

Introduction to the National EMS Quality Measure Set Project

The National EMS Quality Alliance has had the privilege of working to vet and re-specify the EMS Compass candidate measures produced by the EMS Compass team from 2016. Funded by National Highway Traffic Safety Administration (NHTSA) Office of EMS to further develop Quality Measures for the EMS community, NEMSQA has endeavored to conduct this work in an open, structured, systematic way. After establishing organization bylaws and infrastructure, the Measure Development Committee (MDC), chaired by Kathleen Brown and Jonathan Washko, went to work on creating an organized process to perform measure development. Kelly Burlison, a measure development expert, was brought on as the project manager for this work. As the primary operational committee for this project, the MDC developed a clear collaborative subcommittee effort in three areas: Research/Evidence, Specifications, and Testing/Learning.

These key subcommittees went to work on evaluating the EMS Compass candidate measures as proposed and approved by the original EMS Compass project executive committee. The NEMSQA leadership asked for participation from key stakeholders in the EMS community including ePCR vendors, NEMSIS leadership and other leaders in EMS data and quality. This group of experts made up the Technical Expert Panel (TEP) for this project.

This is the story of how these measures were discussed, vetted and re-specified – an open discussion of the debates that were had, the challenges that this team faced in deciding details of these measures within the existing context of EMS as practiced and documented today in the United States. As you will see, there is philosophical tension about what these measures are designed to do; however, the question we asked ourselves first is - *How will this measure help patients treated by EMS?*

The next set of questions we asked ourselves are –
How will tracking these measures improve the EMS systems of care that exist today?
How will this measure impact our EMS agencies across the country?

Many of these measures, in this round of development measure basic elements of care that either in prior studies or in analyses of large prehospital data sets have demonstrated inconsistency in performance across the country. Most of the evidence and rationale for these measures is Level II or Level III, which does not include randomized control trials. In some cases, it was recognized that since the measure represents established standard of care it would not be ethical to withhold standard treatment from a patient for the purposes of a study. Thus, even though the evidence for these measures is not as strong as it could be, there is available information to support the rationale for their existence as a measure of quality, and the consensus that these processes are the right thing to do for EMS patients is very strong.

Each of these 14 measures were discussed at length and supporting evidence from the research, specifications and testing/learning subcommittees were brought to bear at two key meetings of the TEP on April 15^h, 2019 and August 5, 2019.

While each measure was discussed in detail during the meetings of the TEP, one overarching item that was discussed at length that applies to all measures is the definition of *911 Request* and how it is defined. The TEP agreed that the measures should be limited to emergency requests, but also understood there are many ways an emergency request can be made at the local level. After much discussion, the TEP decided to use the standards set by Medicare for 911 Request, which is-911 Request must be in accord with local 911 or equivalent service dispatch protocol. By using the Medicare standard which includes the equivalent protocol, the TEP feels that other methods of emergency requests, other than 911 calls, will be included in the denominator criteria. This is also in line with the NEMSIS registry, as 911 requests and equivalents map to the registry data element of eResponse.05

Clarifications and Definitions.

Each measure was broken down into parts, or elements, required for calculation. Since all the EMS Compass 2.0 measures were proportion measures, which means they calculate percentage scores, their elements include numerators and denominators. Some of them also include denominator exclusions.

For the purposes of quality measurement, ***numerator*** is defined as the processes or outcomes expected for each encounter defined in the denominator. The measure numerator essentially defines the action that satisfies the conditions of the measure.

For the re-specified measures, ***denominator***, which can also be referred to as the *initial population*, refers to the encounters being evaluated for performance. The encounters included in the denominator share a common set of specified characteristics.

In some of the re-specified measures, ***denominator exclusions*** are used, which specify encounters or patients that should be removed from the denominator before determining if numerator criteria are met. Denominator exclusions are used when the clinical processes or outcomes expected in the numerator do not apply to the subset of patients/encounters.

Other descriptive items are also included in the measure specifications, including measure title, score interpretation, definition, guidance and evidence, and rationale. These items provide additional information on the background, intent, and implementation of each measure. This package of comprehensive information should provide a detailed and informative picture of each measure.

