mg/kg maximum single dose of 20 mg.

(ii) Reassess in 5 – 10 minutes. If pain remains moderate to severe, then administer a second dose of morphine 0.05 mg/kg to a maximum additional dose of 10 mg.

(iii) Obtain on-line medical direction for additional doses, if required.

OR

(b) Fentanyl IV/IM/IN

(i) Administer 1 mcg/kg to a maximum initial dose of 200 mcg.

(ii) Reassess in 5-10 minutes. If pain remains moderate to severe, then administer a second dose of fentanyl 1 mcg/kg to a maximum dose of 200 mcg.

(iii) Obtain on-line medical direction for additional doses, if required

(c) Morphine IV/IM

(i) Administer 0.1 mg/kg to a maximum initial dose of 20 mg.

(ii) Reassess in 5 – 10 minutes. If pain remains moderate to severe, then administer a second dose of morphine 0.05 mg/kg to a maximum additional dose of 10 mg.

(iii) Obtain on-line medical direction for additional doses, if required

OR

(d) Fentanyl IV/IM/IN

(i) Administer 1 mcg/kg to a maximum initial dose of 200 mcg.

Administer at a rate of 0.5 mcg/kg/min.



- (ii) Reassess in 5-10 minutes. If pain remains moderate to severe, then administer a second dose of fentanyl 1 mcg/kg to a maximum dose of 200 mcg.
- (iii) Obtain on-line medical direction for additional doses, if required



CHEST PAIN WHICH IS THOUGHT TO BE DUE TO ACUTE CORONARY SYNDROME SHOULD INITIALLY BE MANAGED WITH NITROGLYCERIN. IF PAIN REMAINS REFRACTORY TO NITROGLYCERIN, CONSIDER THE USE OF OPIOID ANALGESIA. AVOID OPIOIDS FOR PATIENTS WITH SUSPECTED EXACERBATION OF CONGESTIVE HEART FAILURE.

USE OPIOID ANALGESIA WITH CAUTION IN THE MANAGEMENT OF THE MULTIPLE TRAUMA PATIENT. OBSERVE FOR EVIDENCE OF HYPOTENSION AND CORRECT AS NEEDED WITH FLUID BOLUSES. REASSESS VITAL SIGNS AFTER ADMINISTRATION OF THE MEDICATION.

USE OPIOID ANALGESIA WITH CAUTION IN THE MANAGEMENT OF PATIENTS WITH ALTERED MENTAL STATUS. OBSERVE FOR RESPIRATORY DEPRESSION AND TAKE STEPS AS NEEDED TO ENSURE A STABLE AIRWAY.

- 4) Repeat - Measure level of pain and monitor the patient's level of pain during subsequent treatment and transport.
- 5) Transport



PATIENTS RECEIVING A NEW OPIOID (EITHER WITHIN 1 HOUR OR GREATER THAN 1 DOSE WITHIN ANY TIME FRAME) FROM ALS OR BY THE SENDING FACILITY MUST BE TRANSPORTED BY ALS.

- 6) Continue General Patient Care

Guideline Development References

The EBG authors will want to provide complete references regarding the development of the guideline to allow the interested reader to review and interpret the literature themselves, if desired. Such references should include updated citations related to the GRADE process and the guideline development and implementation process, in addition to the evidence underlying the guideline itself. These may be divided into “essential,” “recommended,” and “supplemental” references, to guide the reader to the most important or concise information.

Reference Categories

"Essential" reading: Those articles that we feel are most important for individuals involved in the training and use of this EBG to be familiar with.

"Recommended" reading: Those articles which act as a foundation for the understanding of prehospital pain management.

"Supplemental" reading: Those articles that provide background and more in-depth information regarding this topic.

Evidence-Based Practice

Graham ID, Harrison MB, Brouwers M, Davies BL, Dunn S. Facilitating the Use of Evidence in Practice: Evaluating and Adapting Clinical Practice Guidelines for Local Use by Health Care Organizations. *J Obstet Gynecol Neonatal Nurs*. 2002 Sep-Oct;31(5):599-611.

[Abstract](#)

Grimshaw, JM, Eccles, MP. Is Evidence-Based Implementation of Evidence-Based Care Possible? *Med J Aust*. 2004;180(6):50.

