



National EMS Quality Alliance

Seizure-02 Measure Package

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Seizure-02: Patient with Status Epilepticus Receiving Intervention

EMS is commonly faced with caring for patients with status epilepticus, The published rationale and guidelines support this measure – patients experiencing status epilepticus utilize EMS for care and the efficacy of treatments (e.g., benzodiazepines) is evident. There is also strong evidence that earlier of treatment of status epilepticus results in improved patient outcomes. With the current evidence and guidelines, Seizure-02 remains in the EMS Compass 2.0 Measure Set, with the intent of measuring whether or not patients with status epilepticus are receiving benzodiazepines.

During the re-specification project, no substantive changes were made to the denominator of Seizure-02. The denominator remains EMS response for patients with a primary or secondary impression of status epilepticus. However, the TEP did remove the definition of status epilepticus from the measure denominator. After much discussion, the TEP decided that limiting the condition of “status epilepticus” to a specific definition would incidentally exclude a large number of patients who meet the intent of the measure. The intent being treatment of patient with active seizures while in the care of the EMS professional. The final decision was to remove the measure definition and to allow each EMS provider (or agency) to determine if the patient they are treating is experiencing status epilepticus, either by following their own agency’s guidelines or using their own assessment skills.

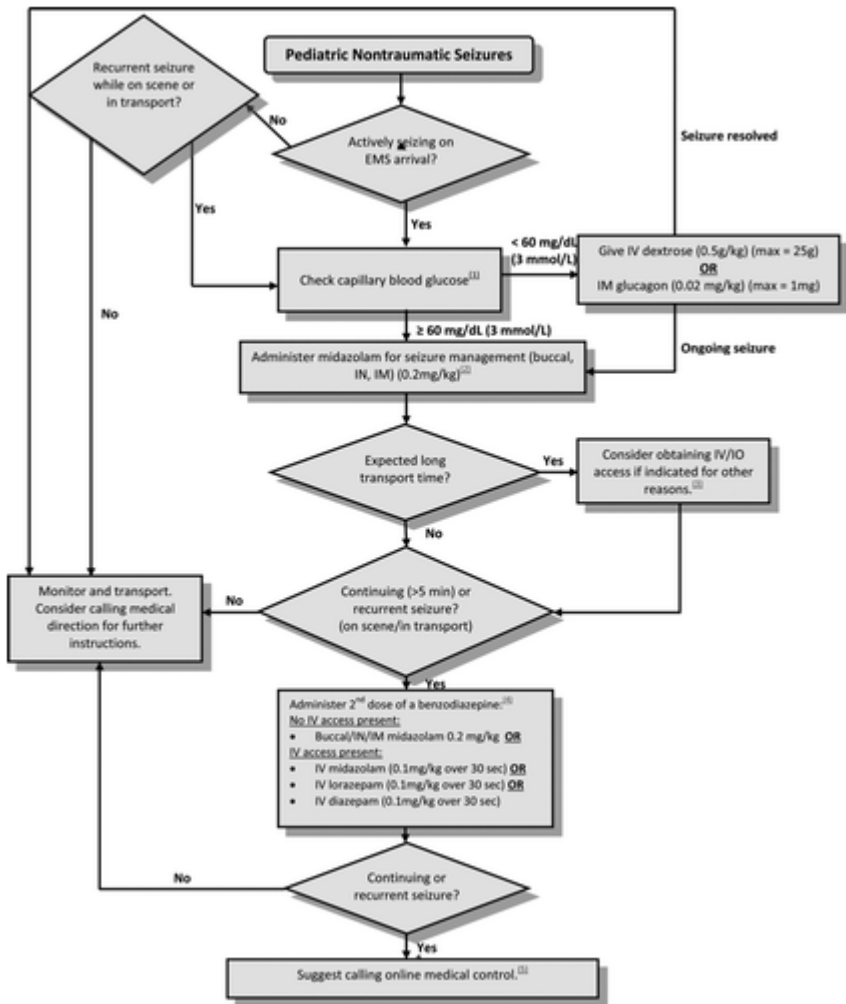
The specifications for the numerator for Seizure-02 have been narrowed down to include only benzodiazepines as an intervention at terminating a patient’s status seizure. This does not change the intent of the original EMS Compass candidate measure, but rather makes the measure more specific, focusing on one, evidence-based clinical process, rather than leaving it open-ended for interpretation.

EMS systems have the opportunity to provide well evidenced benefit to patients by initiating prehospital treatment of status epilepticus. EMS agencies and systems can use this measure to establish how often they are providing this potentially lifesaving therapy. If variability in care or areas for improvement are identified quality improvement efforts can be targeted for this group of patients.

