



QUALITY MEASURES TOOLKIT



Developed in partnership with
The Paramedic Foundation
2022

RURAL  EMS
COUNTS

Rural EMS Counts – Quality Measures Toolkit

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Table of Contents

<i>Rural EMS Counts Project</i>	4
<i>Measures</i>	4
<i>Cardiac Management Quality Measures</i>	5
Cardiac Management Background and Clinical Pearls	5
Cardiac Management Performance Improvement and Best Practices.....	5
Cardiac Management - Other Relevant Data and Educational Resources.....	5
REPORTING: Cardiac Management Quality Measures	6
Cardiac- 12 Lead Performed by EMS for ED-Diagnosed STEMI.....	6
Cardiac- 12 Lead Performed for Suspected Cardiac Chest Pain.....	6
Cardiac- Aspirin Administration for Suspected Cardiac Chest Pain	7
<i>Stroke Management Quality Measures</i>	8
Stroke Management Background and Clinical Pearls	8
Stroke Management Performance Improvement and Best Practices	8
Stroke Management - Other Relevant Data and Educational Resources	9
REPORTING: Stroke Management Quality Measures	9
Stroke- Blood Glucose Check Performed for Suspected Stroke.....	9
Stroke- Last Known Well or Time of Onset Recorded by EMS for Suspected Stroke.....	9
Stroke- Stroke Assessment Performed by EMS for ED-Diagnosed Stroke	9
Stroke- Stroke Assessment Performed by EMS for Suspected Stroke	10
<i>Pain Management Quality Measures</i>	11
Pain Management Background and Clinical Pearls.....	11
Pain Management Performance Improvement and Best Practices	11
Pain Management - Other Relevant Data and Educational Resources	12
REPORTING: Pain Management Quality Measures	12
Pain- Pain Management Intervention Performed for Pain >4	12
Pain- Pain Intervention Resulted in Pain Reduction for Pain >4	12
<i>Vital Signs Quality Measures</i>	13
Vital Sign Background and Clinical Pearls	13
Vital Sign Performance Improvement and Best Practices.....	13
Vital Sign - Other Relevant Data and Educational Resources.....	14
<i>Patient vital signs: 5 tips for EMTs, paramedics</i>	14
REPORTING: Vital Signs Quality Measure	14
Vitals- Glasgow Coma Scale Documented	14
Vitals- Pulse Rate Documented.....	14

Vitals- Respiratory Rate Documented.....	15
Vitals- Set of Vital Signs Documented.....	15
Vital- SpO2 Documented	15
Vitals- Systolic Blood Pressure Documented	15
<i>Provider Safety Measures.....</i>	16
Provider Safety Background and Operational Considerations	16
Provider Safety Performance Improvement and Best Practices.....	16
Provider Safety - Other Relevant Data and Educational Resources.....	16
REPORTING: Provider Safety Quality Measures	16
Safety- Lights and Sirens Not Used During Response to Scene	16
Safety- Light and Sirens Not Used During Transport	17
<i>Patient Safety Measures.....</i>	18
Patient Safety Background and Clinical Pearls	18
Patient Safety Performance Improvement and Best Practices.....	18
Patient Safety Clinical Check List.....	18
Patient Safety - Other Relevant Data and Educational Resources.....	18
REPORTING: Patient Safety Quality Measures	19
Safety- ETCO2 Monitoring with Advanced Airway.....	19
<i>ND EMS Rural Counts Measure Report Descriptions</i>	20
Accessing the Report Portal	20

Rural EMS Counts Project

In September of 2019, the Center for Rural Health (CRH) at the University of North Dakota was awarded the FLEX EMS Supplement to improve the delivery of EMS throughout rural North Dakota. This funding has specifically been earmarked to implement a demonstration project on data collection and reporting for a set of rural-relevant EMS quality measures. This project aims to seek stakeholder buy-in and consensus for the selection, testing, training, and reporting of the rural-relevant EMS quality measures.

CRH contracted with the North Dakota EMS Association (NDEMSEA) to carry out this project including oversight of subject matter experts (SMEs) with expertise in quality assurance and data analysis from within North Dakota's EMS agencies and healthcare systems to contribute to the Rural EMS Counts Project.

The Paramedic Foundation, a nonprofit health services consulting entity, has provided technical assistance to the project and developed this Toolkit.

About the Toolkit

Why Performance Measures?

What we do in EMS impacts the lives of people in our community. Our actions and inactions can help or harm. We recognize the gravity of our work and strive for excellence. But what does excellence look like? How do we know how well we are doing? The measures described here paint a picture of our organization's performance. It allows us to see that we are consistently meeting standards of care. They will enable us to identify areas of strength to learn from and opportunities for improvement. Individually the measures show us whether the changes we make are helping us improve or should be abandoned for another approach. Measuring EMS performance is the culmination of years of collaboration between EMS systems, agencies, and EHR vendors across the country. These were developed by us and are an asset for helping us achieve our best performance.

