Minimum Data Set for EMS Report Form: Historical Development and Future Implications

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Abstract

Report forms are used by Emergency Medical Services (EMS) systems for documentation of services provided and for self-analysis of EMS functions. Although the EMS Systems Act of 1973 originally intended for the development and implementation of a uniform EMS report form, items recorded on EMS forms vary throughout the United States. We review the governmental sponsored development of a recommended minimum data set (MDS) for EMS forms performed in 1974, and discuss areas of needed investigation regarding data set development and usage. The concepts used to develop the recommended MDS provide a useful resource for review of the purpose and content of one's own EMS report form. However, future data set development and applications should use outcome measure guided data set selection, on-line validation of data item accuracy and recordability, psychometric analysis of the process of form completion, and incorporation of new data entry and storage technology.

Introduction

The Emergency Medical Services (EMS) system report form is part of the patient's legal medical record and should identify the patient and note his or her condition and treatment. The EMS report form also is a productive means of assessing the performance of prehospital care systems. Standardization of information collected on EMS report forms has been suggested to facilitate comparison of EMS functions between different geographic areas and national entities.

In the United States, 29 states have uniform EMS data report forms.[1] However, many states have left the choice of the EMS report form to each local prehospital care system. To provide reference information which can be used by EMS systems for modification and adaptation of their current report form, we describe the historical development of a governmental sponsored recommended minimum data set (MDS). We also address areas of investigative need for future data set development.

Development of the Original MDS

A "minimum data set (MDS) for EMS patient record keeping" was recommended by Macro Systems, Inc.[2] as a guide for developing EMS systems funded by the Health Services Administration (HSA) in compliance with the enactment of the

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Element Name	Primary Uses
1. Name	Linkage of records among communications, transportation, and emergency facility components of EMS.
2. Home Address	Analysis of geographic origin relating to system demand. Identification of emergency facility ability to contact patients for follow-up purposes.
3. Birth Date/Age	Correlation of frequency and type of incident with age. Evaluation of appropriateness of medical treatment procedures. Analysis of utilization patterns by different age/sex categories.
4. Sex	Correlation of frequency and type of incident with sex. Evaluation of appropriateness of medical treatment procedures. Analysis of utilization patterns by different age/sex categories.
5 Time of Initial EMS Contact	Evaluation of system response timing in conjunction with other noted times. Evaluation of the utilization of the EMS communications component.
6. Dispatch/Incident Case Number	Linkage of records among communications, transportation, and emergency facility components of the EMS system. Analysis of utilization and demand patterns of the EMS system.
7. Emergency Vehicle ID	Evaluation of performance of specific types of vehicles. Evaluation of vehicle utilization for management purposes. Identification of types of vehicles and serial numbers for case studies.
8. EMS Personnel Identification	Evaluation of linkages between training levels and outcome: system skill resources, training levels, and operational efficiency; and training levels and appropriateness of care provided.
9. Run/Start Time	Identification of system response time delays attributable either to delay *or in notification of the* emergency vehicle crew or non-readiness of crew to respond. Evaluation of system response time in conjunction with other noted times.
10. Location of Incident	Identification of high hazard areas. Correlation of incident location pattern with emergency vehicle deployment. Analysis of geographical origin of system demands.
11. Time of Arrival at Incident	Identification of system response time delays attributable to difficulties en route to incident location. Evaluation of system response time in conjunction with other noted times.
12. Observed condition by (This is to include preliminary diagnosis, vital signs, consciousness, and behavior.)	Evaluation of appropriateness of the emergency crew and of patient emergency care at incident location and en route. Analysis of frequency of observed conditions.
13. Degree of urgency during transportation	Correlation of degree of urgency with types of incidents and medical procedures administered on-site *or in the emergency vehi*cle. Analysis of emergency vehicle utilization.
14. Patient Complaint/ Symptoms	Correlation of patient complaint with medical procedures administered on-site or en route to the emergency facility. Determinant of emergency vehicle equipment, supply and attendant medical training levels needed to treat the patient on-site or enroute to the emergency facility.
15. Type of Communication Used	Analysis of relationships between communications linkages, patient outcomes, systems efficiencies, and patient diagnosis. Evaluation of appropriateness.
16. Treatment Procedures	Evaluation of appropriateness of care at incident location, and en route. Notification of emergency facility personnel of treatment/medications provided before arrival at the emergency facility. Correlation of appropriateness of effectiveness of patient care at incident location and enroute with vehicle and crew training. Correlation of observed condition and patient complaint with patient care provided.
17. Destination	Analysis of utilization patterns. Evaluation of appropriateness of destination with patient's condition.
18. *Time of Departure from* Location	*Correlation of time and* incident location with observed condition and treatment procedures. Evaluation of EMS process time.
19. Time of Arrival at Emergency Facility	Identification of time delays attributable to difficulties en route to the emergency facility. Evaluation of EMS process time.
20. Run Outcome	Correlation of dry runs with incident location to identify patterns of false alarms.