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 Methodology¹:</p>



National Association of State EMS Officials, National Model EMS Clinical Guidelines for Seizureⁱⁱ:

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)

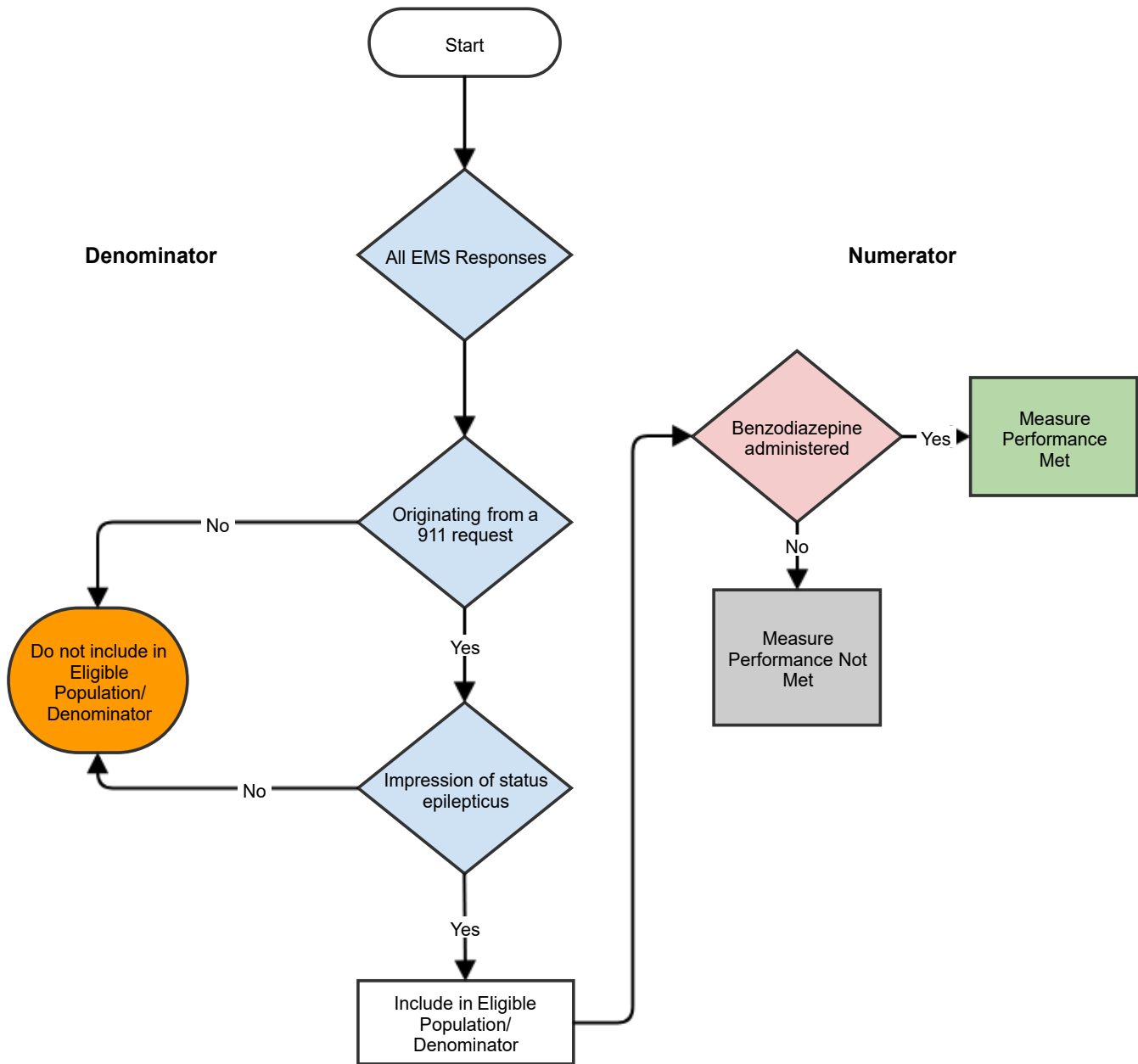
Treatment and Interventions

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,ⁱⁱⁱ 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.^{iv}</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.^v</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.^{vi}</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

Clinical Quality Measure Flow for Seizure-02 Patient with Status Epilepticus Received Intervention



NEMESIS Pseudocode: Seizure-02: Patient Received Intervention for Status Epilepticus

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

Measure Components	
Numerator Pseudocode	<p>Patients receiving EMS intervention (e.g. benzodiazepine) aimed at terminating their status seizure:</p> <p>eMedications.03 Medication Given is in (3322 ("Diazepam"), 6960 ("Midazolam"), 203128 ("Midazolam Hydrochloride"), 6470 ("Lorazepam"))</p>
Denominator Pseudocode	<p>(eSituation.11 Provider's Primary Impression matches /^G40...[1,3]/ ("Epilepsy,..., with status epilepticus") or eSituation.12 Provider's Secondary Impressions matches /^G40...[1,3]/ ("Epilepsy,..., with status epilepticus")) and eResponse.05 Type of Service Requested is 2205001 ("911 Response (Scene)")</p>

ⁱ 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.

ⁱⁱ NASEMSO Medical Directors Council. (2017) National Model EMS Clinical Guidelines. *National Association of State EMS Officials*, 91-95.

ⁱⁱⁱ 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>

^{iv} Trinka, E., Hofler, J., Leitinger, M., Brigo, F. (2015) Pharmacotherapy for Status Epilepticus, *Drugs*, 75, 1499-1521.

^v 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.

^{vi} 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.