



National EMS Quality Alliance

Measure Worksheets

Disclaimer

EMS Performance Measures (Measures) and related data specifications developed by the National EMS Quality Alliance (NEMSQA) are intended to facilitate quality improvement activities by EMS professionals.

These measures are intended to assist EMS professionals in enhancing quality of care. These Measures are not clinical guidelines and do not establish a standard of medical care and have not been tested for all potential applications. NEMSQA encourages testing and evaluation of its Measures.

Measures are subject to review and may be revised or rescinded at any time by NEMSQA. The measures may not be altered without prior written approval from NEMSQA. The measures, while copyrighted, can be reproduced and distributed, without modification, for noncommercial purposes (e.g., use by health care providers in connection with their practices). Commercial use is defined as the sale, license, or distribution of the measures for commercial gain, or incorporation of the measures into a product or service that is sold, licensed, or distributed for commercial gain. Commercial uses of the measures require a license agreement between the user and NEMSQA. Neither NEMSQA nor its members shall be responsible for any use of the measures.

THESE MEASURES AND SPECIFICATIONS ARE PROVIDED “AS IS” WITHOUT WARRANTY OF ANY KIND.

©2019 National EMS Quality Alliance. All rights reserved.

Limited proprietary coding is contained in the measure specifications for convenience. Users of the proprietary coding sets should obtain all necessary licenses from the owners of these code sets. NEMSQA and its members disclaim all liability for use or accuracy of any Current Procedural Terminology (CPT®) or other coding contained in the specifications. ICD-10 copyright 2019 International Health Terminology Standards Development Organization.

CPT ® is a registered trademark of the American Medical Association and is copyright 2019. CPT® codes contained in the Measure specifications are copyright 2004-2019 American Medical Association

Hypoglycemia-01: Treatment Administered for Hypoglycemia

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients who received treatment to correct their hypoglycemia.	
Measure Components	
Numerator Statement	<p>EMS responses originating from a 911 request for patients receiving treatment to correct their hypoglycemia during the EMS response.</p> <p>Treatments to correct hypoglycemia:</p> <ul style="list-style-type: none"> • Food • Oral glucose (tablets, glucose gel, tube of cake icing, etc.) • Dextrose IV/IN • Glucagon IM/IN
Denominator Statement	All EMS responses originating from a 911 request for patients with hypoglycemia and a GCS of <15 or an AVPU of <A or patients with a primary or secondary impression of altered mental status and a blood glucose level of <60.
Denominator Exclusions	Patients less than 24 hours of age.
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statement is quoted verbatim from the referenced clinical guideline:</p> <p>National Model EMS Clinical Guidelines for Hypoglycemia Management, 2017:ⁱ</p> <p>Treatment and Interventions</p> <ol style="list-style-type: none"> 1. If altered level of consciousness or stroke, treat per Altered Mental Status or Suspected Stroke/Transient Ischemic Attack guidelines accordingly 2. If blood glucose is 60 mg/dL or less administer one of the following: <ol style="list-style-type: none"> a. Conscious patient with a patent airway: <ol style="list-style-type: none"> a. Glucose, oral (in form of glucose tablets, glucose gel, tube of cake icing, etc.) b. Unconscious patient, or patients who are unable to protect their own airway: <ol style="list-style-type: none"> a. Dextrose IV – administer in incremental doses until mental status improves or maximum field dosing is reached b. Glucagon IM/IN

	c. iii. Remove or disable insulin pump if above treatments cannot be completed
Measure Importance	
Rationale	<p>One common diabetic emergency EMS professionals encounter is hypoglycemia, which is a condition caused by very low blood sugar levels. Signs of hypoglycemia include altered mental status, confusion, diaphoresis, shaking, tachycardia, and feeling of extreme hunger. If glucose levels are not restored, the patient’s mental status will change, and they will become confused, experience headache, and progress into semi-unconsciousness and unconsciousness, rapidly progressing to brain damage. While hypoglycemia may occur in both diabetic and non-diabetic patients, it is a medical emergency in either case that must be treated immediately.ⁱⁱ</p> <p>Because hypoglycemia does not delay gastrointestinal absorption of glucose, if an adult patient is identified as hypoglycemic and is alert and able to protect their airway, they should first receive a dose of oral glucose, which should take effect within 10-15 minutes. For patients who are unwilling or unable to safely consume oral glucose, IV dextrose is recommended.ⁱⁱⁱ</p>
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input checked="" type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality

	<ul style="list-style-type: none"> • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care • <input type="checkbox"/> Emergency Departments • <input type="checkbox"/> Urgent Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Pediatrics-01: Pediatric Respiratory Assessment

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients less than 18 years old with primary or secondary impression of respiratory distress who had a respiratory assessment.	
Measure Components	
Numerator Statement	EMS responses originating from a 911 request for patients who received both a SPO2 and respiratory rate measurement during the EMS response.
Denominator Statement	<p>All EMS responses originating from a 911 request for patients <18 years of age with a primary or secondary impression of respiratory distress.</p> <p>Respiratory distress may include impressions of:</p> <ul style="list-style-type: none"> • Asthma • Dyspnea • Unspecified Orthopnea • Shortness of breath • Diagnosis of a respiratory ailment • Complaint or condition commonly associated with dyspnea
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following flowcharts were taken verbatim from the referenced treatment protocol:</p> <p>National Association of State EMS Officials, National Model EMS Clinical Guidelines for Pediatric Respiratory Distress:^{iv}</p> <p>Patient Management</p> <ol style="list-style-type: none"> 1. History <ol style="list-style-type: none"> a. Onset of symptoms (history of choking) b. Concurrent symptoms (fever, cough, rhinorrhea, tongue/lip swelling, rash, labored breathing, foreign body aspiration) c. Sick contacts d. Treatments given e. Personal history of asthma, wheezing, or croup in past 2. Exam <ol style="list-style-type: none"> a. Full set of vital signs (T, BP, RR, P, O2 sat) b. Presence of stridor at rest or when agitated c. Description of cough d. Other signs of distress (grunting, nasal flaring, retracting) e. Color (pallor, cyanosis, normal)

	f. Mental status (alert, tired, lethargic, unresponsive)
Measure Importance	
Rationale	Pediatric transports make up approximately 10% of all EMS requests, and respiratory distress is a common reason for these requests. A 2015 retrospective study found that 13.7% of pediatric EMS transports were due to respiratory distress. ^v
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input checked="" type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input checked="" type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional

	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Pediatrics-02: Administration of Beta Agonist for Pediatric Asthma

