

Exploring State Data Sources to Monitor Rural Emergency Medical Services Performance Improvement

Flex Monitoring Team
Briefing Paper #43
March 2020

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KEY FINDINGS

- An expert panel validated the use of the Flex Monitoring Team’s (FMT’s) rural-relevant Emergency Medical Services (EMS) measures to monitor and improve rural EMS capacity with minor revisions to clarify and expand the measures set.
- States EMS agencies collect EMS service licensure, personnel licensure/certification, and patient care/run data that can be used by State Flex Programs (SFPs) to monitor and improve rural systems of care.
- The use of state EMS service licensure systems to monitor and improve rural EMS capacity could be enhanced by identifying a minimum set of rural-relevant licensure data elements and encouraging state EMS agencies to incorporate these elements into their initial and renewal licensure applications.
- SFPs would benefit from education and technical assistance on the use of existing state EMS data to support their EMS activities.
- Measurement areas identified for future development include EMS financial performance and the sustainability of rural EMS services.

ACKNOWLEDGMENT

We thank the members of our rural EMS expert panel who contributed their time and expertise in support of this project. Please see the Appendix for the list of participants.

INTRODUCTION

Under the Medicare Rural Hospital Flexibility (Flex) Program, State Flex Programs (SFPs) receive grant funding to strengthen rural healthcare delivery systems. As an optional area of Flex Program activity, SFPs may undertake initiatives to integrate Emergency Medical Services (EMS) into rural systems of care, improve the functioning of systems of care for time critical diagnoses (TCDs), enhance the financial viability of rural EMS providers, and/or improve the quality of EMS services.^{1,2} Prior Flex Monitoring Team (FMT) studies found that SFPs struggled with the availability and use of EMS data to monitor the location, distribution, capacity, and performance of rural EMS services and to document the impact of efforts to improve EMS systems of care. This study builds on the FMT’s prior work by exploring and describing potential data sources that support SFPs in assessing and improving the performance of rural EMS services.

BACKGROUND

Prior to the early 1980s, primary responsibility for oversight of EMS lay with the federal government, primarily the National Highway Traffic Safety Administration (NHTSA). In 1981, the Omnibus Budget Reconciliation Act established state block grants for health services thereby shifting responsibility for EMS to the states.³ This change in funding led to significant decreases in federal funding for EMS as well as changes in state involvement.³ Some states increased their role in EMS while others delegated more responsibility for oversight to cities and counties. Although lead state EMS agencies remained in all states, their levels of authority and funding varied. Maryland, for example, chose to retain significant state authority over EMS planning and systems

development, while California and other states delegated more responsibility to local, regional, and county EMS authorities for developing EMS systems of care.³ These changes contributed to fragmentation in the development of EMS systems at the state and local levels. This fragmentation has created data collection and reporting issues that have limited the availability of EMS data.⁴

Rural areas have suffered disproportionately from this fragmentation of EMS systems of care due to challenges that include coverage of large geographic areas, a high reliance on a volunteer workforce, difficulties recruiting and retaining a skilled workforce, shortages of skilled medical directors, complications in maintaining critical care skills due to low call volumes, inadequate reimbursement and funding, insufficient data capacity, and variations in the types and quality of EMS services available.^{3,5,6} In our study of rural-relevant EMS performance measures, members of our expert panel noted how little we know about the core administrative, operational, and clinical capacity of rural EMS services, particularly those staffed by volunteers.⁷ Panel members highlighted the importance of understanding the core capacity and processes of care performance of rural EMS services before moving to traditional EMS outcome measures.⁷ They further noted that initial work to improve rural EMS performance should focus on identifying and addressing the gaps in administrative, operational, and clinical capacity. The measures identified through our study reflect this focus on assessing core capacity issues.⁷

SFPs undertaking initiatives to address rural EMS issues have faced additional data-related challenges, as documented by subsequent FMT studies. In conducting the assessments required of SFPs wishing to implement initiatives to improve rural EMS, Flex Program stakeholders noted challenges in obtaining up-to-date contact information on EMS services necessary to conduct their assessment surveys.⁸ The five SFPs featured in our study conducted surveys of local EMS services to collect original data on their needs and capacity issues. None of these efforts appeared to use EMS service licensing data or EMS run data collected by state EMS agencies as part of their oversight roles. In a subsequent study of state initiatives to improve systems of care for TCDs, SFP stakeholders reaffirmed the challenges associated with data collection for rural EMS services, citing a high reliance on volunteer staff, heavy workloads, and increasing demands for data reporting and measurement.⁹ As a result of these resource challenges, small rural EMS services, including both paid and volunteer services, may not consistently collect and report run data. In addition, the data collected may have quality issues. Panel members also highlighted the importance of reaching consensus on a set of core measures that rural agencies are willing to use. Upon achieving such a consensus, they called for national EMS stakeholders to work with state EMS agencies to adopt this consensus set of core measures.

METHODOLOGY

For our previous study of rural-relevant EMS performance measures, we recruited a panel of rural EMS experts including representatives from SFPs, state EMS agencies, the National Association of State EMS Officials (NASEMSO), the National EMS Information System (NEMSIS), NHTSA, and other stakeholder organizations to assist in the process.⁷ We used a similar process for this study to explore state data sources to support SFP activities to improve rural EMS performance. The members of this new expert panel included a mix of panel members from our earlier study as well as new members representing SFPs and EMS stakeholder organizations. The panel was asked to describe EMS data issues and challenges, identify data to support rural EMS performance measurement, and review our 2017 rural-relevant EMS

performance measures to determine their ongoing relevance and suggest revisions to improve their utility.

The expert panel met with the project team three times via Zoom between November 2018 and April 2019. During the first meeting, we reviewed the project's goals, provided an overview of SFP EMS initiatives for the new members, and discussed the FMT's past work on EMS and EMS performance measurement. This set the stage for a discussion on the relevance of the FMT's EMS performance measures, the use of these measures within the Flex Program, the challenges involved with state EMS data collection, and the difficulty of identifying data to support rural EMS performance measurement. During the second meeting, panel members continued to discuss the process of data collection at the local and state levels; service licensing, workforce, and run data; the process of reporting state data to NEMSIS; and state oversight of EMS services. The third meeting was devoted to discussion of our current measures, their continued relevance, and potential revisions that might better capture EMS capacity issues.