The Toolkit is intended to provide additional information on the selected quality measures' clinical relevance and provide the reader with specific details on how best to develop systems of care, workflows, and standard operating procedures that improve patient outcomes by addressing the selected quality measures. This Toolkit also includes relevant external and other publicly accessible articles and resources that can further support North Dakota's Rural EMS agencies and providers in understanding and improving care.

Measures

The rural-relevant measures were selected by the SMEs who work in EMS or work closely with EMS professionals across North Dakota. The measures chosen will help understand the current performance and challenges of North Dakota's EMS professionals and the systems of care they work within. These measures will help inform decisions and may be utilized to develop quality improvement plans or leverage further additional funding or support for local EMS systems.

The measures selected align with broader industry-wide efforts to improve the care of patients in the pre-hospital setting.

Cardiac Management Quality Measures

- Aspirin Administration for Suspected Cardiac Chest Pain
- 12-Lead Performed for Suspected Cardiac Chest Pain
- 12-Lead Performed for ED-Diagnosed STEMI

Cardiac Management Background and Clinical Pearls

An ST-elevation myocardial infarction (STEMI) typically occurs when a plaque ruptures within a coronary artery and platelets adhere to it, forming a clot or blockage. Several medications are used to limit the progression of this clot until it can be opened with a stent or dissolved with thrombolytics. Only one of these medications, aspirin, is routinely given prehospital, but aspirin is highly effective and safe.

During a STEMI, heart muscle is lost with each passing minute until reperfusion. Therefore, optimal STEMI care requires a highly coordinated system of care designed to limit the time from the onset of the blockage until reperfusion and reduce the likelihood that the patient will have permanent heart failure or cardiac arrest.

The critical first step of the process is early recognition on a 12-lead ECG. Prehospital 12-lead acquisition and notification of the receiving hospital allow the hospital to mobilize resources before the patient even arrives and has been consistently shown to reduce time to reperfusion.

Cardiac Management Performance Improvement and Best Practices

Early recognition of a potential cardiac event enables the prehospital provider to provide the appropriate treatment including transport method and destination decisions and to activate specialized teams to better care for the patient. Depending on the location of the cardiac catheterizing lab, staff may need to be called in or clear the table from a less urgent case.

Depending on the patient demographics, cardiac chest pain may present differently. Females, diabetics, and the elderly may present with vague abdominal pain, back pain, or heartburn-related complaints that should increase the index of suspicion of the prehospital provider. If the patient presents with acute coronary syndrome, aspirin should be administered per local protocol barring any contraindications.

Consider a 12-lead for at least any patient over 35 with risk factors and dizziness, syncope, nausea, poor skin signs or other symptoms between their mouth and belly button. Remember, not all patients present with the classic symptoms of an MI. Prehospital providers should obtain, interpret, and transmit a 12-lead as soon as possible. The 12-lead should be obtained within 5 minutes of patient contact.

Consider obtaining a 15-Lead (V4R, V8, and V9) for non-descript ECG changes or a normal ECG in the presence of acute coronary syndrome complaint. Proper skin preparation and lead placement are essential factors in accurate ECG tracings.

- Shaving, cleaning, and abrading the skin help reduce artifacts.
- Appropriate placement of limb leads will ensure an accurate cardiac axis capture.

Cardiac Management - Other Relevant Data and Educational Resources

MidMichigan Health's Streamlined Regional STEMI Alert Program. Educational YouTube video accessible here: [MidMichigan Health's Streamlined Regional STEMI Alert program](#)

The American Heart Association's developing systems of care for ST-Segment Elevation Myocardial Infarction policy statement can be accessed here: [AHA STEMI Care](#)

The American Heart Association recommends EMS leaders work to eliminate barriers in the STEMI system of care by:

- Increase public awareness campaigns of heart attack signs and symptoms and the importance of calling 9-1-1; pursue individualized interventions, especially for those at increased risk (patients with prior acute coronary syndromes or known coronary artery disease)
- Develop 9-1-1 destination transport protocols by having EMS agencies, referring hospitals, and receiving centers work together
- Adopt and implement prehospital cardiac catheterization laboratory (CCL) activation and direct to catheterization laboratory protocols when appropriate for STEMI receiving centers
- Improve door-in–door-out (DIDO) times by having STEMI referring hospitals and receiving centers work together with designated interfacility transport providers
- Develop and implement regional transfer for PCI protocols and processes
- Present and discuss focused feedback with each member in the system of care
- Increase participation in active regional STEMI systems of care, including review of regional data and sharing of best practices
- Increase attention to cardiogenic shock

REPORTING: Cardiac Management Quality Measures

Cardiac- 12 Lead Performed by EMS for ED-Diagnosed STEMI

Description:

This report is for EMS Agencies that receive information back from the hospital regarding the patient diagnosis and treatment at the hospital. The EMS ePCR is updated to reflect the ED and hospital diagnosis. If the hospital diagnosed the patient with ST-elevation myocardial infarction (STEMI) or Non-STEMI, the report would flag the ePCRs that did not have a 12-Lead performed by EMS.