Hypoglycemia-01: Treatment Administered for Hypoglycemia

Direct evidence for treating hypoglycemia/low blood sugar in the EMS environment is not available. However, it has clearly the standard of care for patients who have the condition. The medical community/literature understands that untreated hypoglycemia can cause brain injury, coma and other consequences. AS noted above a randomized trial of this therapy would not be ethical. Clearly, EMS has a role in giving early treatment, be it oral, IV or IO delivery. Patients, wherever they may be, should have access to this critical, simple antidote for a life-threatening condition. The intent of this measure is to determine if treatment is being administered to EMS patients who are experiencing hypoglycemia.

The denominator, or initial population included in this measure is EMS encounters for patients who have a clinical condition associated with hypoglycemia. After much debate and discussion, it was decided that the initial population could be captured in one of two ways— encounters for patients with a documented primary or secondary impression of *Altered Mental Status* and a blood sugar less than 60 ug/mL (The TEP decided on this number because it is the most specific/lowest and captures the sickest patients), OR, encounters for patients with a primary impression of *Hypoglycemia* with a documented GCS of <15 or an AVPU score of V, P or U. The TEP believes that this denominator will offer the best opportunity to identify the patients affected by this condition.

Because the definition of and treatment for hypoglycemia in the newly born (< 24 hours old) has different parameters this population of patients has been excluded from the denominator for Hypoglycemia-01. Any EMS responses for this population of patients who meet the inclusion criteria should be removed from the denominator.

The numerator consists of EMS responses for patients who receive the care expected (and was documented!)— in this case, these are the number of patients from the denominator who receive sugar in one way or another. Many medication codes correlate to the NEMSIS capture of this treatment including IV/IO and oral formulations of dextrose and glucose; however, there is no existing treatment code for “food” We understand that some of our EMS treated patients will get this care but not be recorded for electronic specification. NEMSQA anticipates this may lower overall treatment percentages for any given EMS agency – this is likely to affect EMS agencies throughout the country. NEMSQA also hopes that NEMSIS and ePCR vendors will consider adding this code in the next round of updates so that agencies can get credit for this treatment.

Different EMS systems will allow different treatment for hypoglycemia at different levels – some BLS may be able to use a glucometer to find this condition but if the patient cannot take oral glucose, their only option is to transport without ALS backup - in this type of system, there may be a lower rate of EMS treatment of hypoglycemia compared to other similar systems. This low number might therefore incentivize the system to

adapt, add resources to EMS or look for mutual aid to improve the rates of improvement for their patients suffering from hypoglycemia.

Pediatrics-01: Pediatric Respiratory Assessment

This measure also does not have direct evidence to support its validity. However, it is known that providers often express discomfort with assessment of children and that respiratory distress is one of the most common serious conditions encountered by EMS providers in pediatric patients. The TEP agreed this measure is clinically important and there is value to measuring it. The medical community agrees that, if a pediatric patient is experiencing respiratory distress, a respiratory assessment should be conducted. Performing the respiratory assessment on the patient is the first step to determining if additional clinical interventions are necessary, and it is important that this process in care be measured. The intent of this measure is to determine if pediatric patients experiencing respiratory distress are receiving respiratory assessments.

The denominator, or initial population, for this measure includes EMS encounters for patients less than 18 years of age with a primary or secondary impression of respiratory distress. Those who are familiar with the original EMS Compass candidate measure may recognize the changes in the denominator for the re-specified measure. The inclusion criteria have been expanded from less than 15 years of age to less than 18 years of age and has been expanded to include a general impression of respiratory distress, which could include many different respiratory conditions. These changes mirror what is found in current published guidelines and literature for pediatric respiratory distress and assessments.

The numerator for the re-specified measure has not changed. While the TEP discussed potentially adding additional elements of a respiratory assessment, such as auscultation of the lung, it was ultimately decided to limit the numerator to SPO2 and respiratory rate measurements, due to feasibility concerns. While there are other elements to a respiratory assessment, Pediatrics-01 focuses on the completion and documentation of these two elements.

To the experienced EMS Professional, Pediatrics-01 appears to state the obvious – Every patient should have an assessment of their respiratory status. However, documentation of this fundamental element of care is often not completed. This may be simply a documentation omission but may also represent an incomplete clinical assessment or perhaps because providers are less comfortable assessing children than adults. An agency or system can use this measure to identify gaps in standard care or documentation of that care and target areas for improvement. This will drive recognition for the importance of this measure.