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients 2-18 years of age with a diagnosis of asthma who had an aerosolized beta agonist administered.	
Measure Components	
Numerator Statement	<p>EMS responses originating from a 911 request for patients who had an aerosolized beta agonist administered by an EMS professional during the EMS response.</p> <p>Beta agonist medications may include:</p> <ul style="list-style-type: none"> • Albuterol • Levalbuterol • Metaproterenol
Denominator Statement	All EMS responses originating from a 911 request for patients 2-18 years of age with a primary or secondary impression of asthma exacerbation or acute bronchospasm.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced clinical guidelines and other statements:</p> <p>A Model Protocol for Emergency Medical Services Management of Asthma Exacerbations:^{vi}</p> <p>For patients with prior diagnosis of asthma or prior use of an inhaled asthma medication and who are experiencing an acute exacerbation, the workgroup recommends that EMS personnel, consistent with their scope of practice, should:</p> <ul style="list-style-type: none"> • Transport all patients to the appropriate medical facility (e.g., hospital emergency department). • Provide oxygen • Provide inhaled bronchodilators, such as albuterol and ipratropium • Consider systemic corticosteroids in more severe exacerbations and when transport times are prolonged.
Measure Importance	
Rationale	Asthma is a very common disease among both children and adults. In fact, according to the Centers for Disease Control and Prevention, 1 in 13 individuals have asthma ^{vii} , and asthma is the leading chronic disease in children. ^{viii}

	Of all the EMS calls that occur on an annual basis, approximately 10% are pediatric transports, and 14% of these pediatric transports are attributed to patients in respiratory distress. Because asthma is a common cause for respiratory distress in children, guidelines have been established in most states to administer beta-agonists and other medications to prehospital patients having an asthma exacerbation. ^{ix}
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input checked="" type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional

	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> EMS Agency • <input type="checkbox"/> Hospital/ED
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Pediatrics-03: Documentation of Estimated Weight in Kilograms

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients less than 18 years of age who received a weight-based medication and had a documented weight in kilograms or length-based weight estimate documented during the EMS response.	
Measure Components	
Numerator Statement	EMS responses originating from a 911 request for patients in which a weight value was documented in kilograms or a length-based weight was documented during the EMS response.
Denominator Statement	All EMS responses originating from a 911 request for patients less than 18 years of age who received a weight-based medication during the EMS response.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced clinical guidelines and other references that also apply to pre-hospital care:</p> <p>Joint policy statement- guidelines for care of children in the emergency department, 2008:^x</p> <p>4. GUIDELINES TO IMPROVE PEDIATRIC PATIENT SAFETY IN THE ED</p> <p>The delivery of pediatric care should reflect an awareness of unique pediatric patient safety concerns and should include the following policies or practices:</p> <p>a. Children should be weighed in kg, with the exception of children requiring emergent stabilization, and the weight should be recorded in a prominent place on the medical record, such as with the vital signs.</p> <p>i. For children requiring resuscitation or emergency stabilization, a standard method for estimating weight in kg should be used (eg, length-based system).”</p> <p>The Joint Commission offers the following suggested actions to prevent pediatric medication errors and their related adverse events in pediatric care settings:</p>

Since patient weight is used to calculate most dosing (either as weight-based dosing, body surface area calculation, or other age-appropriate dose determination), all pediatric patients should be weighed in kilograms at the time of admission (including outpatient and ambulatory clinics) or within four hours of admission in an emergency situation. Kilograms should be the standard nomenclature for weight on prescriptions, medical records and staff communications.

Measure Importance

Rationale

Pediatric medications require weight based on dosing and several calculations are often required to ensure that the correct dose is administered. It is common pharmaceutical practice to list medication doses in mg/kg, thus weighing pediatric patients in pounds may lead to two errors;

1. Other clinicians may see the patient’s weight in pounds and assume that the weight is documented in kilograms, leading to a potential overdose of medication.
2. Errors in conversion from pounds to kilograms may lead to under dosing or overdosing.

Making it common practice to weigh pediatric patients in kilograms will eliminate the need for assumptions on how weight is documented and eliminate the need for converting weight in order to calculate medication doses. The elimination of the conversion calculation will remove a potential source for potential medication error.^{xi}

Opportunity for Improvement

A 2009 analysis of 479 medication errors involving wrong weights discovered that over 25% were due to “confusion between pounds and kilograms.”^{xi}

Measure Designation

Measure purpose

- Quality Improvement
- Accountability
- MOC

Type of measure

- Process
- Outcome
- Structure
- Efficiency

National Quality Strategy/Priority/CMS Measure Domain

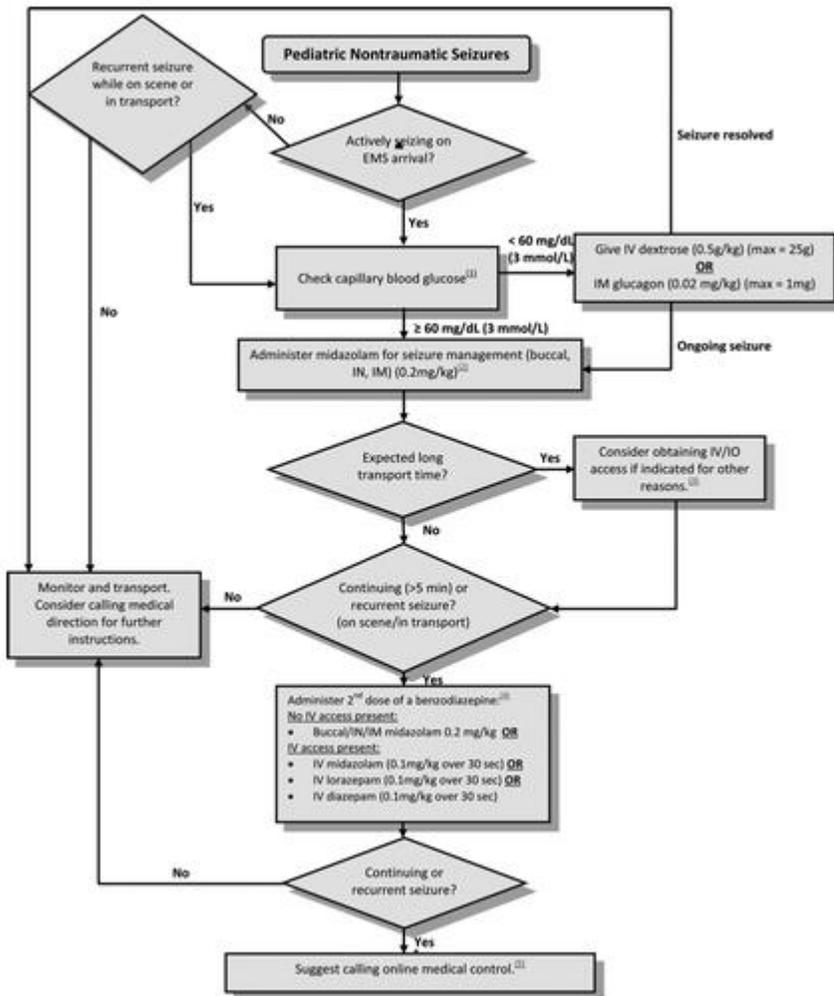
- Clinical Process-Effectiveness
- Patient Safety
- Patient Experience
- Care Coordination
- Efficiency: Overuse
- Efficiency: Cost
- Population & Community Health

CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input checked="" type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient’s Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient’s Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agencies
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Seizure-02: Patient with Status Epilepticus Receiving Intervention

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients with status epilepticus who received benzodiazepine aimed at terminating their status seizure during the EMS response.	
Measure Components	
Numerator Statement	<p>EMS responses originating from a 911 request for patients who received benzodiazepine aimed at terminating their status seizure during the EMS response.</p> <p>Benzodiazepines may include: Diazepam Lorazepam Midazolam</p>
Denominator Statement	All EMS responses originating from a 911 request for patients with a primary or secondary impression of status epilepticus.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced treatment protocols:</p> <p>An Evidence-Based Guideline for Pediatric Pre-Hospital Seizure Management Using GRADE Methodology^{xiii}:</p>



National Association of State EMS Officials, National Model EMS Clinical Guidelines for Seizure^{xiii}:

Patient Presentation

Seizures due to trauma, pregnancy, hyperthermia, or toxic exposure should be managed according to those condition-specific guidelines

Inclusion Criteria

Seizure activity upon arrival of prehospital personnel or new/recurrent seizure activity lasting greater than 5 minutes

Exclusion Criteria

None

Patient Management

Assessment

1. History
 - a. Duration of current seizure
 - b. Prior history of seizures, diabetes, or hypoglycemia
 - c. Typical appearance of seizures

- d. Baseline seizure frequency and duration
 - e. Focality of onset, direction of eye deviation
 - f. Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence, or fever
 - g. Bystander administration of medications to stop the seizure
 - h. Current medications, including anticonvulsants
 - i. Recent dose changes or non-compliance with anticonvulsants
 - j. History of trauma, pregnancy, heat exposure, or toxin exposure
2. Exam
- a. Air entry/airway patency
 - b. Breath sounds, respiratory rate and effectiveness of ventilation
 - c. Signs of perfusion (pulses, capillary refill, color)
 - d. Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit or signs of stroke)

Treatment and Interventions

1. If signs of airway obstruction are present and a chin-lift, jaw thrust, positioning, and/or suctioning does not alleviate it, place oropharyngeal airway (if gag reflex is absent) or nasopharyngeal airway
2. Place pulse oximeter and/or waveform capnography to monitor oxygenation/ventilation
3. Administer oxygen as appropriate with a target of achieving 94-98% saturation. Use bag-valve-mask ventilation if oxygenation/ventilation are compromised
4. Assess perfusion
5. Assess neurologic status
6. Routes for treatment
 - a. IN/IM routes are preferred over rectal (PR), IV, or IO routes, if within the provider's scope of practice
 - i. If none of these routes (IN/IM/IV/IO) of medication administration are in provider's scope of practice, diazepam 0.2 mg/kg PR (maximum dose 10 mg) is an acceptable route of administration
 - b. IV placement is not necessary for treatment of seizures, but could be obtained if needed for other reasons
7. Anticonvulsant Treatment
 - a. If vascular access is absent: midazolam 0.2 mg/kg (maximum dose 10 mg), IM preferred, or IN
 - b. If vascular access (IV or IO) is present:
 - i. Diazepam 0.1mg/kg IV or IO, maximum 4mg
 - ii. Lorazepam 0.1mg/kg IV or IO, maximum 4mg
 - iii. Midazolam 0.1mg/kg IV or IO, maximum 4mg

Measure Importance	
Rationale	<p>According to the Centers for Disease Control and Prevention (CDC), in 2015, 3.4 million people in the United States have epilepsy,^{xiv} with status epilepticus being the most severe and extreme form of epileptic seizure. While treatment of seizure and status epilepticus has changed over time, the administration of benzodiazepines is now commonly used as first-line treatment for patients with status epilepticus.^{xv}</p> <p>Emergency Medical Services are commonly utilized to treat patients with complaints of seizure. In a 1997 study to determine the frequency of patients with seizure disorders who visit the ED, it was found that 368 patients, or 1.2%, of the total patient population, visited 12 EDs over the course of 18.25 days. Of these patients, 257, or 71%, utilized EMS for transport and care.^{xvi}</p> <p>A study published in 2012, which reviewed patients experiencing status epilepticus who were treated by EMS professionals with either intramuscular midazolam with intravenous lorazepam found that IM midazolam is at least as safe and effective at terminating prehospital seizures as IV lorazepam.^{xvii}</p>
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input checked="" type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality

	<ul style="list-style-type: none"> • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Stroke-01: Suspected Stroke Receiving Prehospital Stroke Assessment

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients suffering from a suspected stroke who had a stroke assessment performed during the EMS response.	
Measure Components	
Numerator Statement	EMS responses originating from a 911 request for patients who had a stroke assessment performed on scene during the EMS Response.
Denominator Statement	All EMS responses originating from a 911 request for patients with a primary or secondary impression of stroke.
Denominator Exclusions	Patients who are unresponsive.
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced treatment protocol:</p> <p>American Heart Association American Stroke Association: EMS Stroke Assessment Guide:^{xviii}</p> <p style="padding-left: 40px;">EMS management of suspected stroke:</p> <ul style="list-style-type: none"> • Support ABCs: airway, breathing, circulation – give oxygen if needed • Perform prehospital stroke assessment • Establish time when patient last known normal • Rapid transport (consider triage to a center with a stroke unit if appropriate; consider bringing a witness, family member, or caregiver) • Alert receiving hospital stroke center “STROKE CODE” • Check glucose level, if possible
Measure Importance	
Rationale	Stroke is a significant public health problem. More than 795,000 strokes occur in the United States each year, resulting in 889,000 hospitalizations. ^{xix} The timing of treatment for patients with stroke is an important factor in determining their outcomes for morbidity and mortality. ^{xx} Stroke assessments are helpful tools in identifying patients with stroke in the prehospital setting, who will require therapies to treat stroke upon hospital arrival. ^{xxi} In addition, stroke assessments can help prehospital professionals determine the type of facility in which to transport a patient. For example, interventions to treat a large vessel occlusion (LVO), a type of ischemic stroke that results from a blockage of the major artery in the brain, are often only available at hospitals in heavily populated, urban areas. Treatments for LVOs are often not