*Developed by Macro Systems, Inc.

Table 1 - Minimum EMS Data Set*

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EMS Systems Act of 1973.[3] Under Section 1206 (b)(4)(C)(xi) of the law, the sponsored EMS systems were to "provide for a standardized patient record keeping system meeting appropriate standards established by the Secretary, which records shall cover the treatment of the patient from initial entry into the system through his discharge from it, and shall be consistent with ensuing patient records used in follow-up care and rehabilitation of the patient."

Although a uniform data set was deemed necessary by Congress, the actual implementation of this data set has not evolved as suggested by law. Macro Systems, Inc., through their discussions with the HSA, concluded that imposition of an absolute uniform record keeping form or procedure upon evolving or established EMS systems was both unfeasible and unnecessary to accomplish the intent of the EMS Systems Act. This conclusion was based upon three assumptions: 1) Each EMS system was heterogenous and in all likelihood, the composite organizations already had developed and were satisfied with their own forms and data collection procedures. Furthermore, most of the forms in use were likely to contain the items that could form the basis of a uniform record keeping system; 2) The HSA and EMS grantees had limited authority to impose new or uniform record keeping upon the constituent entities. Tying the use of a standard form to financial assistance possibly would have discouraged participation with the EMS Act; and 3) The EMS system grantees were heterogenous and no uniform record keeping approach would be likely to serve all the needs of each EMS system because of variations in system structure, operations, and objectives. Therefore, the HSA decided to develop a minimum set of data items that were likely to be included in existing report forms or would represent only a minor inconvenience when upgrading existing EMS system forms to include such items.

Due to a severe time constraint, the contracting agency used five steps to develop the MDS. First, the goals, objectives, and essential structure of EMS systems were examined. Because the overall goal of an EMS system is "to reduce avoidable death or disability from accidents and sudden illnesses through the rapid provision of competent EMS when needed," each EMS system had to address four main objectives to meet this goal: "(1) deployment of resources in a manner most likely to assure prompt access to EMS when needed by all individuals within the system service area; (2) efficient utilization of these EMS resources as they are deployed; (3) assurance that the service provided to individuals who enter the EMS system, particularly services in the direct patient care area, are appropriate to the medical conditions of those individuals in that they are consistent with professionally accepted standards of care; and (4) containment of EMS system costs."

The EMS data form was expected to support the management and subsequent evaluation of the EMS system in each of the above areas. In pursuit of these objectives, each EMS system must coordinate direct patient service (EMS communications, rescue and ambulance services, emergency departments or other fixed facilities) and support functions (system financing, training of EMS personnel, and public education). Because patient record keeping systems interface only with the direct patient service functions, only the first three components of the EMS system were considered in the development of the MDS.

Second, the agency reviewed the overall functions of the EMS system from patient access and system activation to patient care in an emergency facility. They reasoned that administrators would wish to know: "(1) who was using the system and for what pur-

poses; (2) how the communications and rescue/ambulance service components responded to requests for assistance; (3) what conditions were encountered by a rescue/ambulance crew and how the crew responded to those conditions; (4) what conditions were observed by emergency department personnel, and what services were rendered in response to those conditions; and (5) how the patient left the EMS system."

Third, the agency evaluated sixty existing medical forms. Because of limited time availability, there was no random sampling and only forms that were immediately available to the agency were reviewed. The majority of these forms did not address the prehospital phase of EMS care. In fact, only fifteen of the sixty forms analyzed were related to prehospital care. A tabulation was made to determine how many times in each of the sixty forms various data items were included and expressed in a particular terminology. Several hundred discrete data elements were noted on the sixty forms but no single data element appeared on all sixty. The agency noted that the most common element was patient name, but several forms omitted even this basic element.