Pediatrics-02: Administration of Beta Agonist for Pediatric Asthma

Asthma is a common disease among both children and adults, and a common reason for EMS calls. With EMS being utilized so often for pediatric asthma exacerbation, the TEP felt strongly about continuing to include this measure in the measure set. There is strong evidence demonstrating the benefits of albuterol administration to patients with an acute asthma exacerbation in the Emergency Department setting based on patient centered outcomes. There is also evidence to support that it can be administered safely and effectively by EMS. There are also national guidelines that support this measure. The intent of this measure is to determine if pediatric patients experiencing asthma exacerbation are receiving a beta agonist.

The denominator for Pediatrics-02 includes EMS responses for patients 2-18 years of age with a primary or secondary impression of asthma. The reason why patients less than 2 years of age are not part of the inclusion criteria The rationale for this exclusion is to exclude patients with wheezing from other etiologies such as bronchiolitis in which the evidence does not support routine use of beta- agonists. The inclusion criteria for age has also been changed to include patients up to 18 years of age, as the evidence continues to support administering beta agonist medications to this age group. The TEP felt it important to include the entire pediatric population in the measure, rather than creating an upper limit of 15 years of age in the inclusion criteria.

Two substantive changes were made to the numerator of Pediatrics-02 during the measure re-specification process. In order to meet quality standards for the measure, not only does a beta agonist have to be administered, but it must be an **aerosolized** beta agonist; and the beta agonist must be **administered by an EMS professional**. There was meaningful discussion among the members of the TEP in order to get to these changes. TEP members felt requiring that beta agonist medication be administered by an EMS professional makes Pediatrics-02 a true quality measure, as improvement can be driven by the EMS providers themselves.

Every State and Region will have variation with regard to availability of Advanced Life Support, Basic Life Support and First Responders as well as protocols for care of pediatric patients with asthma. In considering this measure, the TEP envisioned a patient-centric stance – in other words – it doesn't matter who is responding, or, if BLS cannot administer albuterol in a particular state or region, if the patient is not receiving this important, possibly life-saving medication in the course of their EMS care, there might be an opportunity to make system changes to address this lack of care.

Pediatrics-03: Documentation of Estimated Weight in Kilograms

Pediatrics-03 is classified as a pediatrics measure in the EMS Compass 2.0 Measure Set, but its intent is deeply rooted in safety. There is significant published literature that attributes pediatric medication errors to errors in converting pounds to kilograms while dosing a medication. With pounds and kilograms commonly being confused, leading to pediatric medication errors, Pediatrics-03 is important for measuring a clinical documentation process that can lead to better patient outcomes. The intent of Pediatrics-03 is to determine if the weight of EMS pediatric patients is being documented in kilograms.

The denominator for Pediatrics-03 includes EMS responses for patients less than 18 years of age who receive a weight-based medication during the EMS response. The TEP discussed this inclusion criteria at great length, even considering developing a measure that would assess documentation of weight in kilograms for all pediatric patients, regardless if a weight-based medication was administered. However, after much discussion, it was determined to leave weight-based medication in the inclusion criteria so the true intent of the measure, which is to reduce medication errors, will not get lost. During the re-specification project, the inclusion criteria was also expanded so EMS responses for patients up to 18 years of age are measured, rather than limiting it to patients less than 15 years of age. The decision to expand the age range of the inclusion criteria was made to ensure the process of documenting weight in kilograms is encouraged for all pediatric patients.

The numerator for Pediatrics-03 was not changed during the measure re-specification project. EMS professionals can meet the performance for Pediatrics-03 in one of two ways – documenting the patient weight in kilograms or documenting a length-based weight.

Pediatric patients make up approximately 5-10% of patients taken care of by EMS. Critical pediatric patients make up < 1 percent of these patients. The accurate dosing of many medications to pediatric patients requires calculation based on the patient's weight in kilograms. In these rare high stress situations, the likelihood of making a medication error on a pediatric patient is high even when the weight is measured and documented appropriately. Measuring this specific population will drive regions/systems to consider how they are performing this critical task and how they can improve. This will, in turn, lead to an EMS system that will have higher likelihood of providing the correct dose to a patient thereby improving the safety of medication administration.