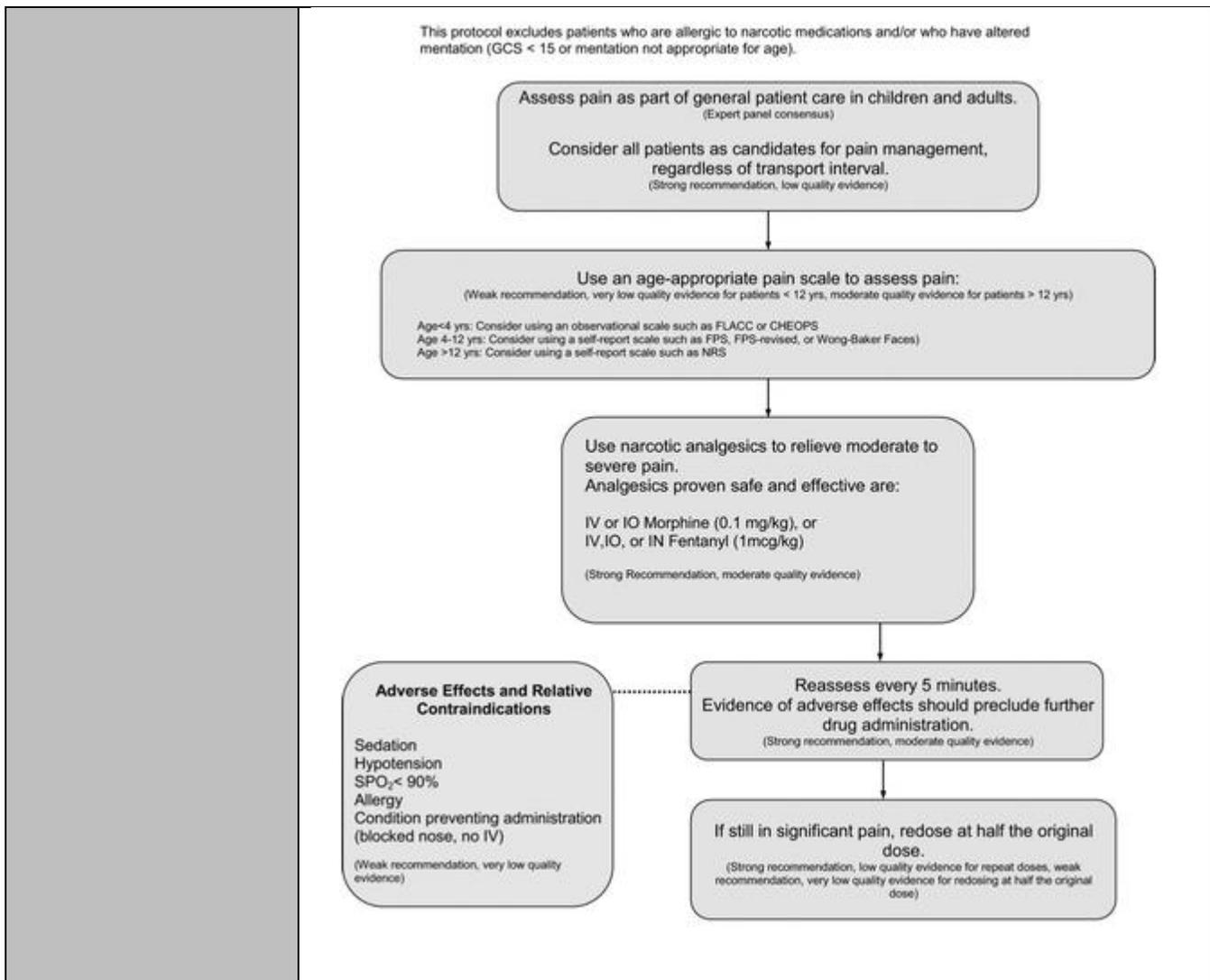
	available at rural or tertiary facilities, thus, prehospital screening and identification of LVOs is important to determine the most appropriate patient destination. ^{xxii}
Opportunity for Improvement	Although rates have significantly improved in the past decades, stroke remained the fifth leading cause of death in the United States in 2013. Despite improvements, almost 800,000 individuals in the US each year have a new or recurrent stroke, and of these people, 140,000 of them die. Stroke continues to account for one in every 20 deaths. With better recognition of stroke and stroke symptoms by emergency medical service professionals, patient outcomes can be improved. ^{xxiii}
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input checked="" type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals

	<ul style="list-style-type: none"> • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Trauma-01: Injured Patients Assessed for Pain

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients with injury who were assessed for pain.	
Measure Components	
Numerator Statement	EMS responses originating from a 911 request for patients with any pain scale value documented during the EMS encounter.
Denominator Statement	All EMS responses originating from a 911 request for patients with injury and a Glasgow Coma Score (GCS) of 15 or an Alert Verbal Painful Unresponsiveness (AVPU) of A.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	The following evidence statements are quoted verbatim from the referenced treatment protocol: Evidence-Based Guideline for Prehospital Analgesia in Trauma: ^{xxiv}



Measure Importance

Rationale

Pain is a common symptom in prehospital care. In a study conducted in 2007, it was found that among the patients who indicated they were in pain, 64% reported they were in intense to severe pain.^{xxv}

Due to the complexities of pain, one-dimensional scales where the patient can self-report intensity are recommended. However, providers must take young children and infants, who cannot adequately self-report into consideration.^{xxvi}

Pain control benefits patients in ways that go beyond making them comfortable. Proper identification and treatment of pain can prevent long-term consequences in very young children. As well, uncontrolled pain can also cause side effects such as elevations in heart rate and blood pressure that may be misinterpreted as other clinical conditions or may have consequences on existing disease processes.^{xxvii}

