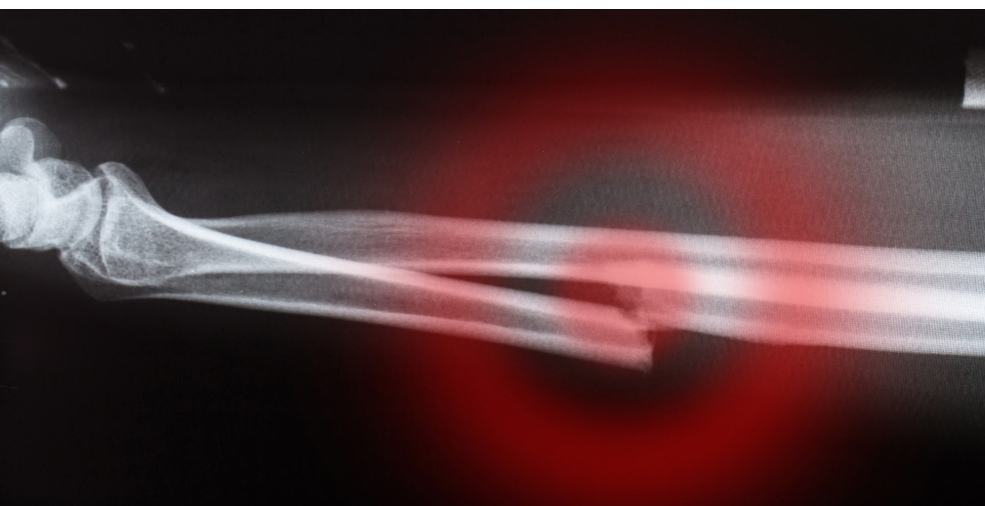


QUALITY IMPROVEMENT NEWSLETTER



A publication from the Maine EMS Quality Improvement Committee

Traumatic Injury in Maine's Pre-Hospital Environment



OVERVIEW

Maine has three designated Regional Trauma Centers: Maine Medical Center (Portland), Central Maine Medical Center (Lewiston) and Northern Light Eastern Maine Medical Center (Bangor). These centers, per the State Trauma Plan, can accept field traumas as well as trauma patients as interfacility transfers. The remainder of the hospitals in the state are considered Trauma System Hospitals which may serve to initially stabilize a trauma patient prior to transfer to a Trauma Center. Trauma System Hospitals are critical to the care of our patients as many times they are the closest hospital to the scene and must assess and stabilize the patient prior to transfer to a Trauma Center. Our EMS protocols state that if the Trauma Center is less than 45 minutes from the scene, the patient may be taken directly to the Trauma Center and bypass the other nearby hospitals. However, given the geography and rurality of our state, that is not always possible. In this newsletter, we look at some of the National EMS Quality Alliance measures as well as explore our use of various trauma treatments as outlined in the MEMS Trauma Protocols

TAKE AWAYS:

- Bleeding is the leading cause of preventable trauma death. In addition to aggressive management of uncontrolled bleeding by emergency medical dispatchers and EMS clinicians, EMS organizations should consider bleeding control outreach education in their communities.
- Trauma patient charts should be evaluated for destination decision-making on a case-by-case basis. The services should take ownership of Trauma Measure 4, and work with their medical directors to assure that they are providing the best care to these patients by delivering them to the most appropriate facility.

Quality Improvement Leaders should think about:

- Make sure your agency has a QI process for patients experiencing traumatic injury. EMD Centers may choose this as an area for focused review.
- Community education programs like, Stop the Bleed, may encourage the early placement of tourniquets and stop serious bleeding.

Injured Patients Assessed for Pain



EMS has a role in assisting with pain management and it is important that pain be assessed and documented (NEMSQA Trauma-01). Assessment and treatment of pain in the pre-hospital environment is an opportunity for EMS to impact an outcome that is highly valued by patients (relief of pain).¹ Pain is a common symptom in pre-hospital care. Pain control benefits patients in ways that go beyond making them comfortable. In a review of MEFIRS data from 2020, it was found that of the 26,353 patients who were transported, were alert, and indicated a possible injury, 50% (13,170) of them had their pain assessment documented.