This is a learning opportunity for EMS. Knowing the hospital diagnosis allows EMS Agencies to review their assessment, training, and protocols and improve patient care.

Specific filters to identify ED-Diagnoses STEMI include:

1. Patient Age (in Years) \geq 18
2. Outcome ED Diagnosis = 1) Admitting or 2) Final
3. Outcome Diagnosis ICD-10 Diagnosis Group = STEMI/NSTEMI

Cardiac- 12 Lead Performed for Suspected Cardiac Chest Pain

Description:

This measure calculates how often a 12-lead ECG was performed for patients with an EMS provider impression related to suspected Acute Coronary Syndrome.

Specific filters to identify suspected Acute Coronary Syndrome include:

1. Primary or Secondary Impressions include one of these values: 1) Chest Pain / Discomfort, 2) Angina pectoris, 3) Angina, unstable, 4) ST elevation (STEMI) myocardial infarction of anterior wall, 5) ST elevation (STEMI) myocardial infarction of inferior wall, 6) ST elevation (STEMI)

myocardial infarction of other sites, 7) ST-elevation myocardial infarction (STEMI), 8) Myocardial infarction, or 9) Non-ST elevation myocardial infarction (NSTEMI)

Cardiac- Aspirin Administration for Suspected Cardiac Chest Pain

Description:

This report calculates how often aspirin was administered to patients with an EMS provider impression of non-traumatic chest pain. This report is part of a suite of measures defined by the North Dakota Rural EMS Counts project to identify performance measures that matter for EMS in rural settings.

Exceptions:

The following pertinent negatives (reasons procedure not performed) are not included in the measure. These records will be found in the "Exceptions" row in the drill through: Contraindication Noted, Denied By Order, Medication Allergy, and Medication Already Taken.

Note: The following pertinent negatives are not treated as exclusions: Unable to Complete and Refused. These records will be included under "Measure Criteria Not Met."

Specific filters to identify suspected cardiac chest pain include:

1. Patient Age (in Years) \geq 18
2. Primary or Secondary Impression includes one of these values: 1) Chest Pain / Discomfort, 2) Angina pectoris, 3) Angina, unstable, 4) ST elevation (STEMI) myocardial infarction of anterior wall, 5) ST elevation (STEMI) myocardial infarction of inferior wall, 6) ST elevation (STEMI) myocardial infarction of other sites, or 7) ST elevation myocardial infarction (STEMI)

Stroke Management Quality Measures

1. Last Known Well Time or Time of Onset Gathered for Suspected Stroke
2. Blood Glucose Check Performed for Suspected Stroke
3. Prehospital Stroke Assessment Performed for Suspected Stroke
4. Prehospital Stroke Assessment for ED-Diagnosed Stroke

Stroke Management Background and Clinical Pearls

Early notification to the hospital of suspected stroke patients allows the hospital to prepare several time-sensitive diagnostic and therapeutic interventions. The first is preparing to perform a CT within 25 minutes of hospital arrival to rule out a hemorrhagic stroke, which allows the use of clot-busting medication called fibrinolytic/thrombolytics. A CT with contrast can also be used for patients with severe symptoms to identify large vessel occlusions, which will benefit from mechanical thrombectomy. This can be done immediately at thrombectomy capable stroke hospitals, or the patient will be rapidly transported to this type of hospital. The hospital may need to call in a appropriate staff, and early notification prevents delays.

Stroke treatment is based on time windows since the patient was last known well or without symptoms. Time is brain, meaning as this time extends, more neurons are lost leading to worse stroke outcomes. The patient's ability to receive certain therapies is dependent upon how long they have been experiencing symptoms. Therefore, establishing the last known well time is critical to the patient getting the treatment they need and doing so safely. Even therapy within the window is not guaranteed a good outcome; every minute that passes, millions of brain cells are dying. Stroke care must proceed smoothly, rapidly, and flawlessly.