[Abstract](#)

Lang ES, Spaite DW, Oliver ZJ, et al. A National Model for Developing, Implementing, and Evaluating Evidence-based Guidelines for Prehospital Care. *Acad Emerg Med*. 2012 Feb;19:201–209.

[Full Article](#) (Free Access)

Wright, J. Evidence-Based Guidelines for Prehospital Practice: A Process Whose Time Has Come. *Prehosp Emerg Care*. 2014;18 No. Supplement 1:1-2.

[Full Article](#) (Free Access)

GRADE Process

Atkins D, Best D, Briss PA, et al. Grading Quality of Evidence and Strength of Recommendations. *BMJ*. 2004 Jun 19;328(7454):1290.

[Full Article](#) (Free Access)

Brown KM, Macias CG, Dayan PS, et al. The Development of Evidence-based Prehospital Guidelines Using a GRADE-based Methodology. *Prehosp Emerg Care* 2014;18 Supplement 1:3-14.

[Full Article](#) (Free Access)

Sample Evidenced-Based Guidelines in EMS

Shah M, Macias C, Dayan P, et al. An Evidence-based Guideline for Pediatric Prehospital Seizure Management Using GRADE Methodology. *Prehosp Emerg Care*. 2014;18 No. Supplement 1:15-24.

[Full Article](#) (Free Access)

Gausche-Hill M, Brown KM, Oliver ZJ, et al. An Evidence-based Guideline for Prehospital Analgesia in Trauma. *Prehosp Emerg Care*. 2014;18 No. Supplement 1:25-34.

[Full Article](#) (Free Access)

Thomas SH, Brown KM, Oliver ZJ, et al. An Evidence-based Guideline for the Air Medical Transportation of Prehospital Trauma Patients. *Prehosp Emerg Care*. 2014;18 No. Supplement 1:35-44.

[Full Article](#) (Free Access)

Patterson PD, Higgins JS, Van Dongen HPA, et al. Evidence-Based Guidelines for Fatigue Risk Management in Emergency Medical Services. *Prehosp Emerg Care*. 2018;22 Supplement 1:89-101.

[Full Article](#) (Free Access)

Williams K, Lang ES, Panchal AR. Evidence-Based Guidelines for EMS Administration of Naloxone. *Prehosp Emerg Care*. 2019;26:749-763.

[Full Article](#) (Free Access)

3. How to Implement a Guideline

The Implementation Challenge

Implementation of evidenced-based guidelines in EMS can be a complex and sometimes challenging process involving multiple stakeholders. Adopting evidenced-based practices into EMS activities may involve state regulatory agencies, advisory bodies, EMS medical directors and EMS service leadership. In addition, effective implementation of EBGs requires the buy-in of EMS practitioners in the field.

Step 1: Evaluating the Change Process

Fortunately, unlike medicine where changes in practice can take years to well over a decade to take hold, EMS has a long history of practicing protocol-based care. As a result, the EMS standard of care can be advanced fairly quickly as more and more sets of protocols adopt evidenced based guidelines. In some states this may be as simple as working through a state level protocol committee, in others it may involve changing protocols on an agency-by-agency basis. Many states also have regional bodies that weigh in on protocol development either formally or informally. Regardless, it is critical to understand the process used in your state and community.

Step 2: Engaging Stakeholders to Obtain Buy-In

Once the process for change is understood the critical next step in implementing any guideline is to educate stakeholders on the rationale for and the methods used to develop the guidelines. Like all healthcare professionals, EMS practitioners are interested in providing good care to their patients and are often very receptive to opportunities to improve their care through the implementation of evidence-based practice. As with most medical organizations, there is often a subset of interested clinicians who regularly seek out and advocate for advancements in care. These individuals may or may not have formal roles in training or other areas. This is likely the group that reads journals avidly and regularly attends conferences at the local, state, and national levels. As a champion of evidence-based care, it is important to identify who these thought leaders are, and engage them through the forums (newsletters, email groups, meetings, conferences, etc.) they use regularly.

Well-designed EBGs often make a strong case for themselves, so plan to share that rationale with those who will be directly implementing them and build grassroots support early. Newsletters and conferences are likely the best options to get the word out to many field personnel. The grassroots support of field personnel will hopefully develop a constituency prior to the implementation of changes and set the stage for implementation success. Engaging EMS service leadership, either directly or through state associations, is also a useful step in building support for EBG implementation.