The agency developed a preliminary list of data elements for the MDS. A data element was considered important if it met all of the following criteria: "(1) it had significant value for planning, controlling, or evaluating an EMS system; (2) it already was collected by a high percentage of existing EMS recordkeeping systems, or it could be collected readily without imposing an excessive burden on EMS operational or clerical personnel; and (3) it was capable of being expressed in objective terms." On the other hand, a candidate data element was *rejected* if it met either of the following criteria: "(1) it was highly dependent on subjective judgment; or (2) it could not be expressed either as (a) a numeric value, or range of numeric values, (b) an item from a set of discrete items; (c) the presence or absence of a specific condition or activity; or (d) a universally understood identifying label for a person, place, or physical resource."

In order to achieve the objectives noted, the project team then developed a list of measures that should be available for managing and evaluating EMS performance. "For each such measure, the project team identified data elements which would be needed to construct the measure and also would meet the criteria described." Initially, the project team concluded that 23 data elements would satisfy the most important requirements of EMS system management and evaluation, of which 14 would be collected normally by the communications and transportation components of the system and nine would be collected normally in the emergency department. Another 14 data elements were identified as highly desirable but not essential, of which eight were related to communications and transportation and six to emergency department function.

Fourth, the tentative EMS-MDS was critiqued during four site visits and a seminar. Input was obtained from the University Association for Emergency Medicine (now the Society for Academic Emergency Medicine) and the American College of Emergency Physicians.

Fifth, the tentative MDS was modified and refined and a draft EMS record keeping system handbook was prepared. At the time, there were 17 data elements relating to transportation and communication. Subsequent analysis and input led to the addition of three more items. The full MDS list is in Table 1. These items never were field tested formally. However, it is likely that EMS systems that were aware of the development of the MDS incorporated these items into their EMS forms.

Discussion

The EMS report form has many applications. The form does more than identify the patient and document the treatment used. The form provides the mechanism for analyzing EMS system performance. Supervising physicians and EMS administrators from different systems will have different concerns and perspectives. Hence, different data items for the different data forms will be needed to address various performance issues. Nonetheless, comparison of systems requires some uniformity in data item collection and definition.

Although comprehensive EMS data sets have been developed which include many report form items and address a multitude of EMS system needs,[4,5] the basic process of outcome guided item selection remains relevant today. The limited on-line investigation of the data sets or specific items currently in use remains a concern. Scholarly examination of the application of data items and other aspects of data collection presents a fertile area for EMS research.

Areas needing investigation include the accuracy of data recording and frequency of data item use. For example, how accurately are data items recorded that have been recently introduced, such as trauma scores or other physiologic indices? Do some data items appear on the report forms of many systems, but seldom are used? What is the inter-observer variability for each of these factors?

Similarly, we need to review how data items correlate with the outcomes we are seeking to modify. For example, do scene times affect outcome? Such a process requires that we carefully define the outcome that we wish to correlate with our data items. Do we wish to see happier patients, patients with better physiologic indices upon hospital arrival, more surviving patients, shorter hospital stays, or more patients released home from the emergency department as a result of aggressive prehospital care? Clear patient outcome measures are needed for monitoring care and establishing correlations with report form data items.

Some data set items may serve as a barometer of prehospital care in the community. For example, an increase in the number of cardiac arrest patients with asystole (or very fine ventricular fibrillation) may suggest that the system response times have slowed. This concern can be addressed by examining response times for basic and advanced life support teams. Hence, the interrelationship of data items is an important area in need of further investigation.

The process of data collection as affected by patient care demands, time availability, and report form factors (e.g., number of items and form layout), should be evaluated from a user perspective. Study of the psychometrics of report form completion is needed. The role of new report form technology requires investigation as well. Do optical scan forms improve the quality or quantity of data obtained? How might records be entered directly into computers and how will data collection, transferral, analysis, and confidentiality be affected by direct computer use?

Conclusions

As financial issues increase in importance and emergency medical services (EMS) systems are required to provide better documentation of the services provided and their efficacy in providing care, the EMS report form will be expected to provide these data. Current data items and handwritten multicopy report forms should not be considered sufficient. Emergency medical services administrators, supervising physicians, and care providers need systematically to review the use of their current EMS report form and technique of data collection and storage. While the process outlined in this paper records a bench mark approach

to data set development, future efforts will require a combination of consensus development, outcome measure guided data item selection, on-line validation of data item accuracy and recordability, psychometric analysis of the process of form completion, and incorporation of new technology.

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