Stroke Management Performance Improvement and Best Practices

Obtain the patient's last known "normal." This may be difficult to obtain, especially if the patient presents with a 'wake up stroke' first thing in the morning. If the timeline is unclear, document the last time the patient was known to be at their baseline. Obtain history to include any recent trauma, anticoagulant therapy, and recent surgery.

A prehospital stroke scale, such as BEFAST, should be performed as soon as possible on all suspected strokes. If the scale is positive, transport to the closest stroke center or most appropriate facility without delay. If applicable, call a pre-alert to the receiving facility. Establish two large-bore IVs that are forearm or higher to facilitate the appropriate imaging.

Hypoglycemia and seizures can mimic strokes. Perform a detailed assessment to include a blood glucose level. If unsure, treat it as a stroke. Be aware of the potential for mental status changes that may require suction or airway control. Depending on local protocols, consider anti-hypertensive therapy that does not dramatically decrease the patient's blood pressure.

The general inclusion time frame for "clot-busting medication" or thrombolytics such as tissue plasminogen activator (tPA) is 4.5 hours after onset of symptoms or less, depending on surrounding circumstances. If the receiving facility is a thrombectomy-capable stroke facility, they may attempt thrombectomy procedures up to 24 hours after the onset of symptoms. A stroke scale should still be completed prior to transport if performing an interfacility transfer of a diagnosed stroke patient. This allows the provider to note and report any changes in the patient's condition or presentation to the receiving facility staff.

Stroke Management - Other Relevant Data and Educational Resources

North Dakota has established the BEFAST stroke assessment as the preferred state-wide prehospital stroke assessment. Information on BEFAST and the North Dakota Stroke System of Care can be found at: <https://www.health.nd.gov/north-dakota-stroke-system-care-guidelines>.

EMS program directors have developed internal resources that align with BEFAST and the American Heart Association recommendations for caring for suspected stroke patients. A North Dakota-based EMS system developed this BEFAST assessment tool; similar tools can be used to improve the care of stroke patients.

This publicly accessible [video](#) provides an EMS-centric approach to completing the BEFAST stroke assessment.

REPORTING: Stroke Management Quality Measures

Stroke- Blood Glucose Check Performed for Suspected Stroke

Description:

This report evaluates the percentage of adult suspected stroke patients that received a blood glucose evaluation. As a protocol adherence report, the provider gets credit for performing the assessment if a value is recorded or if it is documented that the patient refused the assessment.

NOTE: The Blood Glucose Check must be documented in the Vital Signs section of the ePCR.

Specific filters for this report include:

1. Patient Age (in Years) \geq 18
2. Primary or Secondary Impression includes one of these values: 1) Stroke, 2) Transient Cerebral Ischemic Attack (TIA)
3. Treatments Documented (per Patient) = Stroke Alert
4. Narrative Treatment Protocol = Suspected Stroke

Stroke- Last Known Well or Time of Onset Recorded by EMS for Suspected Stroke

Description:

This report calculates the percentage of records for patients with suspected stroke or TIA who had time of onset or time last known well (LKW) documented in the appropriate discrete data field as part of the stroke assessment.

Specific filters for this report include:

1. Primary or Secondary Impression includes one of these values: 1) Stroke, 2) Transient Cerebral Ischemic Attack (TIA)
2. Treatments Documented (per patient) = Stroke Alert
3. Narrative Treatment Protocol = Suspected Stroke

Stroke- Stroke Assessment Performed by EMS for ED-Diagnosed Stroke

Description:

This report calculates the percentage of EMS responses originating from a 911 request for patients with an ED ICD10 diagnosis code indicating stroke, who had a stroke assessment performed during the EMS response.

This report is for EMS Agencies that receive information back from the hospital regarding the patient diagnosis and treatment at the hospital. The EMS ePCR is updated to reflect the ED and/or hospital diagnosis. If the hospital diagnosed the patient with a stroke, the report will flag the ePCRs that did not have a stroke assessment performed by EMS.

This is a learning opportunity for EMS. Knowing the hospital diagnosis allows EMS Agencies to review their assessment, training, and protocols and improve patient care.

Stroke- Stroke Assessment Performed by EMS for Suspected Stroke

Description:

This report calculates the percentage of EMS responses originating from a 911 request for patients with suspected stroke who had a stroke assessment performed during the EMS encounter.

Documentation of any part of a stroke screen will count towards “measure criteria met.” Performance improvement teams may wish to dive further into assessment to determine whether or not all elements of the screening instrument were completed.