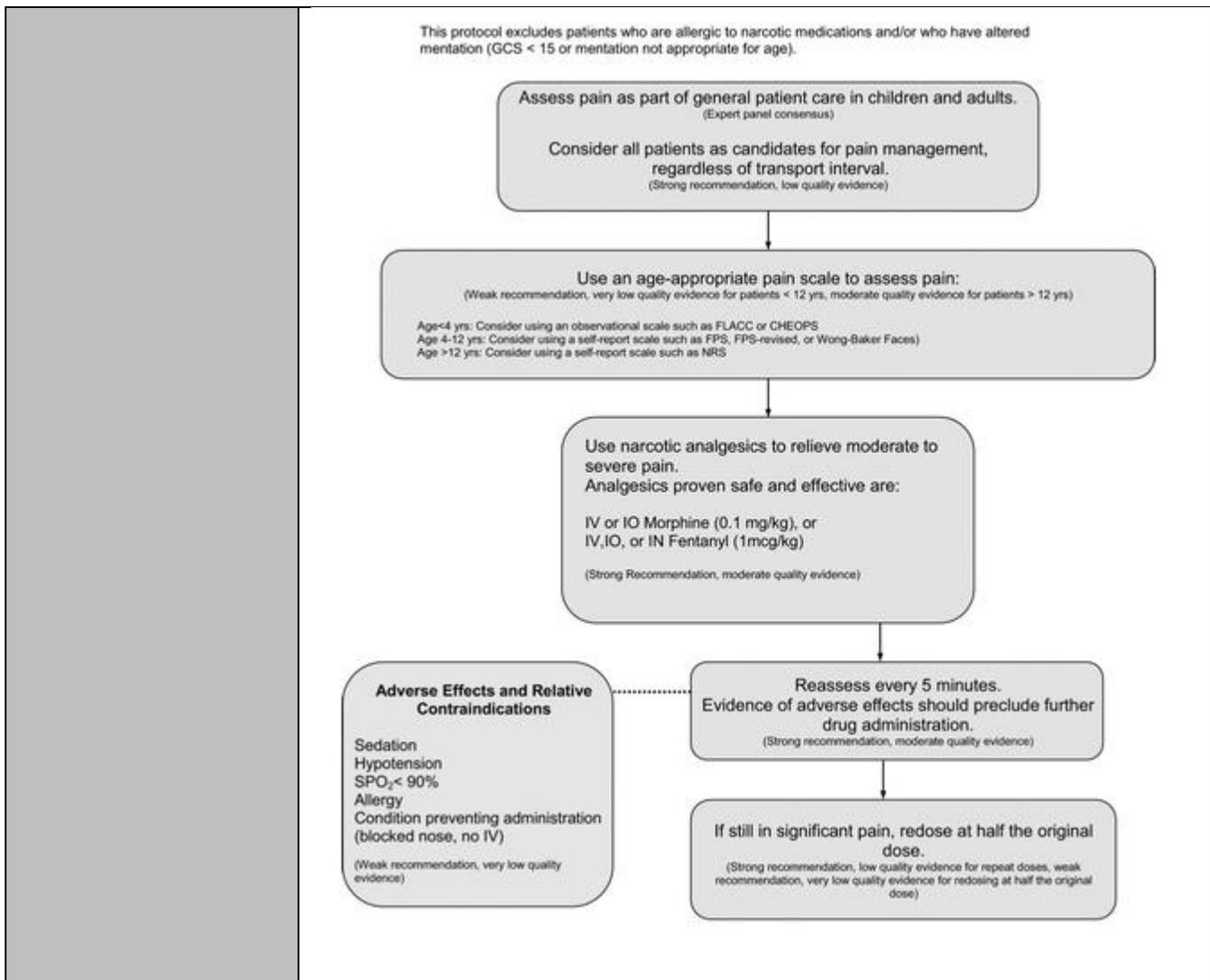
Opportunity for Improvement	<p>In a review of NEMESIS research data from 2012-2014, it was found that of the 69,564,130 patients who were transported for trauma conditions such as fracture, burn and/or penetrating injury, only 29.5% of them had “pain” as a documented symptom in their EMS record.^{xxviii}</p> <p>While prehospital providers document that they conducted a pain assessment on pediatric patients, the presence or absence of pain remains undocumented 20% of the time.^{xxvii}</p>
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input checked="" type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient’s Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input checked="" type="checkbox"/> Patient’s Experience of Care

	<ul style="list-style-type: none"> • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Trauma-03: Effectiveness of Pain Management for Injured Patients

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS transports originating from a 911 request for patients whose pain score was lowered during the EMS encounter.	
Measure Components	
Numerator Statement	EMS transports originating from a 911 request for patients with two or more documented pain scores and a final pain score value less than the first documented pain score.
Denominator Statement	All EMS transports originating from a 911 request for patients with injury and a Glasgow Coma Score (GCS) of 15 or an Alert Verbal Painful Unresponsive (AVPU) of A who had an initial pain score of greater than zero.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	The following evidence statements are quoted verbatim from the referenced treatment protocol: Evidence-Based Guideline for Prehospital Analgesia in Trauma: ^{xxiv}



Measure Importance	
Rationale	<p>Pain is a common symptom in prehospital care. In a study conducted in 2007, it was found that among the patients who indicated they were in pain, 64% reported they were in intense to severe pain.^{xxv}</p> <p>Pain control benefits patients in ways that go beyond making them comfortable. Proper identification and treatment of pain can prevent long-term consequences in very young children. As well, uncontrolled pain can also cause side effects such as elevations in heart rate and blood pressure that may be misinterpreted as other clinical conditions or may have consequences on existing disease processes.^{xxvii}</p>
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input type="checkbox"/> Process

	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input checked="" type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input checked="" type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Trauma-04: Trauma Patients Transported to a Trauma Center

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request for patients who meet CDC criteria for trauma and are transported to a trauma center.	
Measure Components	
Numerator Statement	EMS transports originating from a 911 request for patients transported to a trauma center.
Denominator Statement	All EMS transports originating from a 911 request for patients who meet 2011 CDC Step 1 or 2 criteria for trauma.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced treatment protocol:</p> <p>Centers for Disease Control and Prevention: Guidelines for Field Triage of Injured Patients:^{xxix}</p>
Measure Importance	

<p>Rationale</p>	<p>Victims of severe violent injuries involving trauma not only see a slight improvement in survival rates if they receive treatment in a trauma center, but they also benefit from less complications and shorter lengths of stay.^{xxx}</p> <p>A study on the effect of trauma center care on mortality published in 2006 found that one-year survival rates among patients with traumatic injuries were significantly higher when patients received care in trauma centers as opposed to non-trauma centers. This same study showed a 25% decrease in mortality for severely injured adult patients who received care at Level I trauma centers.^{xxxi}</p>
<p>Measure Designation</p>	
<p>Measure purpose</p>	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input checked="" type="checkbox"/> Accountability • <input type="checkbox"/> MOC
<p>Type of measure</p>	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
<p>National Quality Strategy/Priority/CMS Measure Domain</p>	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Clinical Process-Effectiveness • <input type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
<p>CMS Meaningful Measure Domain</p>	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input type="checkbox"/> Preventable Healthcare Harm

	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Safety-01: Use of Lights and Sirens During Response to Scene

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS responses originating from a 911 request in which lights and sirens were not used during response.	
Measure Components	
Numerator Statement	EMS responses originating from a 911 request during which lights and sirens were not used.
Denominator Statement	All EMS responses originating from a 911 request.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced guidance:</p> <p>U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Emergency Medical Services: Lights and Siren Use by Emergency Medical Services (EMS) Above All Do No Harm.^{.xxxii}</p> <p>Recommendations for EMS Vehicle Operators:</p> <ul style="list-style-type: none"> • The driver is responsible for the mode of response to the scene based upon dispatch category, information available from dispatcher, and agency policy • The EMS provider, with the highest level of training, caring for the patient should direct whether or not L&S are used during transport based upon the patient’s medical condition and potential benefit of time saved with L&S transport. • L&S merely request the right of way from other drivers, but neither emergency warning lights nor siren are very effective. Do not assume that your vehicle has been seen by other drivers, and always proceed with caution and due regard. • Consider the following when driving an EMS vehicle:

- Automatic daytime running lights or manual headlights increase vehicle visibility and should be on at all times when vehicle is moving
- Both L&S should be used when exercising moving privileges (e.g. traveling through a red traffic signal or in travel lanes that oppose normal traffic). Likewise, if the driver does not intend to exercise these privileges, neither lights nor siren should be used during the response or transport. Traffic is confused by an EMS vehicle that approaches an e signal to turn green if the traffic has given the right of way.
- EMS vehicle operators (assisted by EMS provider passengers) should ensure eye contact with other drivers and clear intersections before proceeding through intersections against a red traffic signal or stop sign.
- EMS vehicle drivers should primarily use a combination of wail and yelp when “requesting right-of-way” with a siren. High-low and air horns are less effective siren modes.
- EMS agencies and EMS vehicle operators should avoid continuous use of siren during L&S response or transport and should limit the siren use when needed to “request right-of-way” or when exercising privileges only permitted by emergency vehicles with L&S. Using sirens when travelling at highway speeds with traffic or when traveling unimpeded without exercising emergency vehicle privileges may impede crucial communication related to the response or patient care.
- Avoid flashing white lights after dark, as these may blind oncoming drivers.
- Do not exceed the posted speed limit in EMS vehicles (some experts suggest not exceeding the speed limit by more than 10 mph).
- Drivers should have the mindset that L&S use is only asking permission of other drivers – never assume that permission will be granted.
- Come to a “full stop” at red traffic signals or stop signs before proceeding, when using L&S.
- Limit speed to less than 20 mph when traveling in a lane opposing the normal flow of traffic.