Once buy-in is obtained from the field, associated support must be obtained from institutions and medical professionals affected by the EBG. This may involve emergency physician groups, local hospitals, specialty physicians and others. EMS medical directors are often well positioned to connect with these groups and explain the value of an EBG. In states where protocols are managed at the state level, this step may involve working with state associations and/or advisory boards. In states with decentralized management of EMS protocols, this likely involves educating EMS medical directors first so they can carry the message forward within their communities.

Step 3: Modifying Protocols

Once broad buy-in is achieved, groups with authority over EMS protocols and practice standards must make the changes needed to conform to an EBG. It is often helpful at this stage to provide draft language for protocol writers to use. Supplemental information, such as references or flow charts, is also very helpful items to make available. In states with decentralized approaches to protocol management, making this type of information online for protocol writers to access is very helpful. Furthermore, stakeholders should have the opportunity to participate in the protocol modification process.

As protocols are modified, it is also important to remember that the change itself will set the stage for a natural experiment. It is therefore worthwhile to consider how to collect data for a period both prior to and after the change in order to validate the effectiveness of the EBG based change. This information may be very helpful in encouraging additional adoption of the EBG.

Step 4: Training and Validation

Once the change is adopted by protocol, and an implementation date is set, appropriate training needs to be delivered. Ideally, information used to obtain initial buy-in can be adapted for a more general audience and the specifics of the protocol change can be added. Based on previous EBG roll-out experience at the state level, it is best to keep the number of trainers to a minimum and be sure those individuals are well versed in the EBG background, the protocol, implementation plan, and how success will be measured. In most cases this training needs to include rationale, a description of the change, and the associated logistics, procedural and reporting changes that will be required. Educating clinicians on how compliance will be measured is also important. Based on the EMS service, this training may be delivered through an online learning management system, in person, or through a combination of both. Continuing education credits should be provided regardless of the delivery method to encourage participation.

Reinforcement and validation of the training process can be done in several ways. Written tests, skills checkoffs and/or simulations can be used. EMS organizations may also use protocol tests either initially for new members or on a recurring basis for all practitioners. If the opportunity exists, protocols changed to conform to EBGs should be included in those tests.

Step 5: Implementation

Prior to implementation, associated logistics should be in place. If the deployment of an EBG involves new equipment or medications, they must be purchased, stocked and ready to go by the implementation date. Job aids, such as quick reference cards, charts, etc., may also need to be produced and distributed. Where applicable, legacy equipment or medications will need to be removed. Electronic reporting systems may also need to be updated to accommodate the changes. The implementation date and/or any changes to the implementation schedule should be well communicated to all staff. Once implemented, data collection on the change can begin immediately or delayed for a period to allow for the change to propagate and stabilize.

Step 6: Evaluation

The final step in implementation is evaluating how the implementation proceeded. A review of implementation by service leadership and the EMS medical director is critical both immediately after implementation and a few months post implementation. The immediate review should validate that the policies, procedures, equipment and/or medications are working as expected. The later review should verify that the EBG has been adopted and that the outcomes are as expected. Changes in clinical practice will likely take time to settle in and stabilize. As a result, enforcement should be tempered, especially early on, with coaching being the primary tool for non-compliance.

Finally, it must be recognized that changes in protocol require a significant amount of energy and effort on behalf of medical direction, service leadership, training staff and field personnel. As practice change is undertaken it is both imperative and respectful to communicate progress with all involved staff, especially field personnel, regarding how the implementation is progressing and what changes in outcomes are being seen based on the pre-post metrics created in Step 3.

Checklist for Implementing a Guideline

- Evaluate the Change Process**
- Engage Stakeholders**
- Modify Protocols**
- Perform Training and Validation**
- Implement Guideline**
- Evaluate Guideline Implementation**
- Revise the Change Process**

5. Educational Resources

The Education Challenge

Whenever a new guideline is introduced, or an existing guideline is changed; education should accompany and preferably precede implementation of the new expectations. The process of designing the educational materials should not be haphazard, but requires forethought, evaluation of existing knowledge, identification of expected outcomes, and reevaluation of the process. It is also helpful to identify both roadblocks and facilitators to the change(s) being taught. This chapter outlines steps to take when designing an educational presentation. Completing these 10 steps is an excellent start when designing the education related to implementing new guidelines. Keep in mind – education does not always need to be a large or complex event; it may be a simple memo that states “this will be the change”, but prior to sending the memo – review the following steps.