To supplement the information provided by the expert panel, FMT staff collected and reviewed available state EMS agency licensing applications.* We also reviewed the EMS data collected by NEMSIS, the process by which these data are collected and reported by local EMS services to state EMS agencies, and the process by which the states report EMS data to NEMSIS.

STATE OVERSIGHT ROLE

An important theme raised by members of the expert panel involved the oversight role of state EMS agencies. Panel members highlighted the need for the active engagement of state medical directors in the oversight of local EMS services as well as the development of adequately resourced state and, where relevant, regional EMS oversight and data systems appropriate to the scope and distribution of local EMS services. Such changes, the panel proposed, would help to structure EMS leadership in the state and to hold local services accountable.

Panel members noted that states often lack staff capacity and expertise (e.g., an epidemiologist) to analyze EMS data and that different states find little agreement on what the relevant performance measures should be. With limited time and resources, it has been challenging for state EMS agencies to work systematically with local EMS data; identify, standardize, and track measures indicative of high performance; and target those services most in need. Having access to EMS service-level data is also critical to effective and appropriate oversight.

While acknowledging that the data may not be perfect (or in some cases, timely or accurate), state EMS agencies need to be able to look at the data and create a baseline for local EMS services to employ in their performance and quality improvement efforts. Toward that end, we asked panel members to identify performance and quality issues that states should monitor and then to discuss a process by which states can share those data with local services and their medical directors. State EMS agencies can also use such data in partnership with local medical directors to ensure that EMS personnel are operating at the highest level of their scope and practice. This, according to one panel member, may help to address EMS workforce shortages.

* We could not access licensing applications from all states as some make their application forms available only through their online portals or do not make their applications available online. We have requested copies from these states.

STATE EMS DATA COLLECTION ACTIVITIES

Panel members representing state EMS agencies described three sets of data collected as part of their regulatory/oversight responsibilities: (1) EMS service licensure; (2) personnel licensure and certification; and (3) electronic patient care record (ePCR)/run data. Members of the panel explained that state EMS agencies are increasingly turning to software-based solutions, such as ImageTrend or ESO products, to collect and manage these three sets of EMS data. Two of our panel members, representing the state EMS agencies in South Dakota and Wyoming, reported that their agencies were using ImageTrend to collect these data and that EMS services could use the ImageTrend portal to submit their service licensure applications as well as ePCR/run reports. EMS personnel also submit their licensing materials through ImageTrend in these two states.

EMS service licensure data are collected through state licensure management systems. As described by one panel member, this is basically service-level demographic information that typically includes primary and secondary contact information, ownership, medical director information, levels of services provided, lists of vehicles and aircraft, ownership, dispatch information, and communication capabilities (Table 1). States vary in the level of information collected as part of the licensure process, with some collecting more detailed information on ePCR use, billing capacity, service area definitions, staffing rosters by type and employment status, estimated run volume, and charges for ambulance transports (e.g., ALS and BLS loading fees and loaded mile charges). This information is collected upon initial licensure and at required renewal intervals. Although some states collect elements of useful demographic information, a member of our expert panel noted that many state EMS agencies do not collect sufficient demographic data from EMS services, either through licensing or NEMESIS (which includes demographic submission capabilities), to allow for use of the data to quantify system capacity or performance. By way of example, members of the expert panel explained that we still cannot accurately quantify how many EMS providers there are in the United States.

Personnel licensure and certification data are individual-level demographic information for specific EMS personnel categories (i.e., Emergency Medical Responder, Emergency Medical Technician, Advanced EMT, and Paramedic). Data collected include contact information, certification, current status, and work history. According to panel members, these data allow states to track an individual throughout their career trajectory and to ascertain how long they have been part of the EMS system. Panel members did note that personnel licensure systems can be useful for describing the overall EMS workforce, but are less useful for tracking workforce gaps at the agency level as personnel licensure and service licensure data are not always linked. To support the licensure and certification of EMS providers, panel members described the use of the National Registry of Emergency Medical Technicians (NREMT) as part of the state licensure/certification process. Used by 46 states as a basis for their own licensure and certification of EMS personnel, NREMT provides a nationally recognized process to track the knowledge and skills required for competent practice by EMS professionals throughout their careers, and to maintain a registry of certification status.¹⁰

Patient Care Records (PCRs)/Run Reports record pre-hospital patient care and inter-facility patient transport care, typically involving the following data elements:

- Patient demographics: includes personal, employment, and insurance information;
- Response: identifies services, crew members involved, response times, and travel distances;
- Initial impressions: observations on illness or mechanism of injury and patient status upon arrival of EMS providers;
- Assessment: assesses the scene (for safety of EMS personnel) and the patient (evaluation of patient's airway, quality of breathing, quality of circulation, etc.), and records patient vitals and condition;
- Vital signs, symptoms, and history: records patient vital signs and symptoms;
- Physical examination: identifies type and location of trauma, injury, and/or pain;
- Traumatic injury and crash data: records cause of injury, crash information, and safety equipment in use by the patient at the time of injury; and
- Interventions, treatment, and transport decisions" records decisions on these issues as well as the rationale supporting those decisions.¹¹

EMS patient care records/run reports serve five important functions by providing: (1) information about the patient and their pre-hospital treatment to emergency department and hospital providers; (2) information to support accurate patient billing; (3) a legal record of the ambulance call's context and circumstances; (4) data to support EMS quality and performance improvement; and (5) data for research and tracking purposes.¹¹⁻¹³ It is also important to recognize that run reports have changed from static documents to an electronic patient care record with the increased adoption of ePCRs. As Nick Nudell, the chief data officer for the Paramedic Foundation and a member of our expert panel, explained in a report on a 2016 survey on EMS data use, "For the first time, when we collect data in an ePCR we are not creating 'ambulance run reports' like we did in the past, we are now updating a patient's electronic medical record. How and what we record will forever be a part of their medical record and will impact their life in major ways. Accuracy and precision are critical attributes for these records. It is important for patient safety, organizational efficiency, and customer service."^{14(p17)}

Most state EMS agencies set standards for the data elements collected through the PCRs/run reports and for the reporting of those data elements to the state.¹⁵ New York State, for example, distributes a data dictionary that defines the data elements that a completed PCR/ePCR must include.¹⁶ It further directs that a PCR/ePCR must be completed each time an EMS agency is dispatched for any type of response, including but not limited to: patients transported to any location; patients who refuse care and/or transport; patients treated by one agency and transported by another; and calls where no patient contact is made (i.e., calls cancelled before reaching the scene or where no patient is located, when a service is dispatched for a stand by, or for events).¹⁶

Although most state EMS agencies set standards for the data elements collected through the PCRs/run reports, the exchange of data between individual services, hospitals, and other

providers is lacking and does not allow for care to be tracked across a given event (Nick Nudell, personal communication, October 31, 2019). For example, it is not uncommon for multiple services to respond to an event or different stages of the event (e.g., mutual aid, paramedic intercepts, and helicopter rendezvous). In these situations, each service will have its own discrete patient care record that greatly complicates patient care as well as the tracking of patient outcomes and system performance. Similarly, the inability to exchange information between EMS and partner agencies (e.g., hospitals and other providers) also impacts patient care. The ability to link ePCRs with the hospital's electronic health record (EHR) would allow for immediate feedback on lab tests, emergency department physician notes, diagnoses, discharge information, and other clinical information.

Linking EMS ePCRs and hospital EHRs can be an expensive and technically challenging process, requiring sophisticated political maneuvering with hospitals and their information technology departments. Despite these challenges, the benefits of doing so are significant. One expert panel member described the integration of his hospital-based EMS service's ePCR with the hospital's EPIC EHR which resulted in nearly 90% of EMS transport information being sent automatically to the patient's personal health record, noting that "The value of this to patient care is immeasurable." He further noted that this interoperability allowed their EMS personnel to know what is wrong with patients, what they are treated for, why they were treated, and for how long. "We can now self-improve the quality of our care immediately with this real world feedback, in the form of information exchange with the hospital/health system" (Nick Nudell, personal communication, October 31, 2019).

This example highlights the challenges and costs entailed when individual hospitals and EMS services seek to exchange the clinical information necessary to ensure high quality pre-hospital care. As an alternative, two panel members discussed the importance of working with Health Information Exchanges (HIEs) to improve the ability of EMS providers to access patient-level health data (e.g., medical problems, medications, allergies, and end-of-life decisions) when responding to a patient event (Nick Nudell, personal communication, October 31, 2019 and Dan Smiley, personal communication, November 1, 2019). Access to patient information improves the ability of EMS providers to provide appropriate and high quality pre-hospital care, particularly in situations where the patient and/or family members may be unable to provide reliable information.¹⁷ At the same time, the ability to share information collected at the scene or during transport can improve transitions of care and facilitate the provision of appropriate care following hand-off to hospital and other personnel.¹⁷ A 2017 report by the Office of the National Coordinator for Health Information Technology described a process for EMS services and HIE organizations to work together to improve data sharing.¹⁷ It also described the Search, Alert, File, Reconcile (SAFR) model for health information exchange developed by California Emergency Medical Services Authority, the implementation of EMS/HIE initiatives based on the SAFR model in five communities, and factors necessary for the success of EMS/HIE integration. This document provides another opportunity for state EMS agencies and SFPs to collaborate to improve the collection and exchange of clinical data by rural EMS services.

The role of NEMSIS in EMS data collection: A significant number of states report data collected from local EMS services to NEMSIS, a system developed to improve pre-hospital care through the standardization, aggregation, and utilization of point of care EMS data at local, state, and national levels. To achieve its goals, NEMSIS encourages:

- The adoption of an electronic EMS documentation system by every local EMS service to collect and use data based on the current NHTSA Version 3.5 dataset standard;
- The development of a State EMS information system in every state and territory, which can receive and use a portion of the local EMS data via the NEMSIS/HL7 XML standard; and
- The development of a national EMS database with reporting capabilities, allowing Federal, State, and local EMS stakeholders access to performance and benchmarking metrics.¹⁵

The following describes the local, state, and national NEMSIS data collection and reporting process:¹⁸

- Local EMS services select NEMSIS data elements according to their needs—keeping the national elements and state elements as part of their selected elements;
- States select elements from the NEMSIS dataset according to their needs—keeping the national elements as part of their selected elements; and
- The states transmit the national elements to NEMSIS to populate the National EMS dataset.

In September 2019, NEMSIS released Version 3.5 of their EMS data standards which contains 578 data elements that can be implemented by an EMS system.¹⁹ A subset of these elements are defined as “national data elements,” which participating states are asked to collect for the National EMS Database. The additional data elements can be used by state EMS agencies and local EMS services depending on their needs. NEMSIS currently collects EMS data from 45 states and territories, submitting more than 26 million EMS records per year (N. Clay Mann, personal communication, December 6, 2019).²⁰

As with the exchange of information between EMS services, hospitals, and other providers discussed earlier, NEMSIS has its own limitations as it is a framework for reporting information by a single EMS service to the state EMS agency and then from the state to NEMSIS (Nick Nudell, personal communication, October 31, 2019). It does not allow for connecting records for the same event across multiple responding services which, as described earlier, is not uncommon in rural areas. These “disconnected” records complicate performance measurement, particularly when underlying measures rely on the recording of various procedures performed by crews from different services.

Despite this limitation, NEMSIS provides a framework for collecting, storing, and sharing standardized EMS data and is an important resource for local, state, and national EMS stakeholders. These data can be used to assess EMS needs and performance, support local and

state EMS strategic planning, benchmark EMS performance, assess clinical interventions, and facilitate cost-benefit analyses.

Challenges to EMS Data Collection and Use: Even with the use of software to manage EMS data collection, panel members noted a number of challenges to rural EMS performance measurement at the local, state, and national levels. Of particular concern to the panel were perceived barriers to collecting and reporting EMS data, including the fact that such reporting is not seen as a priority by local EMS services and that many administrators, EMTs, and medical directors do not fully understand the need for data collection and performance measurement.

Panel members agreed that ePCR/run data are useful for benchmarking and performance/quality improvement purposes related to clinical processes and/or response times, but noted that many states and rural EMS services face significant challenges in reporting and using EMS data. Some states, for example, may lack the capacity to use the data for benchmarking or system performance improvement as they do not have capacity and/or expertise to analyze and package EMS data to support these activities. Further, states may not have reached consensus among state and local EMS stakeholders on what data elements are important and relevant to rural EMS performance management. At the local level, panel members explained that many EMS services, particularly small and/or rural services, may lack the time, resources, and staff to collect, input, and analyze data and that volunteer staff may not understand the need for data to undertake performance/quality improvement activities. One panel member noted that in the context of the Plan, Do, Check, Act cycle of performance and quality improvement,²¹ the planning step is often left out and local EMS services are not engaged in determining whether a given measure is important to them. As a result, many services may not feel invested in collecting the data. Panel members also raised concerns about the consistency and quality of data reported by local EMS services.

In establishing EMS data collection and reporting processes, panel members suggested that state EMS officials need to be careful not to impose excessive administrative burdens on an already over-burdened system. To do so requires streamlining the data collection and reporting systems, ensuring that the right data are collected, and establishing a process to provide access to the data by local services.

Panel members further noted that data collected through ePCRs/run reports and license management systems may not always provide the contextual information (e.g., call volume, populations and/or geographic areas served, or administrative information) necessary to determine the sustainability of rural EMS services. This information would be useful at the state level and would also help local EMS staff as well as municipal and county officials understand the financial realities of their local services.

Panel members also raised concerns about the accessibility of data collected through ePCRs/run reports and state licensing systems. They stated that it was important that local EMS services have access to the data entered through state portals but that many local services did not know how to access their own data or how to obtain benchmarking data for comparison. Representatives from SFPs explained that they had also experienced some difficulties in working with state EMS agencies to access data on EMS performance. These concerns suggest that the provision of

technical assistance on accessing and understanding data collected by state EMS agencies would be beneficial to SFPs and rural EMS services.

Throughout the course of our panel meetings, consistent themes emerged, such as the dependence of rural EMS services on volunteer personnel and the impact of that reliance on service delivery and data collection. At one level, panel members explained that it is difficult to quantify the extent to which rural EMS services depend on volunteer personnel, as their state systems do not always track the paid versus volunteer status of EMS personnel or the services for which they work. This issue is complicated by the fact that there is no standard definition of what it means to be a volunteer. They noted that being a volunteer does not necessarily mean that an individual is uncompensated and further explained that the type and level of compensation can vary widely. Anecdotally, panel members described different types of “compensation” such as the provision of uniforms and gear, stipends for being on call, or stipends for making runs. Some states have attempted to define what it means to be a volunteer. Minnesota, for example, defines a volunteer as an individual that receives less than \$6,000 per year from their service on an EMS/ambulance crew and does not depend on that payment as their primary livelihood.²² To monitor the performance of rural EMS services, panel members reinforced that it is important to achieve consensus on the definition of a volunteer and to develop systems to collect and analyze these data at the individual EMS service level.

Panel members further raised concerns that a high reliance on volunteers to operate rural services impacts the ability of these services to participate in data collection and analysis and, as a result, may negatively impact the accuracy of the data they do collect. Panel members also noted that small, rural EMS services with limited staff and administrative capacity may experience similar difficulties collecting and reporting data. The underlying issues include a lack of training in data collection and reporting, unfamiliarity with state data collection requirements, and limited time and resources to undertake the work related to data collection and reporting.

REFINEMENT OF THE FMT’s RURAL-RELEVANT EMS PERFORMANCE MEASURES

As noted earlier, we asked our expert panel to review the FMT’s 17 rural EMS measures to assess their continued relevance to state EMS agencies, SFPs, and local EMS services for monitoring Flex Program and rural EMS performance. These measures were incorporated into past and current Medicare Rural Hospital Flexibility Program Notice of Funding Opportunities.^{1,2,23} These measures focus on key capacity issues impacting rural EMS services (as advised by our panel of experts), rather than on outcome measures that assess clinical performance, response times, or patient outcomes. They capture data on the capacity of rural EMS services to: (1) collect, report, and use quality and financial data for performance improvement; (2) bill for services provided; (3) implement quality and performance improvement systems; (4) use nationally recognized protocols for TCD; and (5) collaborate with local hospitals, medical providers, and community stakeholders to develop a “system of care” focus. State EMS agencies, SFPs, and local services may wish to supplement these capacity measures with clinically and/or operationally oriented outcome measures (e.g., measures focused on clinical processes, operational issues, response times, or patient outcomes) based on their performance improvement and/or monitoring needs.

Overall, panel members re-affirmed the validity and relevance of the FMT measures, particularly

from a state program perspective, and suggested revisions to improve the utility of the measure set. Their recommendations (Table 2) focused on revisions to clarify the type of data being collected and the unit of analysis for select measures as well as the addition of new measures on the use of ePCRs and the use of protocols for cardiac arrest.

During the course of their discussions, some panel members raised questions about the ability to monitor these measures longitudinally to allow assessment of EMS system improvement over time. Others expressed an interest in the development of measures to assess the financial performance and sustainability of rural EMS services. Although we agree with these suggestions, additional work is needed to understand how to best use these measures to track changes in rural EMS capacity over time, as well as to identify rural-relevant EMS financial performance and sustainability measures. We will work with the Federal Office of Rural Health Policy to explore these issues in future FMT evaluation studies and projects focused on rural EMS performance measurement.

In a broader discussion of performance measures, the panel's discussion turned to the role of clinical and operational outcome measures in the assessment of rural EMS performance. Outcome measures are generally created from data collected in patient care records/run reports. Such reports are completed following the activation of an ambulance and are used to assess the quality of pre-hospital care as well as key time intervals for different stages of a run, such as the time between a dispatch call and the departure of the ambulance from its base (chute time), travel time to the scene, time spent on the scene of the event, and travel time from the scene to the hospital. Some panel members remarked that clinical data measures are easier to collect and to measure than are some process or capacity measures such as the use of skill sets in response to infrequently occurring conditions or the extent to which rural services are dependent on a volunteer workforce.

The NHTSA-funded EMS Compass initiative was discussed as an example of a process to identify a set of outcome measures to monitor EMS performance. The EMS Compass initiative, managed by NASEMSO, was a two-year process to develop standardized EMS performance measures to improve the clinical and non-clinical performance of local ambulance/EMS services.²⁴ The EMS Compass performance measures are based on current NEMSIS-compliant data points, thereby allowing the calculation of these measures from data reported by local EMS services and states participating in NEMSIS. The process yielded a set of measures focused on hypoglycemia, medication errors, pediatric respiratory issues, seizure, stroke, trauma, trauma pain, and vehicle operations safety. According to the EMS Compass website,²⁴ the measures selected can be used by a wide range of EMS services, including small and/or rural services, as part of their quality and performance improvement activities.

NEW EMS DATA COLLECTION REQUIREMENTS: MEDICARE GROUND AMBULANCE DATA COLLECTION SYSTEM

Section 50203(b) of the Bipartisan Budget Act of 2018 (PL 115-123) requires the Secretary of the Department of Health and Human Services to collect cost, revenue, utilization, and other information from providers/suppliers of ground ambulance services.^{25†} The Centers for Medicare and Medicaid Services (CMS) released the final rules for this process on November 15, 2019.

† Includes ambulance services provided using land and/or water ambulances, but not air ambulances.

The information collected will be used to evaluate how ground ambulance costs relate to current payment policies under the Medicare Part B Ambulance Fee Schedule. The system will also collect information on the utilization of capital equipment, ambulance capacity, and the types of ground ambulance services provided in urban, rural, and low population density (i.e., super rural) areas. The Medicare Payment Advisory Commission will then use these data to prepare a required report to Congress assessing the adequacy of Medicare ground ambulance payments rates and the geographic variations in the cost of providing those services.

Effective January 1, 2020 and continuing each year through 2024, CMS will collect data from a sample of 25 percent of the ground ambulance organizations that bill Medicare for ambulance transport services each year. A new sample will be selected during each subsequent year until all ground ambulance services have reported. Each ground ambulance service will be required to report detailed organizational, cost, utilization, and revenue data for one twelve-month period with the data due within five months of the close of the organization's fiscal year end. Ground ambulance services that fail to fully comply with the reporting requirements will be subject to a 10 percent reduction in payments under the Ambulance Fee Schedule, unless a hardship exemption has been granted. The categories of information to be collected including organizational characteristics, services provided, costs, and revenues. A subset of the elements included in Ground Ambulance Data Collection System are similar to some of the information already collected through state licensure management systems.²⁶

Given our understanding of the data collection and reporting challenges faced by rural EMS services, especially small rural services, it seems likely that many of these services will require technical assistance as well as consultative and/or staffing support to accurately collect and report these required data. As these data will be used to assess the adequacy of Medicare ambulance reimbursement rates and geographic variation in ground ambulance costs across urban, rural, and super rural areas, it is vital that all rural EMS services report accurate data.

DISCUSSION

Prior FMT evaluation studies on SFP activities to support rural EMS have identified the lack of data on rural EMS capacity and performance as a barrier to assessing rural EMS needs, planning SFP interventions, and documenting the impact of those interventions. Although the FMT's EMS capacity measures and NHTSA's EMS Compass outcome measures provide a set of rural-relevant performance measures to monitor and improve rural EMS capacity and performance, SFPs and state EMS agencies are hindered in their ability to use these measures by the challenge of accessing accurate and timely data. Since the two measure sets require different types of data, we will discuss the respective data issues separately.

Measuring EMS capacity: The FMT's measures are designed to assess the capacity of rural EMS services to collect, report, and utilize financial, operational, and clinical data to monitor and improve performance. They also focus on the extent to which rural services are using protocols for STEMI, stroke, trauma, and cardiac arrest that are consistent with nationally recognized, evidence-based protocols developed by organizations such as the Centers for Disease Control and Prevention (trauma), the American Heart Association (STEMI and cardiac arrest), and the American Stroke Association (stroke); the training of service personnel on the recognition and treatment of TCDs; and the extent to which rural EMS services are engaging in collaborative

activities to improve the coordination of local systems of care. Despite the agreement of our expert panel on the need to understand the capacity of rural EMS services, there are no currently existing data sets to support these measures. The two opportunities discussed below provide potential solutions to address this data gap.

The Attributes of a Successful Rural Ambulance Service assessment tool,²⁷ developed through the Joint Committee of Rural Emergency Care (JCREC), a partnership of NASEMSO and the National Organization of State Offices of Rural Health (NOSORH), provides an opportunity to collect data on some of these capacity issues. A number of SFPs have used this survey as part of the assessments of rural EMS needs required of SFPs wishing to undertake EMS activities with Flex Program funding.⁸ Although a useful tool, it does require a survey of rural EMS agencies to collect the data, which can be staff intensive and time consuming.

An alternative approach would be for state EMS agencies to collect these data through their EMS service licensure process. We reviewed state EMS service licensure applications, as available on their websites, and found that a number of these capacity-focused data elements are already being collected (Table 1), although not consistently across all states.[‡] The experience of the state EMS agencies that already collect some of these data elements may provide a pathway for other states to modify their licensure applications to collect these data on a regular basis. Since EMS services are already required to submit a range of data elements in their initial licensure applications and subsequent renewals, this would not appear to impose a significant administrative burden on rural EMS services and would provide more consistent data collection compared with voluntary surveys.

As part of this process, the study team proposes the development of a rural-relevant “minimum set” of service data elements that states could collect through their licensure processes. This proposed minimum set of licensure data elements would be based on the basic administrative data already collected by many states; the FMT’s capacity measures; personnel rosters that list each EMS professional by license/certification, employment status (i.e., paid versus volunteer), and the percentage of their time dedicated to the service; definitions of the service areas and/or populations served for each service; identification of the main station and any sub-stations, the use of established protocols; vehicle rosters; communication protocols, ownership and organizational control, medical director information, mutual aid agreements, quality improvement protocols, ePCR and management information systems, fee schedules, and dispatch protocols. This proposed idea is similar conceptually to the work undertaken by NEMSIS to identify a standard set of EMS data elements to bring consistency to the reporting process. To ensure broad EMS stakeholder input into the definition of this minimum set of licensure data elements, we propose that an expert panel of representatives from national, state, and local EMS stakeholder organizations be assembled to identify and define the data elements that should be included. Such representation from key stakeholder organizations may also help to ease the path to states’ adoption of this minimum set of licensure data elements.

[‡] Of the 50 states, 12 did not have application materials available on their websites. In some cases, EMS services must complete their applications through an online portal so there is no separate application form. In other cases, the forms must be requested through state or regional EMS agency personnel. We have requested, but did not receive, licensure application materials from these states: AK, CA, CO, CT, DE, ID, IA, KS, MD, MS, MT, and NC.

This effort should also be informed by the service-level demographic information collected through the Medicare Ground Ambulance Data Collection System. As previously discussed, the Ground Data Collection System is a one-time effort, conducted over four years, to collect twelve consecutive months of data from every EMS service system in the country that bills Medicare for ambulance transports. The demographic elements identified by CMS in its efforts to assess the adequacy of Medicare ambulance reimbursement rates and geographic variations in costs should help to provide a “road map” to assist state EMS agencies in identifying the licensing element necessary to conduct their oversight activities as well as to monitor and improve rural EMS performance.

Measuring EMS outcomes: As noted earlier, patient care/run reports are the typical source of data to calculate EMS clinical and non-clinical performance measures such as those included in EMS Compass. NEMSIS version 3.5 provides the foundation of standardized data elements that local EMS services can collect and report to their states and that the states can then report to NEMSIS. During our discussions with members of the expert panel, we identified a number of challenges to the collection and reporting of consistent, accurate, and actionable data by rural EMS services, along with the limitations of the NEMSIS national dataset. Targeted efforts to improve the collection of local EMS patient care/run data can provide an opportunity for state EMS agencies and SFPs to work together to train and educate rural EMS services on the collection of patient care/run data. Such efforts may also assist them with the development of the local capacity and infrastructure to support and improve the accuracy of their reporting processes. This would also provide an opportunity for state EMS agencies to clarify their EMS reporting requirements, clearly define their required data elements, develop a process to verify the accuracy of data collected and reported by rural services, develop state-level benchmarks, and help local services to access and use their data and related benchmarks for performance improvement.

In addition to working with rural EMS services to improve their capacity to collect and report EMS data, state EMS agencies and SFPs can play an important role in supporting the exchange of information between EMS services, hospitals, and other providers through EMS/HIE integration initiatives. These initiatives help to improve the quality of pre-hospital care and facilitate the hand-off between EMS and hospital providers. They can also help to monitor the quality and outcomes of care across systems of care and providers. Challenges to developing and implementing these EMS/HIE initiatives include funding to support this work, integrating proprietary ePCR and EHRs, and the need for collaboration between involved organizations.¹⁷ One particular challenge involves the fact that EMS ePCRs and hospital EHRs use different data elements and standards that must be reconciled. The architecture of EMS ePCRs reflects the event-based nature of ambulance transport data while hospital EHRs are patient/identify-based. Greater progress on EMS/HIE integration can be facilitated by the development of a shared vision among stakeholder organizations, standardization of EMS data through the adoption of NEMSIS Version 3.5 data standards, collaboration between ePCR, EHR, and HIE vendors to develop the functionality necessary for bi-directional exchange of information, and education of EMS providers, HIEs, and the public on benefits of EMS/HIE integration.¹⁷

The role of State Flex Programs: SFPs can play an important role in supporting rural EMS data collection by developing initiatives to improve the infrastructure and capacity of rural EMS services to collect and report data. These efforts might include trainings on data issues impacting rural services as well as working with state EMS agencies to target vulnerable rural services for direct education and technical assistance, preparing benchmarking reports for rural services in their states, and helping rural services to use these benchmarking reports for quality and performance improvement. The requirements of the Medicare Ground Ambulance Data Collection System underscore the need to support the data collection capacity of rural EMS services through technical assistance, training, technology, funding, and staffing. Given the importance of accurate data in the CMS data collection initiative, state EMS agencies and SFPs may wish to reach out to rural EMS services to determine their data collection capacity and to identify the support needed to participate in this effort. SFPs can also play an important role in representing the needs of rural EMS services in efforts to develop and implement EMS/HIE integration initiatives.

At the same time, it is clear that SFPs themselves may need assistance with understanding and accessing the relevant EMS data collected by their states, and may also benefit from guidance as they develop a process to utilize these data to support rural EMS services. States would benefit from training and technical assistance on the availability and use of state-collected EMS data. Potential partners to develop and provide training and technical assistance to states would include the Joint Committee on Rural Emergency Care (JCREC), the National Association of State EMS Officials (NASEMSO), the National Organization of State Offices of Rural Health (NOSORH), and the Technical Assistance and Services Center (TASC) of the National Rural Health Resource Center. They would also serve as appropriate partners in the development of the minimum set of EMS service licensure data elements as discussed above.

CONCLUSIONS

The process of collecting and reporting data on rural EMS performance remains an ongoing challenge and a priority for NEMESIS, the NHTSA Office of EMS, the Federal Office of Rural Health Policy, SFPs, state EMS agencies, and CMS (with the implementation of its Medicare Ground Ambulance Data Collection System). We have identified opportunities for SFPs and state EMS agencies to enhance the performance of rural EMS systems of care by improving the collection, reporting, and use of data by rural EMS services as well as supporting EMS/HIE integration initiatives to facilitate the exchange of data between rural EMS services, hospitals, and other emergency care partners. Given the data issues identified in the FMT's earlier EMS studies as well as the issues raised by members of our expert panel, this is an area of activity that is ripe for collaborative action by national, state, and local stakeholders interested in improving the availability of data to enhance rural EMS systems of care.

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TABLE 1. Relevant EMS Data Collected on State EMS Agency Licensure Applications

State	Administrative	Locations/ Stations	Personnel Roster	Medical Director	Vehicle Roster	Service Area	Other
Alabama	X		Includes employment status (FT, PT, or volunteer)	X	X		Advanced life support agreement, pharmacy supply agreement, types of communication used, QA/QI contact, Alabama Incident Management System Agreement, provider ePCR agreement, dispatch center information, organization mission (e.g., fire, law enforcement, etc.), business structure (e.g., county, city, for-profit, not-for-profit, etc.)
Alaska							Licensure application only available through state web portal
Arizona	X	X	X	Medical direction and communication	Each ambulance and air ambulance registered individually	Service area and map; response times and tolerances for each scene locality, demographics, square mileage, environmental context, medical and emergency medical resources, alternative back up plans	To operate a ground ambulance service, a Certificate of Need application must be file with the Bureau of EMS and Trauma Systems and a CON granted. Projected ambulance revenue and cost report, financing and source of funds
Arkansas	X	X	Rosters are not required but services can register as a volunteer service.	X	Vehicles registered through Section of EMS and Trauma Systems	Primary area of operation as defined by the service is filed separately with the Department of Health	Submit treatment protocols, drug policies, procedures and inventory (Paramedic, air, and advanced response)
California							California EMS agencies must complete a five year plan with annual updates detailing how they meet State EMS systems standards and guidelines. Materials requested from State.
Colorado							Licensure application only available through state web portal
Connecticut							Not available online
Delaware							Not available online
Florida	X	X		X	X	Counties Served	Certificate of Public Convenience and Necessity for each county served
Georgia	X		Includes employment status	X	X		Pharmaceutical agreement, communication information
Hawaii	X		Lists primary crew member	X	Roster by type of unit		

TABLE 1. Relevant EMS Data Collected on State EMS Agency Licensure Applications

State	Administrative	Locations/ Stations	Personnel Roster	Medical Director	Vehicle Roster	Service Area	Other
Idaho							Materials only available through online portal
Illinois	X	X (map of garage locations)	X	X	X	Define primary, secondary, and outlying area of response for each vehicle	Mutual aid agreements, dispatch protocols. Services can request approval of alternative rural staffing and response patterns from the State.
Indiana	X	X	Must report paid and volunteer staff and staffing patterns	X	X	Detailed map or list of all counties, townships, cities, or towns with territorial boundaries	Describe communication, record keeping, training, and data collection systems
Iowa							Not available online
Kansas			X				Materials only available through License Management Portal
Kentucky	X	X		X		Map and written description of its geographic service area with copy of Certificate of Need	Dispatch information
Louisiana	X	X	List personnel and drivers	X	X	Service area including map	
Maine	X	X	X	X	X	Primary service by town/city	License level, quality improvement committee, communication process
Maryland							Materials only available through online portal
Massachusetts	X	X	List by name, FT/PT, paid per diem, on call, and/or volunteer	X	X	List by town (full or part), municipal designate, and unique population if relevant	Number of runs in past year, hospital agreements, discussion of limits on populations served (if relevant), back up ambulance services as well as those services this organization will back up
Michigan	X	X	X	X	X	Listed by county, city, or township	Mutual aid agreement
Minnesota	X	X	Include employment status by type	X	X	Estimate maximum and average response times to most distant point in service area, size of population served, maximum distance served from base or substation	Estimate number of runs by type, provide financial pro-forma (revenues sources by type, average charges, expenses), accounting methods
Mississippi							Not available online. Materials requested from State

TABLE 1. Relevant EMS Data Collected on State EMS Agency Licensure Applications

State	Administrative	Locations/ Stations	Personnel Roster	Medical Director	Vehicle Roster	Service Area	Other
Missouri	X	X	Personnel schedules examined during inspection	X	X	Indicate by shading counties on a state map	Following application, an inspection of the service is conducted. Documents reviewed during the inspection: personnel schedules, medical control plan, communication procedures, vehicle and equipment maintenance schedules, disaster/multiple casualty protocols, quality improvement program
Montana							Application are offline pending updates to ADA standards. Materials requested from State
Nebraska	X		X	X	X	Description or map of service area	Submit protocols if service has modified Nebraska EMS protocols, medical director attestation form
Nevada	X	X	X	X	X	Description of geographic service area	If applying as a volunteer service, proof of applicant’s volunteer status must be verified by local Board of County Commissioners. Must submit statement of financial worth, pre-hospital emergency care endorsement, hospital agreement, pre-hospital emergency care endorsement, service agreement, rate/fee schedule, protocols, radio communications, record keeping critique system
Missouri	X	X	Personnel schedules examined during inspection	X	X	Indicate by shading counties on a state map	Following application, an inspection of the service is conducted. Documents reviewed during the inspection: personnel schedules, medical control plan, communication procedures, vehicle and equipment maintenance schedules, disaster/multiple casualty protocols, quality improvement program
Montana							Application are offline pending updates to ADA standards. Materials requested from State
Nebraska	X		X	X	X	Description or map of service area	Submit protocols if service has modified Nebraska EMS protocols, medical director attestation form
Nevada	X	X	X	X	X	Description of geographic service area	If applying as a volunteer service, proof of applicant’s volunteer status must be verified by local Board of County Commissioners. Must submit statement of financial worth, pre-hospital emergency care endorsement, hospital agreement, pre-hospital emergency care endorsement, service agreement, rate/fee schedule, protocols, radio communications, record keeping critique system