- Downgrade L&S use if not indicated after more information becomes available during response or transport.
- L&S are not indicated if ALS is not indicated.
- L&S use is a medical treatment that should be used only when indicated.
- Consider specific approach to crossing intersections during EMS vehicle L&S driving (From Ambulance Insurance Services, Inc. Sample Intersection Crossing Policy).
 - Crossing on Green – slow down, look all 3 directions, proceed with caution.
 - Crossing on Red – come to complete stop, make eye contact with drivers of another vehicles, wait for partner to communicate all clear, wait 2 seconds, proceed with caution.
 - Making right or left turns across stopped vehicle – come to complete stop next to vehicle, establish eye contact via partner or self, wait for partner to tell you all clear, be aware of vehicles from behind, proceed with caution.
 - Other – use yelp siren mode, use headlights hi-lo beam, be patient.
 - Other – avoid passing on the right unless it is the last resort.
 - Other – avoid traveling in opposing traffic unless you are certain traffic is clear. If you must, use extreme caution and stay to your far right.
- When “blocking the right-of-way” at a scene, consider altering the lighting pattern of the vehicle with the goal of drawing attention without blinding or overwhelming other drivers.
 - Do not use headlights or flashing white lights.
 - Consider decreasing the number and intensity of flashing lights overall.
 - Consider using scene floodlights to illuminate the scene and areas around the vehicle.
 - Consider turning off distracting flashing emergency lights if the EMS vehicle is not the primary vehicle “blocking the right-of-way” for traffic.

	<ul style="list-style-type: none"> ▪ Consider using amber warning lights to warn of hazards ahead or amber directional signals to direct traffic away from hazards.
Measure Importance	
Rationale	<p>When the National Highway Traffic Safety Administration reviewed two decades of data in 2005, it was found that there is an average of 4,500 MVC's involving ambulances each year, and of these crashes, and average of 34% involve injuries and 33 people are killed.^{xxxiii}</p> <p>A 1999 study of ambulance response times in Syracuse, New York found that the use of lights and sirens reduced ambulance response times by an average of 1 minute, 46 seconds, which is statistically significant but unlikely to make a difference in clinical outcomes for most patients.^{xxxiv}</p> <p>A 2005 study of motor vehicle crashes in Pennsylvania found that ambulances were more likely to be in crashes at intersections and traffic signals than other vehicles of similar size. In addition to the increased MVC rate for ambulances, the study found that MVC crashes involving ambulances typically involve more people and more injuries than MVCs among vehicles of similar size.^{xxxv}</p>
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input checked="" type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Clinical Process-Effectiveness • <input checked="" type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance

	<ul style="list-style-type: none"> • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input checked="" type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient's Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient's Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

Safety-02: Use of Lights and Sirens During Transport

Measure Score Interpretation: For this measure, a higher score indicates better quality.

Measure Description	
Percentage of EMS transports originating from a 911 request during which lights and sirens were not used during patient transport.	
Measure Components	
Numerator Statement	EMS transports originating from a 911 request during which lights and sirens were not used.
Denominator Statement	All EMS transports originating from a 911 request.
Denominator Exclusions	None
Denominator Exceptions	None
Supporting Guidance & Other Evidence	<p>The following evidence statements are quoted verbatim from the referenced guidance:</p> <p>U.S. Department of Transportation, National Highway Traffic Safety Administration, Office of Emergency Medical Services: Lights and Siren Use by Emergency Medical Services (EMS) Above All Do No Harm.^{.xxxvi}</p> <p>Recommendations for EMS Vehicle Operators:</p> <ul style="list-style-type: none"> • The driver is responsible for the mode of response to the scene based upon dispatch category, information available from dispatcher, and agency policy • The EMS provider, with the highest level of training, caring for the patient should direct whether or not L&S are used during transport based upon the patient’s medical condition and potential benefit of time saved with L&S transport. • L&S merely request the right of way from other drivers, but neither emergency warning lights nor siren are very effective. Do not assume that your vehicle has been seen by other drivers, and always proceed with caution and due regard. • Consider the following when driving an EMS vehicle:

- Automatic daytime running lights or manual headlights increase vehicle visibility and should be on at all times when vehicle is moving
- Both L&S should be used when exercising moving privileges (e.g. traveling through a red traffic signal or in travel lanes that oppose normal traffic). Likewise, if the driver does not intend to exercise these privileges, neither lights nor siren should be used during the response or transport. Traffic is confused by an EMS vehicle that approaches an e signal to turn green if the traffic has given the right of way.
- EMS vehicle operators (assisted by EMS provider passengers) should ensure eye contact with other drivers and clear intersections before proceeding through intersections against a red traffic signal or stop sign.
- EMS vehicle drivers should primarily use a combination of wail and yelp when “requesting right-of-way” with a siren. High-low and air horns are less effective siren modes.
- EMS agencies and EMS vehicle operators should avoid continuous use of siren during L&S response or transport and should limit the siren use when needed to “request right-of-way” or when exercising privileges only permitted by emergency vehicles with L&S. Using sirens when travelling at highway speeds with traffic or when traveling unimpeded without exercising emergency vehicle privileges may impede crucial communication related to the response or patient care.
- Avoid flashing white lights after dark, as these may blind oncoming drivers.
- Do not exceed the posted speed limit in EMS vehicles (some experts suggest not exceeding the speed limit by more than 10 mph).
- Drivers should have the mindset that L&S use is only asking permission of other drivers – never assume that permission will be granted.
- Come to a “full stop” at red traffic signals or stop signs before proceeding, when using L&S.
- Limit speed to less than 20 mph when traveling in a lane opposing the normal flow of traffic.