10 Steps for Designing Education as Part of Evidenced-Based Guideline Implementation

This 10-step process can be used to assist educators in designing an education program based on evidenced-based guidelines.

- A presentation for educators accompanying this toolkit can be found [here](#).
- Additional educational resources related to EMS evidence-based guidelines are also available [here](#).

1. Identify Reason(s) Why Changes are Needed

“Improving patient outcomes” is the ultimate reason for change; but the instructor needs to understand why the change is needed, as well as the evidence behind the change. Only then will they be able to convince others that change is needed. Other reasons for change could include new or updated evidence-based guidelines, need to communicate evidence for new guidelines, new or changed laws or regulations, new technology or equipment, results from performance improvement projects/quality studies, evaluations from previous courses, survey data, discussions, observations, trends/ideas, changes in local or regional standards of care, or licensing requirements. Ultimately, changes should lead to improved knowledge and expertise based on the latest evidence, improved patient outcomes, increased safety for the patient and/or providers, improved data collection, increased compliance, and reimbursement.

Systems may be encouraged (or forced) to make these changes as the result of input by stakeholders (medical directors, managers, learners), Federal, state, or local authorities, and those who provide re-imbusement. Understanding and being able to explain the

evidence or rationale behind the recommended change can contribute to acceptance into the culture.

2. Desired State

The “desired state” describes the goal(s) or performance levels being reached for and should be based on the latest evidence-based practices. The instructor needs to begin by searching for the reason why the EMS system is NOT already performing at the level of the goal by asking, “Is this an educational issue? Or is the goal not being reached due to lack of a protocol / guideline, laws, documentation, equipment or funding?” Education alone may not be the answer to reaching the desired state but will be part of the solution once a cause is identified.

3. Current State

The current state looks at, or defines, what and how we are doing things today. The instructor needs to identify the components involved in, and that impact on, how things are currently being done and identify why they are being done that way. This includes reviewing current protocols/guidelines, laws/rules, equipment, reimbursement, documentation, and methods of recording the activity, as well as how the information about the current state is being taught to end-users.

In addition to reviewing the “old science”, the instructor needs to review the latest science (evidence-based medicine) published on the topic. Herein is a link to a presentation on [EMS Research and Evidence-Based Guidelines](#) that can help instructors provide background education on the importance of research and implementation of guidelines to advance prehospital care.

4. Educational Gap

The educational gap is the difference between the “current practice” knowledge and the “desired state” knowledge. Knowledge “gaps” may involve new science, protocols / guidelines, laws / regulations, procedures, equipment, or ways to document. Only after an instructor can identify the gap, can they determine the objectives that will best “fill the educational gap”. Objectives should describe where you want to be – they can include changes in practice, performance, competence, and most importantly better patient outcomes.

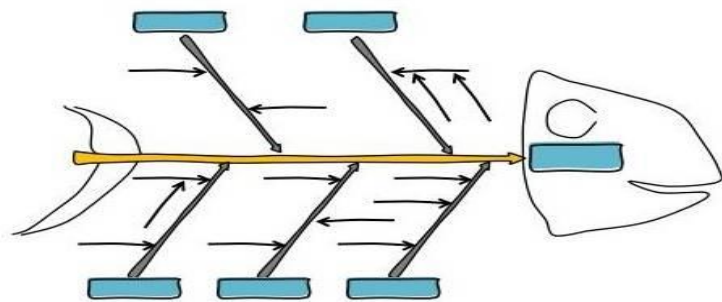
5. Learning Objectives

The educational gap(s) help determine the specific learning objectives for the education. Each objective should clearly identify a single gap, and if several gaps exist, an instructor may need several learning objectives to reach the desired goal. As noted, objectives may describe change(s) in practice, performance, competence, or patient outcomes, but may also involve new science, treatments, and other opportunities for improvement.

Questions to ask when identifying objectives include:

- What are the specific interventions being discussed?
- Is this action new or a modification of a prior action?
- How may the patient be impacted and what are the overall goals?
- Who can perform them (i.e., individual EMS personnel levels)?
- Why should they be performed?
- When should they be performed?
- When should they not be performed?
- How are they performed (including tips for success)?
- What legal considerations are there?
- How should the actions be documented?