Effectiveness of Pain Management for Injured Patients

The intent of this measure (NEMSQA Trauma-03) is to determine if pain resulting from an injury is being managed during encounters with EMS. The Quality Improvement Committee 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.¹ For a numeric measurement of pain, zero is no pain, anything higher than zero, indicates pain. In 2020, 42% of (5,048 of 11,974) patients had a documented improvement in their pain for patients that were transported, were alert, and had a documented possible injury.



Trauma Patients Transported to a Trauma Center

Due to the rural nature of Maine, it is difficult to evaluate transportation destination decisions made by EMS clinicians as they are affected by a variety of factors (i.e., resources, distance, geography, weather, etc.). Additionally, some patients may require immediate interventions that require transport to the nearest facility prior to transporting for tertiary care. These may include immediate life threats related to an airway, ventilation concerns, or uncontrolled hemorrhage. In 2020, there were 22,901 trauma patients that met the U.S. CDC's trauma triage criteria who may have benefitted by transport

directly to a Trauma Center. These criteria are comprised of Step 1, physiological criteria ($GCS \leq 13$, $SBP < 90$ mmHg, and/or abnormal respirations or need for ventilatory support), and Step 2, anatomic criteria (e.g., penetrating injuries to head, neck, torso, and extremities proximal to elbow or knee; chest wall instability or deformity; two or more proximal long-bone fractures; crushed, degloved, mangled, or pulseless extremities; amputation proximal to wrist or ankle; pelvic fractures; open or depressed skull fracture; and/or paralysis). In Maine, only 6,750 (29.5%) of the 22,901 trauma patients were transported directly from the scene to one of the three designated Trauma Centers (NEMSQA Trauma-04) leaving the remaining approximately 70% of patients that were first taken to a non-trauma center for stabilization.¹ This highlights the importance of EMS clinicians making the most appropriate destination decision as well as the importance for smaller receiving hospitals to be prepared to provide initial care for these critical patients and arrange appropriate transfer to a Trauma Center, as needed.

1. National EMS Quality Alliance Trauma Measure Package <https://www.nemsqa.org/completed-quality-measures/> Accessed on June 1, 2021

Use of Tourniquets and Hemostatic Agents

Most years, trauma is regarded as the third leading cause of death in the United States for all ages and the leading cause of death for citizens under the age of 46.² It is estimated that 64% of the hemorrhagic deaths that occur in the pre-hospital setting were preventable.³ In 2020, Maine EMS clinicians documented the use of tourniquets and/or hemostatic dressings 91 times for a variety of injuries.



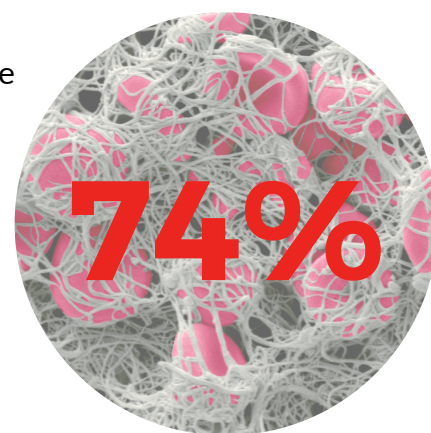
EMD Pre-Arrival Instructions for Hemorrhage

In the Medical Priority Dispatch Software (MPDS) update Version 13.2, released late in 2019, the IAED and Priority Dispatch added pre-arrival instructions (PAIs) for EMDs to assist in tourniquet application when it is recognized that applying pressure is not working to control life-threatening hemorrhage. Instructions include both the application of a commercially available tourniquet and makeshift tourniquets. The IAED, a charter member of the Stop The Bleed campaign, recognized the need for this critical, life-saving intervention to be performed by EMDs as the first-first responders; citing an increase in mass casualty and violent attacks in recent years and the knowledge that uncontrolled life-threatening hemorrhage is one of the leading causes of preventable death following traumatic injury.



Pre-Hospital TXA Usage

In 2020, there were 39 patient encounters where TXA was administered. Of those 39 patients, 29 (74.4%) had documented evidence of potential hemodynamic instability. 13 of the 39 (33.3%) of the encounters lacked documentation of fluids administered. This highlights the importance of fluid boluses for patients where hypovolemic shock is of concern. If blood pressure remains less than 90 mmHg systolic after a fluid bolus, the patient is at least 16 years old, hemodynamically unstable, and are less than 180 minutes from the time of injury, then TXA can be considered. Hemodynamic instability is characterized by tachycardia, hypotension, and/or other signs of shock. Contraindications for TXA include isolated head injuries, pregnancies greater than 24 weeks gestation or fundus above the umbilicus, known hypercoagulable state, and time since the injury being greater than three hours. The medication is to be mixed in 250 mL of normal saline and given over at least ten minutes. Following TXA administration, be sure to clearly identify the IV line used to the receiving facility since blood and certain antibiotics are not compatible with TXA.