- Downgrade L&S use if not indicated after more information becomes available during response or transport.
- L&S are not indicated if ALS is not indicated.
- L&S use is a medical treatment that should be used only when indicated.
- Consider specific approach to crossing intersections during EMS vehicle L&S driving (From Ambulance Insurance Services, Inc. Sample Intersection Crossing Policy).
 - Crossing on Green – slow down, look all 3 directions, proceed with caution.
 - Crossing on Red – come to complete stop, make eye contact with drivers of another vehicles, wait for partner to communicate all clear, wait 2 seconds, proceed with caution.
 - Making right or left turns across stopped vehicle – come to complete stop next to vehicle, establish eye contact via partner or self, wait for partner to tell you all clear, be aware of vehicles from behind, proceed with caution.
 - Other – use yelp siren mode, use headlights hi-lo beam, be patient.
 - Other – avoid passing on the right unless it is the last resort.
 - Other – avoid traveling in opposing traffic unless you are certain traffic is clear. If you must, use extreme caution and stay to your far right.
- When “blocking the right-of-way” at a scene, consider altering the lighting pattern of the vehicle with the goal of drawing attention without blinding or overwhelming other drivers.
 - Do not use headlights or flashing white lights.
 - Consider decreasing the number and intensity of flashing lights overall.
 - Consider using scene floodlights to illuminate the scene and areas around the vehicle.
 - Consider turning off distracting flashing emergency lights if the EMS vehicle is not the primary vehicle “blocking the right-of-way” for traffic.

	Consider using amber warning lights to warn of hazards ahead or amber directional signals to direct traffic away from hazards.
Measure Importance	
Rationale	<p>When the National Highway Traffic Safety Administration reviewed two decades of data in 2005, it was found that there is an average of 4,500 MVC's involving ambulances each year, and of these crashes, an average of 34% involve injuries and 33 people are killed.^{xxxvii}</p> <p>A 2005 study of motor vehicle crashes in Pennsylvania found that ambulances were more likely to be in crashes at intersections and traffic signals than other vehicles of similar size. In addition to the increased MVC rate for ambulances, the study found that MVC crashes involving ambulances typically involve more people and more injuries than MVCs among vehicles of similar size.^{xxxviii}</p> <p>A 2018 study of trauma outcomes and prehospital transport time was unable to identify a correlation between increased prehospital transport times and 30-day mortality rates or hospital length of stay.^{xxxix}</p>
Opportunity for Improvement	A 2015 medical record review of pediatric transports found that of 490 RLS transports, 19.6% of them unnecessarily used lights and sirens. ^{xl}
Measure Designation	
Measure purpose	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Quality Improvement • <input checked="" type="checkbox"/> Accountability • <input type="checkbox"/> MOC
Type of measure	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Process • <input type="checkbox"/> Outcome • <input type="checkbox"/> Structure • <input type="checkbox"/> Efficiency
National Quality Strategy/Priority/CMS Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Clinical Process-Effectiveness • <input checked="" type="checkbox"/> Patient Safety • <input type="checkbox"/> Patient Experience • <input type="checkbox"/> Care Coordination • <input type="checkbox"/> Efficiency: Overuse • <input type="checkbox"/> Efficiency: Cost • <input type="checkbox"/> Population & Community Health
CMS Meaningful Measure Domain	<ul style="list-style-type: none"> • <input type="checkbox"/> Medication Management • <input type="checkbox"/> Admissions and Readmissions to Hospitals • <input type="checkbox"/> Transfer of Health Information and Interoperability • <input type="checkbox"/> Preventative Care • <input type="checkbox"/> Management of Chronic Conditions • <input type="checkbox"/> Prevention, Treatment, and Management of Mental Health

	<ul style="list-style-type: none"> • <input type="checkbox"/> Prevention and Treatment of Opioid and Substance • <input type="checkbox"/> Risk Adjusted Mortality • <input type="checkbox"/> Equity of Care • <input type="checkbox"/> Community Engagement • <input type="checkbox"/> Appropriate Use of Healthcare • <input type="checkbox"/> Patient-focused Episode of Care • <input type="checkbox"/> Risk-Adjusted Total Cost of Care • <input type="checkbox"/> Healthcare-associated infections • <input checked="" type="checkbox"/> Preventable Healthcare Harm • <input type="checkbox"/> Care is Personalized and Aligned with Patient’s Goals • <input type="checkbox"/> End of Life Care according to Preferences • <input type="checkbox"/> Patient’s Experience of Care • <input type="checkbox"/> Patient Reported Functional Outcomes
Level of measurement	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Individual EMS Professional • <input checked="" type="checkbox"/> EMS Agency
Care setting	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Pre-Hospital Care
Data source	<ul style="list-style-type: none"> • <input checked="" type="checkbox"/> Electronic Patient Care Record (eCPR) data • <input type="checkbox"/> Administrative Data/Claims (inpatient, outpatient or multiple-source claims) • <input checked="" type="checkbox"/> Paper medical record/Chart abstracted • <input checked="" type="checkbox"/> Registry