Specific filters for this report include:

1. Patient Age (in Years) \geq 18
2. Primary or Secondary Impression includes one of these values: 1) Stroke, 2) Transient, or Cerebral Ischemic Attack (TIA)
3. Treatments Documented (per Patient) = Stroke Alert
4. Narrative Treatment Protocol = Suspected Stroke

Pain Management Quality Measures

- Pain Management Intervention Performed for Pain > 4
- Pain Intervention Resulted in Pain Reduction for Pain > 4

Pain Management Background and Clinical Pearls

Aside from the unpleasant or even torturous experience of pain, pain stimulates a fight-or-flight response that is an additional physiological stressor on the acutely ill or injured patient. Effects range from elevated vital signs to impaired healing of injuries. Yet as many as 43% of EMS patients have inadequate pain relief, according to the Agency for Healthcare Research and Quality. Reasons include fear of adverse effects, masking of underlying conditions, and provider indifference. While data on analgesia-related adverse events is lacking, the availability of pulse oximetry, capnography, naloxone, and continuous 1:1 monitoring should make the prehospital environment a uniquely safe place for aggressive pain management.

The masking of symptoms and obscuring a diagnosis by relieving pain is a myth that has been thoroughly debunked. A physical exam is not impaired, but modern diagnostics such as CT are routinely used. Provider bias has been a well-studied problem throughout emergency medicine, with race, sex, age, and provider's perception of the legitimacy of complaints all associated with undertreatment. Patients labeled as "drug seekers" often have legitimate medical problems, and addiction or drug-seeking behavior is managed through a coordinated case management approach. In other words, you aren't going to create or solve addiction in the back of an ambulance. However, not all patients need opioids. Nonpharmacologic interventions, nitrous oxide and ketamine are possible alternatives. Pain assessment is subjective as vital signs are unreliable.

Pain Management Performance Improvement and Best Practices

Assessing pain with different scales may be beneficial depending on the patient's age and presentation. Different scales include 1-10 numeric, Wong-Bakers, CPOTT, and Bloomsbury Sedation Scale.

The assessment of pain relies on subjective and objective information. As prehospital providers, it is essential to document all assessment findings related to the patient's pain, including interventions and responses.

Subjective findings of a patient's pain may include their description and rating of the pain. Everyone experiences pain differently, so all complaints should be treated as valid. Objective findings may consist of physical assessment findings and physiological changes. Document the patient's pain complaint as you would any other vital sign; for example, every 5 minutes for patients considered unstable and every 15 minutes for stable patients.

There are various treatments for pain ranging from BLS interventions to ALS medication administration. Choose the most appropriate means and document all responses and changes in the patient's complaint. Simple interventions such as warming pads have been found to reduce pain from injuries, various abdominal conditions, and kidney stones.¹

Often overlooked by the ALS provider are BLS interventions that are synergistic with medication administration. Splinting and positioning are essential interventions that can profoundly affect the overall pain management.

When performing pain management with medication, remember that more medication can always be given, but a large dose cannot be taken back if adverse effects occur. Consider diluting drugs to make them easier to push over a more extended period. Consider a pain management drip for prolonged patient contact times depending on local protocol.

There are special patient populations for whom extra care should be exercised due to their ability or inability to metabolize medications. Pediatrics, geriatrics, renal insufficiency, and hepatic insufficiency patients should all be medicated according to local protocol, with consideration given to their specific presentations and conditions.

Pain Management - Other Relevant Data and Educational Resources

EMS providers often treat patients presenting with painful conditions and symptoms. This JEMS article is entitled, [A guide to Prehospital Pain Management](#) helps providers understand the physiologic mechanism that causes pain, the physiologic response to pain, and the methods to control it. This understanding makes providers well equipped to care for these patients.

Different approaches to the management of pain in the prehospital setting are discussed in this article entitled, [10 Things EMS Providers Need to Know About Acute Pain Management](#) provided by EMS technology solution provider Pulsara.

REPORTING: Pain Management Quality Measures

Pain- Pain Management Intervention Performed for Pain >4

Description:

The report calculates the percentage of patients with a pain score of five or greater from any cause (trauma, cardiac, other) who received some form of pain intervention and the percentage of patients with pain relief.

*For the purposes of reporting the percentage of patients receiving pain intervention, the following interventions are considered: Toradol, Ibuprofen, Tylenol, Fentanyl, Morphine, Nubain, Versed, Versed Drip, Midazolam, Valium, Darvocet, Demerol, Dilaudid, Hydrocodone, Percodan, Stadol, Nitroglycerin, Nitronox, Nitroprusside, Nitrostat, Nitro Infusion, Nitro Paste, Nitro Spray. The following interventions when applied in the presence of a self-reported **pain score of greater than 4** are assumed to be used in part to reduce discomfort; splinting, traction splint, cooling, bandaging, burn care and irrigation. That report requires documentation of at least two pain scores.*

Specific filters to identify for this report include:

1. Highest Pain Value Gathered \geq 5. [This value is documented in the vital signs section.]

Pain- Pain Intervention Resulted in Pain Reduction for Pain >4

Description:

This report calculates the percentage of EMS transports originating from a 911 request for patients whose pain score was lowered during the EMS encounter.

Specific filters to identify for this report include:

1. Highest Pain Value Gathered \geq 5. [This value is documented in the vital signs section.]

Vital Signs Quality Measures

1. Set of Vital Signs Documented
2. Glasgow Coma Scale Documented
3. Pulse Rate Documented
4. Respiratory Rate Documented
5. Systolic Blood Pressure Documented
6. SpO2 Documented

Vital Sign Background and Clinical Pearls

Vital signs provide objective patient condition data, contributing to the diagnosis, treatment and transport decisions, and triage. Measuring and documenting at least two sets allows trending of the patient's condition and provides medical-legal evidence that you were monitoring the patient for changes. Finally, reporting vital signs to the ED helps them appropriately triage the patient. Respiratory rate and oxygen saturation are important vital signs that deserve special mention because they are often neglected or inaccurately measured. Pulse oximetry is an indispensable tool sometimes met with skepticism in EMS. While undeniably useful, do we know when it is accurate, and are we aware of its pitfalls? Poor perfusion, hypothermia, patient movement, carbon monoxide, and cyanide poisoning (e.g., smoke inhalation) can all prevent accurate assessment of proper oxygenation.

Additionally, pulse ox lag or latency refers to the delay between actual blood oxygen levels and pulse oximetry readings. This delay can be 30 seconds to a few minutes. This can lead to continuing intubations attempts when the patient is more hypoxic than indicated by the pulse oximeter, extubating when the patient is properly intubated, and overly aggressive bag ventilation. The respiratory rate is notoriously estimated or not assessed. Yet changes in respiratory rate are often the earliest indicator of shock, sepsis, respiratory insufficiency, and other severe conditions. It is the most critical predictor of subsequent cardiac arrest.

Vital Sign Performance Improvement and Best Practices

Obtain and document at least one set of vitals on all patient contacts, even if it does not result in a transport. If a patient is transported, a minimum of two sets should be obtained to show continuous monitoring. Vital signs should be obtained and documented in intervals appropriate for the patient's clinical presentation. (I.e., Critical Every 5 Minutes, Routine Every 15 Minutes)

When documenting the GCS or Peds GCS Scale, document the best response for each section. Break down per section; for example, 4-4-5. Pulse rate, rhythm, and quality should be noted when assessing the "pulse." When assessing Respiratory rate, rhythm and quality should also be considered; assess the patient's respiratory effectiveness through the above-stated measures.

Consider using ETCO₂ side stream (nasal cannula) or inline monitoring for accurate respiratory rate with limited advanced airways. Titrate ventilation to an appropriate ETCO₂ Range of 35mmHg-45mmHg. Some conditions may require deviation from these values. Refer to local protocols.

Systolic Blood Pressure is not always accurately displayed on cardiac monitors when using the NIBP cuff. Consider obtaining a manual blood pressure (auscultated or palpated) to better trend the patient's systolic and diastolic blood pressure. Ensure that the appropriately sized cuff is used for the patient's size. A too-small cuff can give a false high reading; inversely, a too-large cuff can give a false low reading.

A consistent waveform must be present for a SpO₂ reading to be considered accurate. Some factors such as low blood pressure, hypothermia, and fingernail polish can affect the waveform and accuracy of the reading. If possible, these issues should be corrected to obtain a better waveform and more accurate reading. SpO₂ waveform should be correlated to a pulse. Conditions such as carbon monoxide

poisoning can present with an SpO2 within normal ranges. This is because SpO2 only measures the percentage of saturated hemoglobin, not what it is saturated with. Titrate oxygen saturation to an accurate SpO2 reading of 92%-99%.

Vital Sign - Other Relevant Data and Educational Resources

EMS programs should be familiar with all current guidance on field triage about the care of patients suffering from traumatic injuries. Numerous informational resources are available from the State of North Dakota's Trauma System via their [website](#). GCS capture remains a critical element of EMS's evaluation and management of trauma patients.

[Patient vital signs: 5 tips for EMTs, paramedics](#)

REPORTING: Vital Signs Quality Measure

The six Vital Signs measures are for all patient contacts. All Vital Signs must be documented in the Vital Signs sections.

