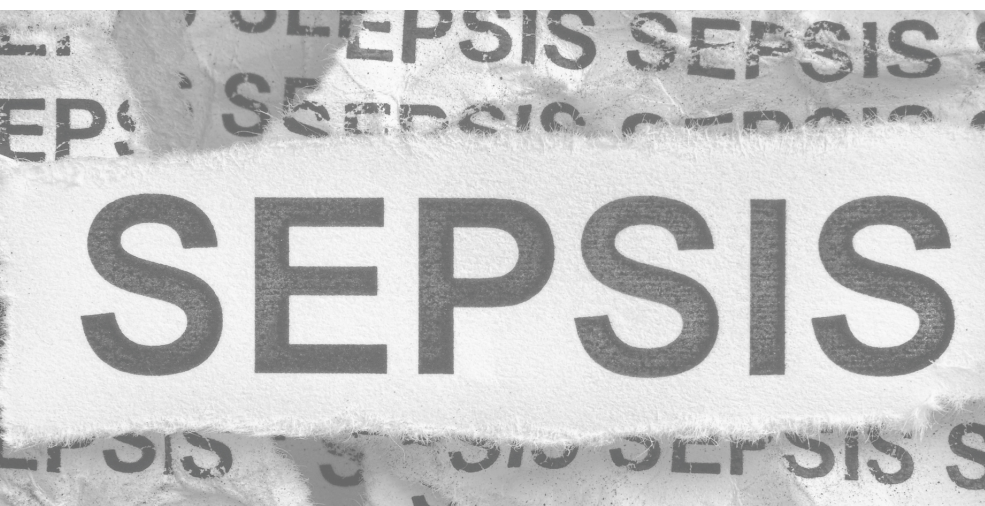


QUALITY IMPROVEMENT NEWSLETTER



A publication from the Maine EMS Quality Improvement Committee

Sepsis



OVERVIEW

Today, sepsis is a severe multisystem disease with difficult treatments for its manifestations and high mortality rates.¹ Studies suggest that mortality rates for septic patients without signs of organ failure may be as high as 15-30%. This number may double when signs of organ failure are present. CODE SEPSIS requires EMS clinicians to provide pre-hospital notification to receiving facilities that a potentially septic patient is being transported. This alert allows receiving hospitals to provide aggressive resuscitative interventions to the patient. Maine EMS's Medical Shock protocol provides guidelines for shock recognition, including identification of a possible source of infection AND the presence of 2 (or more) sepsis markers: HR greater than 90, RR greater than 20, Temp greater than 101 F or less than 96.8 F, new altered mental status or increasing mental status change with a previous altered mental status, and systolic BP less than 90 mmHg or a Mean Arterial Pressure (MAP) less than 65 mmHg.

(1) Polat, G., Ugan, R. A., Cadirci, E., & Halici, Z. (2017). Sepsis and Septic Shock: Current Treatment Strategies and New Approaches. The Eurasian journal of medicine, 49(1), 53–58. <https://doi.org/10.5152/eurasianjmed.2017.17062> Accessed on October 1, 2021

TAKE AWAYS:

- Sepsis is the body's extreme response to an infection. It is a life-threatening medical emergency. Sepsis occurs due to the body's immune response targeting healthy tissues as it attempts to combat the infection. Infections that lead to sepsis most often start in the lung, urinary tract, skin, or gastrointestinal tract. Without timely treatment, sepsis can rapidly lead to tissue damage, organ failure, and death.
- Consider a diagnosis of sepsis in immune compromised patients as well as those living in congregate living situations. Patients who have had recent hospitalizations or invasive medical procedures are also at risk of sepsis. Query patients about sick contacts and recent travel as these patients may be at risk for infections.

Quality Improvement Leaders should think about:

- Consider a CQI process to review for documentation of patients known or suspected source of infection
- Consider working to ensure there are two-way, open communication avenues to receiving facilities regarding Code Sepsis.

"CODE SEPSIS"



Early recognition, notification, and treatment of suspected septic patients is essential. The death risk increases by 15–20% for each organ failure. If there are four or five organ failures, the death rate goes above 90%.¹ In 2020, 248 (21%) of the 1175 calls that fell into the category “sepsis” documented a “CODE SEPSIS” alert (as above). Documentation in the narrative only cannot be reliably queried. The criteria for this data review were based on primary or secondary impressions or symptoms of sepsis. Services are encouraged to establish a QA/I process with receiving hospitals that outlines the expectations of pre-hospital clinicians in caring for septic patients and provides feedback to services regarding the diagnosis and treatment of sepsis.

Emergency Medical Dispatch

In most cases, Emergency Medical Dispatchers (EMDs) do not attempt to diagnose a patient based on symptoms. This is especially true with sepsis, which is a diagnosis based on several clinical markers. For septic patients, EMDs will select the most appropriate protocol pathway based on priority symptoms given in case entry. EMS may receive dispatch of septic patients through a variety of chief complaint protocols, including P6: Breathing Problems; P10: Chest Pain/Chest Discomfort; P19: Heart Problems; P25 Psychiatric/Abnormal Behavior (think altered mental status as with a UTI); P31: Unconsciousness/Fainting; and especially for cases without priority symptoms mentioned in case entry P26: Sick Person. This variety makes it difficult to query data from the EMD system as it relates to the clinical diagnosis of septic patients. However, for quality improvement, EMD centers can (and should) do focused reviews of P26 cases with Delta level determinant codes to ensure that call takers are actively listening in case entry and selecting the most appropriate protocol pathway based on priority symptoms. It is also important for EMD agencies to have a process by which they receive feedback from their EMS agencies. Septic patients may present to clinicians as more sick than expected based on the initial dispatch (particularly those processed through P26), this presents an opportunity for conversation about the EMD process. Combining these QI measures may improve the time-to-dispatch and assist clinicians with the most effective response for these patients.