-
- ⁱ NASEMSO Medical Directors Council. (2017) National Model EMS Clinical Guidelines. *National Association of State EMS Officials*, 78-81.
- ⁱⁱ Maggiore, W.A. (2013) Highs & Lows, Recognizing & treating hypoglycemia, hyperglycemia & other diabetes-related health problems. *Journal of Emergency Medicine Services*, 45-47.
- ⁱⁱⁱ Carroll, M.F., Burge, M.R., Schade, D.S. (2003) Severe Hypoglycemia in Adults. *Reviews in Endocrine & Metabolic Disorders*. 4: 149-157.
- ^{iv} NASEMSO Medical Directors Council. (2017) National Model EMS Clinical Guidelines. *National Association of State EMS Officials*, 138-141.
- ^v Drayna, P.C., Browne, L.R., Guse, C.E. Brousseau, D.C., & Lerner, E.B. (2015) Prehospital Pediatric Care: Opportunities for Training, Treatment, and Research, *Prehospital Emergency Care*, 19:3, 441-447.
- ^{vi} Camargo, C.A. (2006) A Model Protocol for Emergency Medical Services Management of Asthma Exacerbations, *Prehospital Emergency Care*, 10:4, 418-429.
- ^{vii} CDC.gov. (2019). CDC – Asthma. Accessed May 8, 2019 at: <http://www.cdc.gov/asthma/default.htm>.
- ^{viii} CDC.gov (2018). Asthma | Healthy Schools | CDC. Accessed May 8, 2019 at: <http://www.cdc.gov/healthyschools/asthma>
- ^{ix} Nassif, A., Ostermayer, K., Hoang, K.B., Claiborne, M.K., Camp, E.A., Shah, M.I., (2018) Implementation of a Prehospital Protocol for Change For Asthmatic Children. *Prehospital Emergency Care*, 22:4, 457-465.
- ^x Commission, TJ (2008) Preventing pediatric medication errors: Sentinel Event Alert. Accessed March 12, 2019: http://www.jointcommission.org/assets/1/18/sea_39.pdf.
- ^{xi} Authority PPS, (2009) Medication errors, significance of accurate patient weights.
- ^{xii} Shah, M.I., Macias, C.G., Dayan, P.S., Weik, T.S., Brown, K.M., Fuchs, S.M., Fallat, M.E., Wright, J.L., Lang, E.S. (2014) An Evidence-based Guideline for Pediatric Prehospital Seizure Management Using GRADE Methodology, *Prehospital Emergency Care*, 18:sup1, 15-24.
- ^{xiii} NASEMSO Medical Directors Council. (2017) National Model EMS Clinical Guidelines. *National Association of State EMS Officials*, 91-95.
- ^{xiv} Centers for Disease Control and Prevention (2019) Epilepsy Data and Statistics. Accessed on May 8, 2019 at <http://www.cdc.gov/epilepsy/data/index.html>
- ^{xv} Trinka, E., Hofler, J., Leitinger, M., Brigo, F. (2015) Pharmacotherapy for Status Epilepticus, *Drugs*, 75, 1499-1521.
- ^{xvi} Huff, S.J., Morris, D.J., Kothari, R.U., Gibbs, M.A. (2001) Emergency Department Management of Patients with Seizures: A Multicenter Study, *Academic Emergency Medicine*, 8:6, 622-628.
- ^{xvii} Silbergleit, R., Durkalski, V., Lowenstein, D., Conwit, R., Pancioli, A., Palesch, Y., Barsan, W. (2012) Intramuscular versus Intravenous Therapy for Prehospital Status Epilepticus, *The New England Journal of Medicine*, 366;7, 591-600,
- ^{xviii} American Heart Association (2011) *Target Stroke*.
- ^{xix} American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee (2019) Heart Disease and Stroke Statistics – 2019 Update. A Report From The American Heart Association, *Circulation*, 139:e56-e528.
- ^{xx} Musuka, TD, Wilton, SB, Traboulsi, M, Hill, M (2015) Diagnosis and management of acute ischemic stroke: speed is critical, *Canadian Medical Association Journal*, 187(12): 887-893.
- ^{xxi} Kothari, R.U., Pancioli, A., Liu, T., Brott, T., Broderick, J. (1999) Cincinnati Prehospital Stroke Scale: reproducibility and validity, *Annals of Emergency Medicine*, Apr;33(4):373-8.
- ^{xxii} Krebs, W., Sharkey-Toppen, T.P., Cheek, F., Cortez, E., Larrimore, A., Keseg, D., & Panchal, A.R. (2018) Prehospital Stroke Assessment for Large Vessel Occlusions: A Systematic Review, *Prehospital Emergency Care*, 22:2, 180-188.
- ^{xxiii} Yang, Q, Tong X, Schieb L, (2017) et al. Vital Signs: Recent Trends in Stroke Death Rates — United States, 2000–2015. *MMWR Morb Mortal Wkly Rep*, ;66:933–939.
- ^{xxiv} Gausche-Hill, M., Brown, K.M., Oliver, Z.J., Sasson, C., Dayan, P.S., Eschmann, N.M., Weik, T.S., Lawner, B.J., Shani, R., Flack-Ytter, Y., Wright, J.L., Todd, K., Lang, E.S. (2014) An Evidence-based Guideline for Prehospital Analgesia in Trauma, *Prehospital Emergency Care*, 18:sup1, 25-34.
- ^{xxv} Galinski, M., Ruscev, M., Gonzalez, G., Kavaz, J., Ameer, L., Biens, D., Lapostolle, F. & Adnet, F (2010) Prevalence and Management of Acute Pain in Prehospital Emergency Medicine, *Prehospital Emergency Care*, 14:3, 334-339.
- ^{xxvi} National Association of EMS Physicians. (2003). *Prehospital Pain Management* (Position Paper). Overland Park, KS: Alonso-Serra, H.M., Wesley, K.

-
- ^{xxvii} Izsak, E., Moore, J.L., Stringfellow, K., Oswanski, M.F., Lindstrom, D.A., & Stombaugh, H.A., (2008) Prehospital Pain Assessment in Pediatric Trauma, *Prehospital Emergency Care*, 12:2, 182-186.
- ^{xxviii} Hewes, H.A., Dai, M., Mann, N.C., Baca, T, & Taillac, P. (2018) Prehospital Pain Management: Disparity By Age and Race, *Prehospital Emergency Care*, 22:2, 189-197.
- ^{xxix} Sasser, S.M., Hunt, R.C., Faul, M., Sugerman, D., Pearson, W.S., Dulski, T., Wald, M.M., Jurkovich, G.J., Newgard, C.D., Lerner, E.B., Cooper, A., Wang, S.C., Henry, M.C., Salomone, J.P., Galli, R.L. (2011) Guidelines for Field Triage of Injured Patients: Recommendations of the National Expert Panel on Field Triage, 2011. *MMWR Morb Mortal Wkly Rep*; 61(RR01), 1-20.
- ^{xxx} Baez, A.A., Lane, P.L., Sorondo, B., Nituica, C. (2006) Receiving Care Facility and Outcome Differences for Victims of Severe Violent injuries, *Prehospital Emergency Care*, 10:2, 220-223.
- ^{xxxi} MacKenzie, E.J., Rivara, F.P., Jurkovich, G.J., Nathens, A.B., Frey, K.P., Egleston, B.L., Salkever, D.S., Scharfstein, D.O., (2006) A National Evaluation of the Effect of Trauma-Center Care on Mortality, *The New England Journal of Medicine*, 354;4, 366-378.
- ^{xxxii} Kupas, D.F. (2017) Lights and Siren Use by Emergency Medical Services (EMS): Above All Do No Harm. U.S. Department of Transportation, *National Highway Traffic Safety Administration, Office of Emergency Medical Services*, 49-51.
- ^{xxxiii} Smith, N. (2005) A National Perspective on Ambulance Crashes and Safety, *EMS World*, 2015; 44(9): 91-94.
- ^{xxxiv} Lawrence H. Brown, Christa L. Whitney, Richard C. Hunt, Michael Addario & Troy Hogue (2000) Do Warning Lights and Sirens Reduce Ambulance Response Times? *Prehospital Emergency Care*, 4:1, 70-74
- ^{xxxv} Ray, A.F. & Kupas, D.F. (2005) Comparison of Crashes Involving Ambulances with Those of Similar-Sized Vehicles, *Prehospital Emergency Care*, 9:4, 412-415.
- ^{xxxvi} Kupas, D.F. (2017) Lights and Siren Use by Emergency Medical Services (EMS): Above All Do No Harm. U.S. Department of Transportation, *National Highway Traffic Safety Administration, Office of Emergency Medical Services*, 49-51.
- ^{xxxvii} Smith, N. (2005) A National Perspective on Ambulance Crashes and Safety, *EMS World*, 2015; 44(9): 91-94.
- ^{xxxviii} Ray, A.F. & Kupas, D.F. (2005) Comparison of Crashes Involving Ambulances with Those of Similar-Sized Vehicles, *Prehospital Emergency Care*, 9:4, 412-415.
- ^{xxxix} Brown, E., Hideo, T., Bailey, P., Fatovich, D., Pereira, G., & Finn, J. (2018) Longer Prehospital Time was not Associated with Mortality in Major Trauma: A retrospective Cohort Study, *Prehospital Emergency Care*.
- ^{xl} Burns, B., Hansen, ML, Valenzuela, S., Summers, C., Van Otterloo, J., Skarica, B., Warden, C., Guise, J.M. (2016) Unnecessary Use of Red Lights and Sirens in Pediatric Transport, *Prehospital Emergency Care*, May-Jun;20(3):354-61.