Prehospital Sepsis Care

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KEYWORDS

• Prehospital • Emergency medical services • Sepsis • Advanced life support
• Paramedic

KEY POINTS

- Early recognition of sepsis in the prehospital environment can improve patient outcomes.
- Early recognition and aggressive fluid therapy (when appropriate) are important components of a prehospital sepsis protocol.
- Early notification of the receiving hospital and measurement of serum lactate concentrations may expedite care of the septic patient encountered in the prehospital environment.
- Additional research is needed to determine the necessary components of a prehospital sepsis protocol.

INTRODUCTION

Emergency medical services (EMS) personnel frequently provide care for individuals with time-critical illnesses and injuries. One such condition is sepsis, which represents a broad spectrum of clinical presentations requiring early recognition and rapid intervention. Interventions such as the administration of antibiotics and intravenous (IV) fluids within the first few hours have been linked to lower mortalities.[1,2] In the United States, EMS systems have a long-standing tradition of care coordination. For example, trauma victims are conveyed speedily to designated trauma centers and victims of ST-segment elevation myocardial infarction (STEMI) are delivered to waiting cardiac catheterization laboratories. Because sepsis represents a distinct medical entity that would benefit from timely medical intervention, it logically follows that a systematic approach to prehospital recognition and treatment would benefit this distinct group of patients. That said, the recognition of a sepsis syndrome during the prehospital phase of care is far more complex than teaching EMS providers to recognize varying degrees of hemodynamic instability.

Modern EMS systems incorporate a variety of professionals, and each level of EMS provider has been trained to a different level of understanding with respect to human

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anatomy and physiology. Basic emergency medical technicians (EMTs) can interpret abnormalities in vital signs but might not be familiar with the underlying physiology. Paramedics understand the physiologic implications of a septic state but might not appreciate subtle or occult presentations of sepsis in immunosuppressed or chronically ill individuals. Because early recognition and intervention are associated with a decreased mortality, it is imperative to engage EMS systems in a comprehensive approach to the treatment of sepsis. This article explores current practices and available medical decision-making tools, job aids, and point-of-care (POC) tests in order to articulate an evidence-based approach to the prehospital recognition of sepsis.

EXISTING TRIAGE TOOLS

In 2009 and 2010, researchers from Harborview Medical Center attempted to quantify EMS providers' understanding of sepsis.[3] Providers from 3 EMS agencies, at all levels of EMS education and training, participated in an online 10-question survey focused on sepsis recognition. The study population included firefighter (FF)//EMTs, other EMTs, and paramedics. Seven hundred eighty-six EMS providers completed the survey: 408 FF/EMTs (52%), 276 other EMTs (21%), and 102 paramedics (13%). Almost all (97%) of the participants had "heard of sepsis" and appreciated its association with increased in-hospital mortality.[3] However, knowledge gaps were found when participants were asked about their understanding of sepsis. EMTs were less likely than paramedics to identify the correct definition of sepsis, and this finding persisted following logistic regression analysis. Importantly, 55% of respondents agreed that EMS providers could play a role in the early identification of patients at risk for sepsis. These results lend credence to the idea of a systemic, protocolized approach to sepsis care. Important limitations surfaced in the analysis of the study. Each EMS system has different training programs, and the results may not be readily generalizable. The survey did not incorporate clinical scenarios, and researchers were therefore unable to test a provider's ability to engage in more complex medical decision making. However, paramedics' broad and more refined familiarity with sepsis suggested that these providers could be integrated into more specific and widespread prehospital treatment strategies.

Guerra and colleagues[4] examined the utility of an aggressive, goal-directed, prehospital sepsis protocol. Before this study's results are examined, it is helpful to appreciate aspects of the regional EMS system that made such important research possible. First, physicians from a single group staffed all the emergency departments (EDs) involved in the study. The EMS system used an "all-advanced life support" (all-ALS) model of care, meaning that each ambulance crew included at least one credentialed paramedic.[4] Finally, medical direction was provided by board-certified emergency physicians affiliated with area hospitals and EMS system. Although such a collaborative arrangement might seem logical, the reality of physician oversight in EMS is far less consistent. This study featured a rather fortuitous pairing of engaged medical direction and an all-ALS system. Although basic life support (BLS) providers have a pivotal role to play in terms of recognition, EMTs are not often authorized to insert IV lines or administer medication therapy. The authors used an evidence-based triage screening tool and incorporated POC lactic acid testing into the prehospital sepsis algorithm. Patients who met predefined prehospital triage parameters were directed into a "sepsis alert" protocol. Essentially, patients had to fulfill 4 criteria: (1) age greater than 18 years and not pregnant, (2) presence of 2 systemic inflammatory response criteria, (3) suspected infection, and (4) hypoperfusion manifested by prehospital systolic hypotension or an elevated lactic acid level (>4 mmol/L). The study