Clinical Presentation and Identification of Sepsis



In 2020, Maine EMS reviewed emergency responses with documented primary impressions of Shock – General, Shock - Hypotension, and Shock – Septic. Our query returned 95 incidents. Assessing these incidents for the sepsis criteria is not easy in MEFIRS without manual sorting of the records. Through our review, we queried each of the components of an assessment identified in the Identification of Possible Sepsis section of the Medical Shock #1 Protocol (Gold 14.) We assigned a value of “1” to every criterion that met the Identification of Possible Sepsis guidelines and a “0” if it did not meet the guidelines. Of these incidents, eighty-five of them had two or more of the criteria. We found it difficult to query a known or suspected source of infection. Maine EMS works collaboratively with the QI Committee and the Medical Direction & Practices Board to improve sepsis identification and documentation opportunities within MEFIRS.

(1) Bone RC. Gram-negative sepsis. Background, clinical features, and intervention. Chest. 1991;100:802–8. <https://doi.org/10.1378/chest.100.3.802> accessed October 1, 2021

NOREPInephrine Usage for the Treatment of Shock

The Medical Shock Protocol contains NOREPInephrine infusion at the Paramedic level with OLMC consultation for septic shock refractory to IV fluid bolus. Norepinephrine is an alpha and beta1 agonist that stimulates alpha1 receptors on blood vessels causing constriction and increased blood pressure.

Norepinephrine 8 mg is added to 250 ml NS and administered via a Maine EMS-approved infusion pump at a 0.03 mcg/kg/minute starting dose. The infusion is titrated by 0.03 mcg/kg/minute every 3-5 minutes to maintain a systolic BP of greater than 90 mm Hg or a MAP of greater than 65 mm Hg.

In 2020, 0 out of 74 patients treated for medical shock at the ALS level received norepinephrine in the pre-hospital setting. While this number is low, it is unclear if this review represents a lack of patients meeting the inclusion criteria for norepinephrine or barriers to norepinephrine administration (i.e., OLMC, drug preparation, drug infusion, etc.).

Lactated Ringers vs Normal Saline

In sepsis and other forms of shock, current evidence suggests that Lactated Ringers is the preferred fluid for treatment. Lactated Ringers are a “balanced fluid” while fluids that contain chloride are not.¹ The initial pH of Lactated Ringers is 6.5, whereas the pH of Normal Saline (NS) 0.9% is 5.5 (more acidic). Additionally, administration of chloride-containing “unbalanced” NS may produce a hyperchloremic metabolic acidosis² in a septic patient already experiencing a lactic acidosis thus worsening the acidotic state. Lactated Ringers have additional electrolytes that aid in the body’s recovery in instances of dehydration. Also, one of the byproducts of metabolizing the lactate in Lactated Ringers is sodium bicarbonate. This may be beneficial to patients with sepsis as it may buffer the existing acidosis. When metabolized, Normal Saline causes the pH to drop (become more acidic).

MAINE EMS PROTOCOLS MEDICAL SHOCK #1 GOLD 14

IDENTIFICATION OF POSSIBLE SEPSIS

- Suspected infection? **AND:**
- Evidence of sepsis criteria? Includes **two or more** of the following:
 - Temperature less than 96.8 degrees F or greater than 101 degrees F
 - Heart rate greater than 90 bpm
 - Respiratory rate greater than 20 bpm
 - Systolic blood pressure less than 90 mmHg or Mean Arterial Pressure (MAP) less than 65 mmHg
 - New onset altered mental status OR increasing mental status change with previous altered mental status.
 - Pedi: Mottling, Cap refill less than 1 sec (flash) OR greater than 3 seconds (delayed)

(1) Schwarz, Evan: in Sepsis, Fluid Choice Matters: Emergency Physicians Monthly; May 8, 2015

(2) Lobo et al. Should Chloride-Rich Crytalloids Remain the Mainstay of Fluid Resuscitation to Prevent ‘Pre-Renal’ Acute Kidney Injury.com. Kidney International 2014; 86:1096-1105

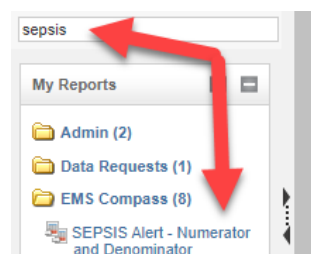
THOUGHTS ON IMPROVING DOCUMENTATION


- Early notification to the receiving facility of "CODE SEPSIS" allows the facility to prepare for aggressive resuscitative measures, consider using the query below to see how often your EMS clinicians document a sepsis alert to the receiving facility.
- Fluid boluses are the primary intervention in the management of hemodynamically unstable patients. Document the amount and type of fluid administered.
- Current evidence suggests there may be a benefit from the use of Lactated Ringers in critically ill patients with shock. Consider using Lactated Ringers preferentially, if available.
- Support CQI efforts to improve consistency and effectiveness of documentation in all emergencies.
- Consider training opportunities regarding patient assessment to identify possible or known sources of infection

VISUALIZING YOUR DATA IN OUR SEPSIS ALERT REPORT

TO ACCESS THIS REPORT FOLLOW THE STEPS BELOW.

1. Login to MEFIRS at www.mefirs.org.
2. Select *Tools* and then *Report Writer*.
3. in the search box enter "*SEPSIS Alert - Numerator and Denominator*"
4. Select *Generate Report*.
5. Enter your date range and select your agency name.
6. Select *Generate Report* again.



	
<small>This Report was generated by: Oko, Jason on 09/30/2021</small>	
SEPSIS-Alert Numerator	
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