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.

Stroke-01: Suspected Stroke Receiving Prehospital Stroke Assessment

Because stroke is such a significant public health problem, and timing of treatment is so important to achieve better patient outcomes, the TEP felt strongly that Stroke-01 has value to the EMS Community. While the direction of published evidence can vary for prehospital stroke scales, it is widely understood that stroke assessments are helpful tools in helping identify patients with stroke and determining which facilities are most appropriate for their transport. The intent of this measure is to determine how many suspected stroke patients are receiving prehospital stroke assessments (and having the assessment documented), on scene during the EMS encounter.

No changes were made to the denominator of Stroke-01 during the re-specification project. The TEP determined that the denominator used in the original candidate measure is appropriate. However, a denominator exclusion was added to the measure – patients who are unresponsive and unable to participate in the assessment. For the purposes of this measure, patients who are unresponsive will be excluded and not be counted in the measure calculation, since they are not able to participate in the stroke assessment.

The numerator for this measure includes EMS responses for patients who had a stroke assessment performed on scene during the EMS response. The addition of *on scene* to the numerator ensures that the stroke assessment was conducted during the EMS response and by the EMS professional, which protects the intent of the measure. During the project, the TEP discussed limiting the stroke assessments to certain types, such as CPSS or LAMS; however, the experts decided against limiting to specific assessment types, as the intent of the measure is to determine if any stroke assessment was performed.

As Stroke Systems of Care become more robust across the country and EMS becomes an increasingly important partner in identifying stroke, this measure will support a key task of prehospital providers in the care of stroke patients – making the diagnosis and key transport decisions.

Trauma-01: Pain Assessment of Injured Patients

EMS has a role in assisting with pain management and it is important that pain is assessed and documented. There is evidence of variability in how often pain is assessed and treated by EM professionals. The intent of this measure is to determine if pain is assessed (and documented) for injured patients who are transported by EMS.

The most substantive change made to the denominator during the re-specification process was the change from EMS responses to EMS **transports**. This change was made to ensure the accurate population of patients is being measured. During the measure testing phase, when documented pain scale scores were measured for EMS responses, the measure scores were significantly lower than anticipated. However, when the inclusion criteria were changed to transports, the scores were more in line with expectations. The rationale behind this change is many injured patients involved in motor vehicle crashes refuse transport or care by EMS. Since these patients are still part of the inclusion criteria for EMS responses for injured patients, the measure score was being driven down. The change to transports will allow the EMS community to better understand their individual and agency performance for this measure. Additionally, the TEP decided to limit the denominator to patients with a **GCS of 15** or an **A on the AVPU scale**, to ensure only patients who are fully alert and conscious are being included in the denominator.

The numerator for Trauma-01 includes patients with any pain scale value documented during the EMS encounter. This numerator mirrors that of the original EMS Compass candidate measure of Trauma-01.

Assessment and treatment of pain in the prehospital environment is an opportunity for EMS to impact an outcome that is highly valued by patients (relief of pain). Published evidence demonstrates that there is wide variability and opportunities for improvement in this area. EMS systems or agencies can use this measure to assess how they are performing and identify areas for quality improvement efforts.

Trauma-03: Effectiveness of Pain Management for Injured Patients

Trauma-03, an outcome measure, measures the effectiveness of pain management for injured patients who are transported by EMS. The published evidence supporting this measure is similar to that of Trauma-01, as EMS often treats patients with pain and there are many clinical indicators for pain management. The intent of this measure is to determine if pain is being reduced for EMS patients during the EMS encounter. However, for this measure, the TEP feels it is important to note that there are alternative pain management methods to the administration of drugs, and drug administration should be used judiciously. The true intent of this measure is to determine if EMS providers are helping their injured patients feel better, not if they are administering opioids to their patients.

Similar to Trauma-01, the initial inclusion criteria for Trauma-03 was changed to EMS **transports** rather than EMS responses, to ensure the accurate initial population is being captured to protect the true intent of the measure – which is to measure how well EMS is helping injured patients who are in pain feel better. As for the threshold for the initial pain scale score, it remains at **greater than zero**. Much discussion took place among TEP members when it came to decide upon this initial pain score value. However, in the end, the experts decided that the initial value should be any score greater than zero, because, again, the intent of the measure is to measure how well EMS is helping injured patients who are in pain feel better, not to measure the effectiveness of opioid administration or other medication-related outcomes.