TABLE 1. Relevant EMS Data Collected on State EMS Agency Licensure Applications

State	Administrative	Locations/ Stations	Personnel Roster	Medical Director	Vehicle Roster	Service Area	Other
New Hampshire	X	X	Unit roster of personnel with any changes	X	Each ambulance separately licensed	Coverage area by town, zip, and county	Hospital affiliation information, communication/dispatch
New Jersey							Not available online. Materials requested from State
New Mexico	X	X	X	X	X	Map of service area with all locations marked	
New York	X	X	List number of staff by paid or volunteer status	X	X	Description of operating territory/boundaries with map	Communication/ dispatch information
North Carolina							Not available online. Materials requested from regional system specialist
North Dakota	X	X	X	X	X		Mill levy in place, indicate how service is staffed: volunteer, paid, or both (paid staff implies payment of greater than \$10,000 per year) and indicate number of paid staff (NA, up to 3, 4-5, 6 or more), dispatch information, squad leader agreement, mutual aid agreement
Ohio	X	X		X	X	List by counties	Communication equipment information, total number of transports last calendar year
Oklahoma	X	X	List by FT, PT, or volunteer	X	X	Coverage area map	Communication policy, response plan, business plan, dispatch information, letter of governmental support, quality assurance plan, authorized procedure list
Oregon	X	X	List by FT, PT, or Volunteer	X	X		Level of care provided, proof of financial responsibility – insurances, and Medicare/Medicaid provider numbers
Pennsylvania	X	X	List by paid or volunteer	X	X	Identified by municipalities	Applications subject to regional EMS Council Review, response plan and staffing plans
Rhode Island	X	X	List by FT or PT	X	X		Copy of policies and procedures
South Carolina	X	X	X	X	X		Call information, statistics on ambulance service calls, run staffing, and first responder services in last six months, radio information, dispatch support

TABLE 1. Relevant EMS Data Collected on State EMS Agency Licensure Applications

State	Administrative	Locations/ Stations	Personnel Roster	Medical Director	Vehicle Roster	Service Area	Other
South Dakota	X		List by employment status	X	X		Charges for ambulance transports (ALS and BLS loading fees and loaded mile charge); billing information (Medicare and/or Medicaid), charge for consumable supplies, balance bill for portions of bills not paid by third party payers, contact information for person responsible for billing and claims processing; ePCR used
Tennessee	X	X	List by type	X	X		Information on certification of agency including dispatch capacity
Texas	X	X	List by paid or volunteer status	X	X	Defined in documents submitted with the application	Letter of approval from governing body, staffing plan, quality improvement plan, mutual aid and inter-local agreements, treatment and transport protocols
Utah	X	X	X	X	X	Description and map of the exclusive geographic service area	Written aid agreements, demonstration of fiscal viability, plan of operations, description of communication policies, protocols, established cost, quality, and access goals (with approval from local government)
Vermont	X	X	X	X	X		Describe process to ensure adequate credentialing and quality improvement, training and control from hospital within service area, coverage agreement for EMS district and local crisis response agreements
Virginia	X	X	X	X	X		Notice for public review and comment must be posted
Washington	X	X	List by employment status	X	X	Map of response area	
West Virginia	X	X	List by employment status (FT, PT, Paid per call, or Volunteer)	X	X	Narrative description and map if available	
Wisconsin	X	X	X	X		Population, community characteristics, and map of primary service area	
Wyoming	X	X	X	X	X	Describe boundaries of normal area of operation	Insurance certificates

TABLE 2. Current and Proposed FMT Rural EMS Program Performance Measures

Domain: Capability, Capacity, and Access	
System Assessment: Measures the extent to which State Flex Programs (SFPs) are developing and evaluating EMS initiatives focused on identified EMS needs	
Current	Proposed Revisions
% of SFPs that have conducted an assessment of rural EMS services to identify priority EMS needs	No change
% of SFP EMS initiatives that address priority needs identified in the assessment	No change
% of SFPs that track and evaluate progress towards addressing priority needs	No change
% of local rural health systems (i.e., community systems of care involving Critical Access Hospitals, EMS services, and other providers and stakeholders) with local system assessment and planning processes involving community providers and stakeholders	% of local rural health systems (i.e., community systems of care involving Critical Access Hospitals, EMS services, other hospitals, medical providers, and community stakeholders) with local system assessment and planning processes involving community providers and stakeholders
EMS Agency Data and Reporting Capacity: Measures the extent to which rural EMS services collect and use data to improve performance and engage in collaborative discussions to improve performance across the system	
% of EMS services able to bill third party payers and patients for services rendered	% of EMS services able to bill third party payers and patients electronically for services rendered
% of EMS services able to access patient billing and agency financial data for performance improvement	% of EMS services able to access patient billing and agency financial data for performance improvement or identifying trends in revenue
% of services with formal quality improvement protocols/continuous quality improvement process	Removed
% of services that use quality data for performance improvement	% of EMS services that use data on a specific set of quality measures, such as EMS Compass, for performance improvement
% of local/regional systems of care in which participants meet regularly to review data on quality and system performance	% of local/regional EMS systems of care in which participants review data on quality and system performance
New	% of EMS services that use an electronic patient care record (ePCR) to report and share pre-hospital/run data
Domain: Recognition and Diagnosis	
Time Critical Diagnoses/System of Care: Measures the extent to which rural EMS services and systems of care are using evidence-based protocols to accurately identify specific episodes of care.	
Current	Proposed
% of staff with training on recognition of STEMI and stroke	% EMS services with training on recognition of STEMI and stroke
% of staff with training on trauma/field triage protocols for all ages	% EMS services with training on trauma/field triage protocols for all ages
New	% EMS services with training on cardiac arrest protocols

TABLE 2. Current and Proposed FMT Rural EMS Program Performance Measures

Domain: Recognition and Diagnosis	
Time critical diagnoses/system of care: Measures the extent to which rural EMS services and systems of care are using evidence-based protocols to accurately identify specific episodes of care	
Current % of staff with training on recognition of STEMI and stroke % of staff with training on trauma/field triage protocols for all ages New	Proposed Revisions % EMS services with training on recognition of STEMI and stroke % EMS services with training on trauma/field triage protocols for all ages % EMS services with training on cardiac arrest protocols
Domain: Coordination of Care	
Governance, shared accountability, handoffs and transitions, and communication: Measures the extent to which rural EMS services are working with other participants in local systems of care to plan for and develop integrated services systems	
Current % of EMS services with local system planning committees involving relevant local CAHs and other hospitals, healthcare providers, fire/law enforcement officials, and community stakeholders % of EMS services with local system planning committees that have developed plans to address emergency system resource, workforce, and training needs	Proposed % of EMS services participating on local system planning committees involving local CAHs and other hospitals, healthcare providers, fire/law enforcement officials, and/or community stakeholders % of EMS services participating on local system planning committees that have developed plans to address emergency system resource, workforce, and training needs

APPENDIX

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