2. Committee on Military Trauma Care's Learning Health System and Its Translation to the Civilian Sector; Board on Health Sciences Policy; Board on the Health of Select Populations; Health and Medicine Division; National Academies of Sciences, Engineering, and Medicine; Berwick D, Downey A, Cornett E, editors. A National Trauma Care System: Integrating Military and Civilian Trauma Systems to Achieve Zero Preventable Deaths After Injury. Washington, DC: National Academies Press (US); 2016; Sep

3. Davis JS, Satahoo SS, Butler FK, Dermer H, Naranjo D, Julien K, Van Haren RM, Namias N, Blackburne LH, Schulman CI. An analysis of prehospital deaths: who can we save? J Trauma Acute Care Surg. 2014;77(2):213-218.

EMD Focused Review on Trauma

While Maine EMS is limited in its capacity as a statewide system to compile and manually review EMD data, it is expected that EMD Centers perform focused reviews on their data for quality improvement purposes, including performance monitoring and identifying training needs. An example of a focused review would be to pull a report for all cases where a trauma related protocol was utilized (e.g., Protocol 30: Traumatic Injuries) within a given time period. The reviewer would evaluate each call to determine if these cases were processed using the appropriate protocol according to case entry Rule 2 which states “If the complaint description involves TRAUMA, choose the Chief Complaint Protocol that best addresses the mechanism of injury.”⁴ Quality assurance reviewers can then work to improve performance, as needed, and to educate staff on common issues found during the focused review. One option for education is assigning EMDs topic-related courses in the online College of Emergency Dispatch.

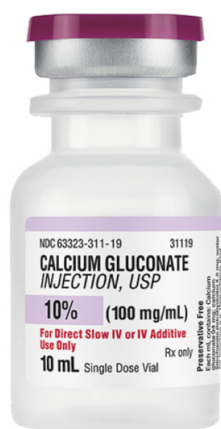


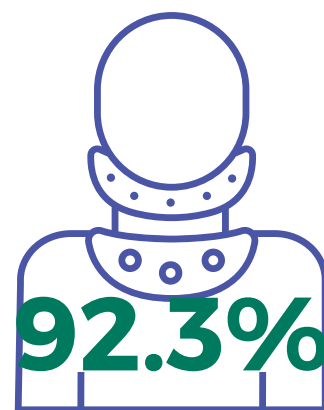
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<https://www.buyemp.com/product/calcium-gluconate-usp-10-100mg-ml-10ml-vial/110-63323-360-19>. Accessed on June 11, 2021

Use of Calcium Gluconate

Patients who have experienced a crush injury can be particularly complicated, especially if it is coupled with a prolonged entrapment. While there isn't a specifically defined time period, some patients present with hyperkalemia in as little as 60 minutes, depending on the severity of injury and degree of compression. Quality patient assessments and rapid treatment can help mitigate the metabolic cascade that can occur as a result of the increased toxicity. The Maine EMS Protocols encourage paramedics to consider sodium bicarbonate and calcium gluconate in patients who have experienced crushing injuries. Calcium gluconate should be used with patients who have EKG changes consistent with hyperkalemia (i.e., peaked T-waves, widened QRS, lengthened QT-interval, and loss of P-waves). Calcium gluconate should only be given if these changes are noted on an EKG. Please note that crush injury patients will need two large bore IV's as calcium gluconate and sodium bicarbonate CANNOT be administered via the same line!

Spinal Motion Restriction

The Spinal Motion Restriction Worksheet in MEFIRS allows EMS clinicians to document their assessment findings and resulting treatment (i.e. whether Spinal Motion Restriction [SMR] was performed). In 2020, 5,899 spinal assessments were performed with patients who were screened for a suspected spinal injury. Of the 3,215 records indicating a failed spinal clearance exam, 2,966, or 92.3% of the patients received SMR. Also, 2,557 patients passed the spinal clearance exam, and of those, 416, or 16%, still received SMR. These discrepancies within charts can provide quality improvement staff with a defined cohort of calls that warrant further review. Spinal fractures can occur at all points along the spinal column, not just the cervical region. Any fractures within the spinal column require that the entire spine be immobilized, including the cervical spine. Patients with thoracic or lumbar fractures often have associated cervical spine injuries.