While the intent of the numerator for Trauma-03 has not been changed, the language has been revised for clarity. The numerator for this measure includes EMS transports for patients with two or more documented pain scores and a final pain score value less than the first documented pain score. In order to determine if the clinical outcome for this measure has been met, a calculation must be completed.

Trauma-04: Trauma Patients Transported to the Trauma Center

Trauma-04 was designed using CDC guidelines for Field Triage of Trauma Patients. Along with the CDC guidelines, published literature clearly supports this measure, as patients who receive appropriate trauma care often have better outcomes. As this measure was being re-specified, the TEP discussed many concerns with the pragmatic implementation of this measure – including the availability of trauma centers in rural communities and whether the measure should focus on transporting patients to the appropriate level of trauma center. While there are many possible variations and stratifications of this measure, the TEP ultimately decided to stay with the intent of the original EMS Compass candidate measure, which is measuring if patients with trauma are being transported to a trauma center.

During the re-specification process, the TEP closely reviewed the CDC Guidelines for Field Triage, which were used to build the denominator for this measure. Originally, in the EMS Compass candidate measures, Step 1, 2, and 3 criteria were part of the denominator inclusion criteria. But, after reviewing the guidelines again, the TEP decided to remove Step 3 from the denominator for the re-specified measure, as Steps 1 and 2 identify the most seriously injured patients. The experts determined that limiting the denominator to **Steps 1 and 2** will satisfy the intent of the measure without running the risk of over transporting patients to trauma centers who may not need the care of such a facility.

As stated above, much discussion was had about the numerator of Trauma-04. While everyone on the TEP agreed that transporting a trauma center is the best course of treatment for certain patients, it was noted that trauma centers are not always available or well-defined. The TEP discussed many different options for the numerator for Trauma-04, including transporting patient with trauma to the nearest hospital and transporting patients to a specific level of trauma center. However, the final measure has been specified to require the patient to be transported to a trauma center.

The TEP understands concerns about limited access to trauma centers in certain communities and concerns that some hospitals labeled as trauma centers may not be as equipped as others. But, as measurement is used to drive change, the TEP hopes data collected from Trauma-04 will help drive change in the availability and standards of trauma centers across the nation.

Safety-01 – Safety-02: Use of Lights and Sirens During Response/Transport

Safety-01 Safety-02 focus on the judicious use of lights and sirens during response to scene (Safety-01) and during patient transport (Safety-02). These measures may have the strongest evidence any measure in the EMS Compass 2.0 Measure Set. There are strong guidelines and published studies that support the limited use of lights and sirens to protect not only the public but also EMS providers and patients from potential danger, as a consequence of lights and sirens use. The intent of these two measures is to determine how often EMS professionals are not using lights and sirens during response and transport.

The denominator for these measures is the total number of EMS responses/transports originating from a 911 request. The TEP decided not to add denominator exclusions to these measures, as even though there may be times were an EMS provider is responding to a high-risk emergency or transporting a high-acuity patient, the principle this measure was built upon is, *Above All Do No Harm*, and in order to uphold this principle and the intent of the measures, lights and sirens usage on all EMS responses and transports will be measured.

The numerator for both Safety-01 and Safety-02 was changed during the measure re-specification process. The original measures released as part of the candidate EMS Compass measure set were inverse measures, meaning lower measure scores indicated better quality. However, to eliminate confusion of the measure score interpretation, the TEP decided to change the measures to standard scoring, where higher scores will indicate better quality. This means the numerator for both Safety-01 and Safety-02 measure the process in which lights and sirens were **not** used.

The TEP understands the use of lights and sirens is often governed by state or local agency protocols. However, quality measures are built upon published guidance and



rationale and the intent is to drive change. While individual EMS providers may still have to follow written protocols, NEMSQA and the TEP hopes that these quality measures will help drive change at the state and local levels, so protocols that are more in-line with the guidelines and evidence for lights and sirens use can be developed.