The Vitals Reports exclude the following disposition values:

- 1) Cancelled (No Patient Contact), 2) Cancelled (Prior to Arrival at Scene), 3) Cancelled on Scene/No Patient Found, 4) Standby - No Service or Support Provided, 5) Patient Dead on Scene - No Resuscitation Attempted (With Transport), 6) Patient Dead on Scene - No Resuscitation Attempted (Without Transport), 7) Patient Dead on Scene - Resuscitation Attempted (With Transport), 8) Patient Dead on Scene - Resuscitation Attempted (Without Transport), 9) Transport Non-Patient, Organs, etc., and 10) Wheelchair Transport.

Vitals- Glasgow Coma Scale Documented

Description:

Assessing and monitoring vital signs is a critical component for ensuring appropriate and timely out-of-hospital care. This report calculates the percentage of all records with at least one Glasgow Coma Scale score gathered and documented in the appropriate discrete data field.

Vitals- Pulse Rate Documented

Description:

Assessing and monitoring vital signs is a critical component for ensuring appropriate and timely out-of-hospital care. This report calculates the percentage of all records with at least one pulse rate gathered and documented in the appropriate discrete data field.

Vitals- Respiratory Rate Documented

Description:

Assessing and monitoring vital signs is a critical component for ensuring appropriate and timely out-of-hospital care. This report calculates the percentage of all records with at least one respiratory rate gathered and documented in the appropriate discrete data field.

Vitals- Set of Vital Signs Documented

Description:

Assessing and monitoring vital signs is a critical component for ensuring appropriate and timely out-of-hospital care. This report calculates the percentage of all records with at least one set of vital signs gathered and documented in the appropriate discrete data fields. For this measure, a set of vital signs consists of: Glasgow Coma Scale score, pulse rate, respiratory rate, systolic blood pressure, and pulse oximetry.

Vital- SpO2 Documented

Description:

Assessing and monitoring vital signs is critical for ensuring appropriate and timely out-of-hospital care. This report calculates the percentage of all records with at least one pulse oximetry reading gathered and documented in the appropriate discrete data field.

Vitals- Systolic Blood Pressure Documented

Description:

Assessing and monitoring vital signs is a critical component for ensuring appropriate and timely out-of-hospital care. This report calculates the percentage of all records with at least one systolic blood pressure reading gathered and documented in the appropriate discrete data field.

Provider Safety Measures

1. Lights and Sirens Not Used During Response to Scene
2. Lights and Sirens Not Used During Transport

Provider Safety Background and Operational Considerations

Operating with lights and sirens (L&S) has long been an EMS industry norm. Still, this practice is increasingly questioned as it increases the risk to the provider, patient, and community while providing minimal benefit. According to NEMSIS data, 74% of 911 responses and 27% of transports used L&S. Yet studies have found less than 4 minutes saved by L&S. It is estimated that only 5% of patients benefit from the use of L&S. Meanwhile, there are around 12,000 EMS vehicle crashes every year. Over 90% of these occur during L&S driving. One study found 67 EMS providers killed during ground transport crashes in five years. Recognizing the folly of everyday L&S driving, EMSA which is Oklahoma's largest EMS provider now responds to only 33% of 911 calls with L&S and has done so without increased morbidity or mortality. L&S is a patient care intervention, and like any intervention, the benefit must outweigh the risk.

Consider that use of L&S is a medical intervention. Performance Measure Benchmarks are:

1. L&S during Response to Scene: <50% [For the measure the goal is >50%]
2. L&S during Transport: <5% [For the measure the goal is >95%.]

Provider Safety Performance Improvement and Best Practices

Regularly review a sample of L&S responses and transports and discuss whether L&S ultimately benefitted the patient. Was the lack of benefit predictable at the time? Are there times when L&S should have been used but was not?

Refine dispatch protocols to use L&S when most likely to benefit. These might include:

- Cardiac or respiratory arrest
- Airway problems
- Unconsciousness
- Severe trauma or hemorrhagic shock
- True obstetrical emergencies

Consider Implementation of a "sterile cockpit" policy of no unnecessary conversation or interruptions during L&S operations. Provide formal EVOC training or an equivalent course and annual refreshers.

Provider Safety - Other Relevant Data and Educational Resources

[Kupas DF. Lights and Siren Use by Emergency Medical Services \(EMS\): Above All Do No Harm. NHTSA 2017.](#)

REPORTING: Provider Safety Quality Measures

Safety- Lights and Sirens Not Used During Response to Scene

Description:

This report calculates the percentage of EMS responses originating from a 911 request in which lights and sirens were not used during response.

Safety- Light and Sirens Not Used During Transport

Description:

This report calculates the percentage of EMS transports originating from a 911 request during which lights and sirens were not used during patient transport.