4. The International Academy QA Guide MPDS Version 13.0. Priority Dispatch Corp. 110 South Regent St, Suite 500. Salt Lake City, Utah, 84111. 2015.

THOUGHTS ON IMPROVING DOCUMENTATION

- Acute pain management is often considered to be a "ladder" process; that is, start at the bottom rung and increase the "strength" AND risk of interventions in a stepwise fashion similar to climbing the rungs of a ladder. Document each intervention and its effect on the patient's pain.
- Fluid boluses are the first step in the management of the hemodynamically unstable trauma patient. Document the amount and type of fluid used. Current evidence suggests there may be a benefit from use of Lactated Ringers in critically ill patients with shock. Lactated Ringers is preferred, if available.
- Consider early notification to the receiving facility when transporting a trauma patient and document this notification as it will positively impact the overall efficiency of the system of care.
- Support CQI efforts to improve consistency and effectiveness of documentation.
- Consider training opportunities regarding effective communication techniques with other agencies regarding scene management for incidents producing trauma patients.

VISUALIZING YOUR DATA ON OUR TRAUMA DASHBOARD

The Trauma Measures Dashboard provides a look at your agency's data in three different reports.

Report 1: Percentage of injured patients with a documented pain assessment score.

Report 2: Average time spent on scene prior to transporting injured patients.

Report 3: Percentage of injured patients transported to a trauma center.

This dashboard is available in Report Writer, by going to *Tools, Report Writer*, and selecting, *Load Dashboard*



Notes on the Data:

The data included in this report is retrospective and originates from the 277 EMS agencies and the approximately 5,600 EMS providers in the state of Maine who provide data to the EMS Run Reporting system.

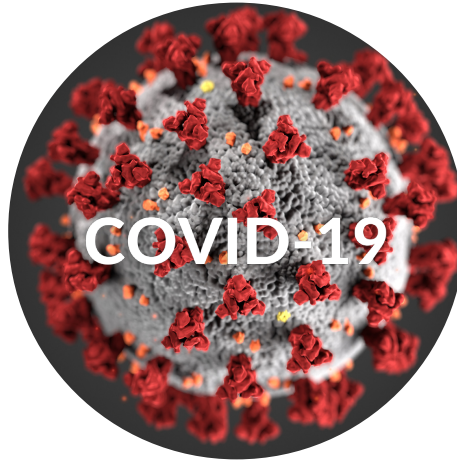
Maine EMS QA/QI Committee

For more information on continuous quality improvement (CQI) and the tools within MEFIRS, feel free to attend a Maine EMS QA/QI Committee Meeting which are held on the third Wednesday of every month at 1:30 P.M. Meetings are held virtually.

The Maine EMS Quality Improvement Committee is a standing committee of the Maine EMS Board and is comprised of 15 members representing the medical director's community, regions, EMS agencies, and at-large representatives. The Committee is focused on continuous quality improvement of the EMS system. As part of their charge, they review statewide, de-identified information to better understand a variety of topics affecting EMS including, but not limited to: naloxone administration, strokes, out-of-hospital cardiac arrest, airway management, and chest pain.

Disclaimer: The purpose of this newsletter is informational only and is not intended to be a comprehensive review of the entire EMS system, nor is it intended to be a scientific review. Rather, this is intended to offer a snapshot of the performance surrounding specific EMS run types.

SEE OUR OTHER QUALITY ASSURANCE NEWSLETTERS



Each image is a link to the corresponding newsletter.

The Quality Assurance & Improvement Committee newsletters have worked hard to provide repeatable measures to EMS agencies, EMD Centers, EMS clinicians, and emergency medical dispatchers to track performance with those measures over time. Each newsletter contains a general overview and take-aways from the Maine EMS QI Committee's review of the data as reported in the Maine EMS & Fire Incident Reporting System (MEFIRS) and the Medical Priority Dispatch Software (MPDS). The newsletter also includes information relevant performance metrics and guidance on how EMS agencies and clinicians can view their own data.

To learn more about this committee, visit the website or use your smartphone to scan the following QR Code:

