

EDITORIAL

Emergency Medical Services Data: An Unexpected Source of Variation in Stroke Care Performance

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Clinical performance metrics underpin how quality clinical care is conceptualized and measured in modern health care. Many models of hospital accreditation and reimbursement follow from the quality of care provided, typically as measured through compliance with clinical performance measures. Compliance with these measures, and aligning reimbursement with high-quality clinical care, is laudable and represents the maturation of accountable clinical care and an evidence-based approach to medicine. Of course, an important assumption inherent in this model of health care is that documentation is accurate and reflects the clinical care provided—ie, “if it is not documented, it did not happen.”

See Article by Oostema et al.

Emergency medical services (EMS) is a field of medicine in a transition from infancy to maturation within the house of medicine. The roots of modern EMS in the United States trace back to efforts to reduce motor vehicle trauma deaths in the 1960s,^{1,2} and this history reflects the focus of what has traditionally been seen as “quality” in EMS systems—system-level and time-based metrics such as response times (within 8 minutes to 90% of high-acuity calls) and on-scene times (10–15 minutes or less for time-sensitive conditions).^{3,4}

However, modern EMS is evolving to have a far greater impact on emergency care and patient outcomes than as just a means of patient conveyance. Prehospital 12-lead ECGs and prehospital stroke screening have had dramatic effects on time-to-treatment for acute, time sensitive emergencies such as ST-segment–elevation myocardial infarction and stroke.^{5–7} Prolonged, advanced on-scene care has expanded for other emergency conditions, such as out-of-hospital cardiac arrest, to conceptualize some disease processes as best treated in the prehospital setting.⁷ Further initiatives, such as community paramedicine, have recast the role of paramedics from responding to “downstream” acute emergencies to “upstream” chronic disease preventive care.⁸ In the context of these expanded clinical roles that EMS clinicians perform, the field of EMS medicine in general has slowly matured into a subspecialty within emergency medicine, with its own fellowship training, board certification,⁹ and an increased emphasis on the true medical management of the prehospital phase of acute care, rather than as just a transportation mechanism.

As a reflection of this evolution in EMS medicine, measuring quality in EMS is starting to shift from operational time metrics to clinical quality metrics, and, as such, there have been several concerted efforts to develop clinical quality metrics specific to the prehospital setting. The EMS Compass initiative, funded

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by the National Highway Traffic Safety Administration Office of Emergency Medical Services and led by the National Association of State EMS Officials developed 14 performance measures of various clinical (eg, EMS stroke assessment, pediatric respiratory distress care) and operational (eg, use of lights and sirens) topics.¹⁰ These performance measures have since been codified into the National EMS Quality Alliance measures sets¹¹ and implemented by many EMS agencies.

How well are EMS clinicians performing core clinical metrics in the prehospital setting? In this issue of the *Journal of the American Heart Association (JAHA)*, Oostema et al¹² examined compliance with prehospital performance measures for acute stroke care, specifically, in a cohort of EMS patient encounters with a hospital-based diagnosis of an acute cerebrovascular event (transient ischemic attack, acute ischemic stroke, or hemorrhagic stroke). Using records from 5707 patients with acute stroke found in a Michigan statewide data set of EMS activations, probabilistically matched to Michigan's Acute Stroke Registry, the authors found generally poor documentation compliance with 6 evidence-based or expert opinion-derived clinical and operational performance measures. Compliance was highest for checking blood glucose level (82%), lowest for documentation of last known well time (24%), and ≈50% to 60% with the remaining measures. Performance was similar at the agency level, with only slight improvement in some measures among agencies that saw a higher volume of patients with stroke.

However, are these reported results a true reflection of the quality of care provided by EMS clinicians in this study? Delving deeper into understanding the sources of variation, Oostema et al¹² found substantial agency-level variation in compliance of documentation of the use of a prehospital stroke screen and last known well time. This raises potential questions of agency-level operations, education, and implementation of robust protocols. However, this variation also raises the question of how EMS clinicians document key clinical metrics for care provided in the prehospital setting. This is a fascinating and concerning issue, with major implications for the EMS community.

In general, EMS clinician documentation is performed in an electronic patient care record that has data fields that can be interoperable with a large national EMS database and data standard, the National EMS Information System (NEMSIS). Such discrete data fields are common in statewide databases and large disease-specific data sets and registries such as those used in the study by Oostema et al. However, these discrete “drop-down box” data elements, required per NEMSIS, may not sufficiently allow for capturing of the complexities inherent in prehospital care. Especially when there is complexity in the medical decision-making of the EMS clinician,

a simple checkbox may not be sufficient to capture the care provided. The EMS clinician may be documenting much of the necessary information for these performance measures in a free-text narrative report. However, there is restricted interoperability of free text to discrete fields in a large database—further complicated by the narrative report often containing protected health information—making such fields less available for research and quality improvement projects on a state or national level. Thus, there is the potential for significant loss of information from the medical record to the research data set.

To address these gaps in accurate data capture, there is an enormous potential for innovation in developing ways to reflect clinical performance captured only in the free text of a prehospital electronic patient care record, such as physical examination elements that can be translated into a stroke scale score or the ambiguities around an estimated last known well time, without compelling an already overburdened EMS clinician to click through pages of checkboxes. Preliminary work related to stroke¹³ and opioid overdose^{14,15} have already demonstrated the feasibility of and improvements in accurate data capture by analyzing free-text data to identify discrete data elements in large data sets. Harnessing the power of machine learning, artificial intelligence, and other evolving technologies could bridge the gap between clinical documentation in EMS electronic patient care records and discrete data fields in large databases, opening the potential to better measure and track care currently provided in the prehospital setting. Only when accurate data are known can true clinical performance be assessed and improved.

Beyond providing interesting results about these 6 performance measures for acute stroke in a cohort of EMS patients in Michigan, the findings from Oostema et al¹² offer a suggestion of one potential reason why core clinical metrics in EMS care are lower than expected, but also offer a call to action for improved means of capturing prehospital data. The variation and poor performance derived and calculated from electronic patient care record data is potentially a reflection of the technology available to EMS clinicians because of differences in software and fields available for documentation. Of course, compliance with core metrics may reflect gaps in knowledge and compliance with protocols; however, with the data we have available, knowing whether these results reflect data capture limitations or true deficits in clinical care is challenging. Differentiating between these two issues is critical to advancing high-quality, patient-centered prehospital clinical care. Before we can truly understand the gaps in guideline or performance measure compliance and implementation, we first need to ensure that we are measuring what we think we are measuring. As it is

often said with data collection, “garbage in, garbage out.”

More work remains to develop robust EMS-specific quality metrics and performance measures for the clinical care of specific conditions, especially time-sensitive conditions such as acute stroke, where high-quality EMS care can most affect patient outcomes. Medicine, as a whole, has developed an intricate language of quality metrics and quality-based care. The focus on clinical quality metrics is what drives process improvement and high-quality clinical care in the emergency department and hospital setting. For EMS medicine to continue to evolve into the evidence-based, high-impact field that it is, there is a critical need to develop and implement clinical quality metrics to measure, track, and improve prehospital care. Furthermore, once applying these quality metrics, we can better describe and explore the sources of variation in care to understand the best approaches to improving prehospital care provided by EMS clinicians. However, this is only possible through complete and accurate data collection from the EMS encounter.

ARTICLE INFORMATION

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