If unsure about your educational gaps and objectives, make a fishbone diagram to look at the entire concept. Education can focus on all or just parts of the concept. The blue box on the fish head is the overall goal or desired state. The blue boxes along the sides of the fish – or fishbones – are specific areas



related to, can affect, or be affected by addressing the educational gap or objective. The smaller lines further break the objective down into smaller portions that include the who, what, why, when, when not, how, and “other” components of the new knowledge needed to reach the desired state. Planning makes it easier to know when the goal has been reached, or if another approach is needed. A fishbone diagram also helps to illustrate how many objectives (steps) and how much work will be involved when filling the educational gap in the process of reaching the desired state. Answering these questions help identify your audience, the amount of time that the project may take, and determine best approach to the educational content. This process may also help identify barriers and facilitators to attain the goal.

For further information on how to use fishbone diagrams:

- [How to Use the Fishbone Tool for Root Cause Analysis](#)
- [Fishbone Diagram Tools](#)

6. Educational Content

The educational content should begin by convincing the students of the importance of why the changes are needed. The educational content needs to be based on the gap analysis and learning objectives but should also consider the desired patient outcome(s), student availability, teaching methods, methods of measuring success, and evaluating outcomes.

Note that not all successful change leads to a good outcome. To maximize good outcomes, it is crucial that the educational content and material is based on evidence-based medicine and includes appropriate and timely references.

7. Method of Teaching

To optimize this education including feasibility of delivering the education, the instructor needs to determine the best teaching methods (didactic only, skills only, or a combination). This can be facilitated by understanding the audience, including an assessment of who needs the education (e.g., call takers/dispatchers, first responders, BLS professionals, ALS professionals, or some combination of these groups). It is beneficial to identify if these learners can be taught with the same materials in mixed groups, or if different types of education are needed for the various levels of personnel.

Other factors to consider when developing education material include the total time needed to accomplish the objectives, time allowed by the system/agency, costs, priority of specific educational topics, resources to optimize the educational content, newness of concepts, complexity, impact of unlearning/relearning, retention issues, and determining the frequency for repeating the education.

Consider who should teach this new material: an EMS physician, paramedic, or other type of instructor? Would a combination of these instructors be more effective? Determine if the educational material should be online and/or live with hands on education. Would a flipped classroom work best? Or would a scenario and/or simulation work best? The instructor needs to consider both the cognitive and affective learning domains when developing the educational material.

The instructor needs to ensure that the educational content matches with the educational learning objectives as part of a comprehensive curriculum and uses best practices from evidence-based medicine. Testing should match the educational learning objectives and the educational content. Best practice models include materials that are medically accurate, properly referenced, and reviewed by an EMS physician. Additionally, they should include a student needs assessment and consider an optimal level of interaction with the instructors to engage the student.

Technology is changing the way continuing education is delivered. Online options (distributive learning), virtual training, and videos facilitate learning, but are associated with challenges of verifying learner participation and knowledge acquisition. If learner evaluation/testing is needed, one might consider integrated testing or gated testing during content delivery to prevent students from getting CE credit without reviewing or knowing the material.

8. Measure Short-Term Effects

Prior to the first class determine:

- What methods will be used to measure the delivery of education, such as a written test/quiz, and/or skills testing (task trainer). This may include sample scenarios or a simulation.
- If pre- and/or post-testing is needed and how this evaluation may be optimally delivered.
- For any testing that takes place, how this will be measured and what the passing score will be.

9. Evaluate Long-Term Effects

Long term goals may require reevaluation using the same items listed under the short-term effects but should also include complications and consider performance measures.

Knowledge transfer to patient care may be further assessed through observation in the field, chart review of patient care, or direct measurement of patient outcomes. Retention of knowledge should be assessed by establishing a future time when the knowledge of participants will be reassessed using similar measures as were evaluated initially.

10. Reassess

Reassessing the delivery of education for future improvements includes understanding:

- How the educational “gap” was filled.
- If the new educational program led to a change in practice.
- If the change that occurred was wanted.
- If the skill is being maintained over the long term.
- If the timing for reassessment is appropriate based on the frequency of when the intervention is performed.

It is important to also identify other gaps or educational components that should have been taught. These may be identified in the process of teaching the classes or from the student’s and instructor’s evaluations.