Specific filters to identify for this report include:

1. Disposition is any of these values: 1) Transported Lights/Siren, 2) Transported Lights/Siren, Downgraded, 3) Transported No Lights/Siren, upgraded, 4) Transported No Lights/Siren

Patient Safety Measures

1. EtCO₂ Monitoring with Advanced Airway

Patient Safety Background and Clinical Pearls

Unrecognized misplaced intubations are preventable tragedies that should never occur, yet reported rates in EMS range from 7%-25%. The square wave of the capnograph is real-time proof that the lungs are being ventilated and can virtually eliminate this catastrophic error. Other approaches, such as colorimetric EtCO₂ detectors, esophageal detection devices, and auscultation, do not replace continuous capnography which is the standard of care for several years. Colorimetric EtCO₂ sensors are poorly sensitive during hypoperfusion with low EtCO₂; they do not provide a numeric CO₂ level, can be positive despite esophageal or hypopharyngeal tube placement, and lose their color change shortly after placement, so they do not provide continuous confirmation.

Aside from ET tube placement, capnography offers additional information about ventilation and perfusion that can improve care for respiratory, cardiac, brain injury, and shock patients. Reasons for *hypocapnia* include hyperventilation, hypoperfusion (CO₂ does not return to the lungs), hypothermia (CO₂ is a byproduct of metabolism and metabolism is slowed), and metabolic acidosis (e.g., DKA and sepsis; CO₂ is lost as bicarbonate, which is buffering the acidosis). Capnography prevents hyperventilation and associated harm (cerebral vasoconstriction, decreased cardiac output, the inability of oxygen to dissociate from hemoglobin, and vomiting) from bagging with excessive rate or volume. Reasons for *hypercapnia* include ventilatory failure (e.g., asthma exacerbation), chronic CO₂ retention (e.g., COPD), and respiratory acidosis.

Other clinical applications of capnography include titrating naloxone, monitoring the effectiveness of CPR, identifying ROSC without pausing compressions, termination of resuscitation, and recognizing severe sepsis/septic shock (EtCO₂ less than 25 correlates with a lactic acid greater than 4), identifying bronchoconstriction, and assessing whether interventions are working or whether the patient is deteriorating.

Patient Safety Performance Improvement and Best Practices

Set up the capnography while preparing for intubation. For initial confirmation, the capnography can and should be used instead of the less reliable colorimetric device. Look for “squares” on the capnography display. Use capnography inline between the mask and bag (with continuous mask seal) for breath-to-breath confirmation of adequate ventilation and to avoid hyperventilating.

Patient Safety Clinical Check List

- Assure Waveform Capnography – Invasive (EtCO₂) on all patients intubated or with advanced airway
- Use Waveform Capnography – Non-Invasive (EtCO₂) on patients meeting local protocol including diabetes, seizure, metabolic, ALOC, respiratory, cardiovascular, or other acute illnesses or injuries that could benefit from capnography.

Patient Safety - Other Relevant Data and Educational Resources

<https://www.ems1.com/capnography/articles/5-things-to-know-about-capnography-in-cardiac-arrest-YipMTGQ2yTt5mTub/#:~:text=A%20higher%20ETCO2%20reading%20during,the%20chances%20of%20Survival%20are.>

REPORTING: Patient Safety Quality Measures
Safety- ETCO2 Monitoring with Advanced Airway
Description:

This report calculates how often at least one ETCO2 measurement was recorded when an advanced airway was used.

This report identifies the patient population:

- *Treatments Performed (per Patient): Combitube, EasyTube Airway, iGEL, King Airway, Nasotracheal Intubation, Needle Cricothyroidotomy, Orotracheal Intubation, Pertrach, QuickTrach (Adult), QuickTrach (Child), Rapid Sequence Intubation (RSI), Retrograde Intubation, Sedation Assist Intubation (SAI), Surgical Cricothyroidotomy, Video Laryngoscopy*
- *First Successful Advanced Airway Attempt Number: 1, 2*

ND EMS Rural Counts Measure Report Descriptions

Each report is part of a suite of measures defined by the North Dakota Rural EMS Counts project to identify performance measures that matter for EMS in rural settings.

Filters applied to all reports include:

1. Active = Yes
2. Locked = Yes
3. Run Type = 911 Response

Five groupings comprise the North Dakota Rural EMS Counts Reports: Cardiac (3), Pain (2), Safety (3), Stroke (4), and Vitals (6).

Accessing the Report Portal

Login to ESO @ <https://www.esosuite.net/login/>

Then open this link: <https://www.esosuite.net/login/?returnUrl=%2FEsoAnalytics%2F#/folder/100612>

Future State:

Login to ESO @ <https://www.esosuite.net/login/>

Click on Analytics > Repository Reports > North Dakota > Rural EMS Counts.



RURAL EMS
COUNTS