Finally, repeat steps 1-10 above until the desired state is achieved.

Additional Resources

- March JA, Loftus RA, Trask S, et al. [Best Practices in CE How technology is changing the way we deliver continuing education](#). EMS World, 2015; 44(6):28-31.
- The CAPCE Board of Directors. [Curriculum Matching](#). EMS World 2017;46(5):44-45.
- Prehospital Guidelines Consortium resource documents: [EBG Resources](#).
- Commission on Accreditation for Pre-Hospital Continuing Education: [Best Practices Model Document](#). 2016.

5. Guideline Evaluation

The initial evaluation phase of a project involving implementation of an evidence-based guideline will occur concurrently with the dissemination and implementation phases of the project to identify and mitigate difficulties and barriers as they occur.

Evaluation Components

Evaluation components could include:

- Assessment of current prehospital care being provided in the specific protocol area to the specific population (i.e., how does it compare to proposed evidence-based guideline?).

Evaluation Consideration

Data elements deemed critical for this assessment are necessary to identify the specific patient population to include in the pre- and post-evaluation of care that will be conducted to assess the impact of the protocol implementation on prehospital care.

- Assessment of barriers to changing the current care being provided as well as assessment of the needs and resources that would help promote the protocol implementation

Considerations

By collecting the run data associated with anticipated barriers, EMS agencies will be able to identify which elements of the protocol have been successfully implemented and which are barriers to providing the care outlined in the protocol.

- Process evaluation of the implementation and dissemination:
 - Identify barriers and modify approach.

Considerations

Obtain data on previously encountered barriers to protocol implementation from other projects. Ideally, each EMS Agency Implementation Plan shall include strategies to avoid the previously identified barriers to protocol implementation.

- Identify facilitators to implementation and dissemination.

Considerations

Obtain data on identified successful strategies, resources, and incentives for protocol implementation from prior projects. Ideally, each EMS agency implementation plan shall include many of these strategies to promote the statewide adoption of the protocol.

- Impact evaluation (was there a change in the EMS personnel's knowledge of the protocol and/or an acquisition of clinical skills needed for care outlined in the protocol and/or a change in the EMS personnel's self-efficacy to provide the care outlined in the protocol after completing the training)

Considerations

Evaluation measures may include a pre-and post-test, and case studies.

- Outcome evaluation:
 - Was there an improvement in the care that was provided (ePCR data will be used to determine compliance with the protocol)

Considerations

Outcomes based data elements deemed critical for this evaluation should be considered in advance and should ideally relate back to data that is already being collected and compiled in the EMS system.

- Post-assessment of barriers to provision of care:
 - If there was no improvement in care provided, why not?
 - What worked well in the project?
 - What were the facilitators to making changes in the care provided?

Considerations

By collecting the run data associated with previously identified metrics, EMS agencies will be able to identify which Key Elements of the protocol have been successfully implemented and which are barriers to providing the care outlined in the protocol.

Agency Adoption Assessment Tool

This tool provides an example that can assist state EMS offices in determining which agencies have adopted a guideline. It will help states determine if agencies are familiar with the guideline, as well as whether the state EMS office will be able to capture change in clinical care or operations over time using the state prehospital database.

The first section is for the compiled information that is gathered from the second section.

Compilation Information

Total number of agencies in the state: _____

Number of agencies that responded to the assessment questions: _____

Of the participating agencies:

Number that does not enter data into the statewide EMS database: ____

Number that does enter data into the statewide EMS database: ____

Of the agencies entering data into the statewide EMS database:

Number that uses statewide protocols: ____

Number that uses regional/county protocols: ____

Number that uses local protocols: ____

Agency Questions

1. Are you familiar with the prehospital guideline/protocol for XYZ condition?
 - Yes → go to #2
 - No → go to #3

2. Has your agency adopted the prehospital guideline/protocol for XYZ condition?
 - Adopted
 - Did not adopt

3. Are you planning on adopting the guideline/protocol?
 - Yes, if included in the statewide guidelines/protocols
 - Yes, if adopted at the regional/county level
 - Plan on partial adoption of the guideline/protocol
 - No plans for adoption

4. Do you have any existing guidelines/protocols that allow for _____ (interventions) for XYZ condition?
 - Intervention 1
 - Intervention 2
 - Intervention 3
 - Other (please indicate) _____