EMS RESEARCH

"The future of EMS is indelibly linked to the future of EMS research. This reality provides EMS with its greatest opportunities, its greatest risks, and its greatest single need to depart from the ways of the past. EMS must grasp this quickly closing window of opportunity." Daniel W. Spaite, MD

Research involves pursuit of the truth. In EMS, its purpose is to determine the efficacy, effectiveness, and efficiency of emergency medical care. Ultimately, it is an effort to improve care and allocation of resources.

The future: A new pharmacologic agent becomes available and might potentially decrease the morbidity of stroke. Theoretically, the sooner the medication is administered after symptom on-set, the more effective it is likely to be. However, it is expensive and has accompanying risks. Therefore, a multi-EMS system study is funded by the National Institutes of Health (NIH). Over the course of two years, information is collected from the participating EMS systems about control patients and those who were treated with the new medication in the field. The information includes out-of-facility EMS data that is linked with hospital and rehabilitation data. Subsequently, the cost-effectiveness and risks of administering the medication in the field are determined and EMS practices are adjusted accordingly.

WHERE WE ARE

EMS has evolved rapidly over the past 30 years despite slow progress in developing EMS-related research. System changes frequently prompt research efforts to prove they make a difference, instead of the more appropriate sequence of using research findings as a basis for EMS improvements.

Most of what is known about EMS has been generated by researchers at a small number of medical schools, generally in midsized cities, that have ongoing relationships with municipal EMS systems. The volume of EMS research is low and the quality often pales in comparison with other medical research.

Most published EMS research is component-based, focusing on a single intervention or health problem, and rarely addressing the inherent complexities of EMS systems.[119] With few exceptions, there has been little emphasis on systems analysis. Development of the "chain of survival" concept for cardiac emergencies provides the best evidence of completed systems research.[22,94] Trauma-related research comprises the only other EMS research emphasis.[119] However, study methods have not been as extensively developed, and experimental designs often limit abilities to compare studies and reach meaningful conclusions.[65] Other clinical conditions have not been scientifically studied with a systems approach. Component-based analyses often lead to conclusions that are incorrect, or at least cannot be supported, when they are considered in the context of the entire EMS system.[119,120] Thus, in many cases, our poor understanding of systems research models has led to the development of wrong assumptions with regard to EMS care.

Currently there are five major impediments to the development of quality EMS research:

- inadequate funding
- lack of integrated information systems that provide for meaningful linkage with patient out-comes
- paucity of academic research institutions with long-term commitments to EMS systems research
- overly restrictive informed consent interpretations
- lack of education and appreciation by EMS personnel regarding the importance of EMS research.

Without dramatic progress on these five fronts, there will not be a significant increase in the quantity of well-done, meaningful EMS research.

Significant barriers to collecting relevant, meaningful, and accurate EMS data exist.[120] EMS data often are not collected in a rigorous fashion that allows academic

evaluation. Linkage with hospital and other data sets, which is required to determine EMS effectiveness, is difficult and infrequently accomplished.

A national agenda for EMS-related research does not exist, and there is no central source for EMS research funding. The EMS-C program has invested in system development and research affecting not only pediatric issues, but all of EMS.[39] Other federal agencies, including the Health Resources Services Administration, Agency for Health Care Policy and Research, and NHTSA have also sponsored EMS-related investigations. Additional support often is sought from private and corporate interests. However, funding frequently is directed only toward component-based studies. Overall, financial support for EMS-related research is inadequate to address the many systems issues requiring study.

Overly restrictive informed consent interpretations create additional barriers to conducting EMS research. They do not consider the clinical and environmental circumstances of field EMS investigations, and impede institutional review board approval of meaningful resuscitation research and other field trials.

EMS education curricula do not include adequate research-related objectives. Thus, very few EMS personnel, including system administrators and managers, have a sufficient baseline understanding and appreciation of the critical role of EMS research. Unlike most other clinical fields, EMS research often is conducted without significant participation by its own practitioners, relying instead on others.

The rationale for many routine EMS interventions is based on in-hospital studies, and not on scientific investigation of their out-of-hospital effectiveness. The effectiveness of most EMS interventions and of EMS systems, in general, has not been well established with outcome criteria.35 Furthermore, the outcome criterion most studied is death, which, although important, is not pertinent to most EMS clinical situations.[35,45]

WHERE WE WANT TO BE

The essential nature of quality EMS research is recognized. A sufficient volume of quality research is undertaken to determine the effectiveness of EMS system design and specific interventions.

EMS evolves with a scientific basis. Adequate investigations of EMS interventions/treatments and system designs occur before they are advocated as EMS standards. The efficacy, effectiveness and cost-effectiveness of such interventions and system designs are determined. This includes the identification of patients who are appropriate for transport, and evaluation of the effects of alternative dispositions for patients when they are not transported to health care facilities.

As much as possible, EMS research employs systems analysis models. These models use multidisciplinary approaches to answer complex questions. They consider many issues that impact a system to help ensure that findings are accurate within the context of multifaceted EMS systems.

The National Institutes of Health (NIH) are committed to EMS-related research. NIH participates in setting a national agenda and provides EMS-related research funding.

Integrated information systems provide linkages between EMS and other public safety services and health care providers. They facilitate the data collection necessary to determine EMS effectiveness.

Several academic centers have long-term commitments to EMS research. They serve as a nucleus of activity that involves many EMS systems with different characteristics and all personnel levels, including field providers, managers, administrators, nurses, and physicians.

Informed consent rules account for the clinical and environmental circumstances of EMS research. They enable credible resuscitation and other out-of-facility investigations to be conducted.

EMS personnel of all levels and credentials appreciate the role of EMS research in terms of creating a scientific basis for EMS patient care. All individuals with some responsibility for EMS structure, process, and/or outcomes are involved, to some extent, with EMS research.

EMS research examines multiple outcome criteria. Thus, it is pertinent to most EMS clinical situations, which do not involve a likelihood of death.

HOW TO GET THERE

Public and private organizations responsible for EMS structures, processes, and/or outcomes must collaborate to establish a national EMS research agenda. They should determine general research goals and assist with development of research funding sources.

The major impediments to EMS research must be addressed:

- Federal and state policy makers must allocate funds for a major EMS systems research thrust. This should include involvement of the NIH in setting a national EMS research agenda and providing research funding.
- Integrated information systems must be developed to provide linkage between EMS and various public safety services and other health care providers to facilitate the data collection that is necessary to determine EMS effectiveness.
- Academic institutions and medical schools must consider making long- term commitments to EMS-related research. They should support EMS-interested faculty members, collaborate with EMS systems, and involve EMS personnel of all levels in conducting credible systems research.
- The Department of Health and Human Services and the Food and Drug Administration must continue to revise their interpretations of informed consent rules so that they enable credible resuscitation and other out-of-facility research to be conducted. Informed consent interpretations should account for the clinical and environmental circumstances inherent in conducting EMS research.
- All individuals with some responsibility for EMS structures, processes, and outcomes must be involved in and/or support quality EMS systems research. They must recognize the need for quality information that demonstrates the effects of EMS for the patient population served, and provides the scientific basis for EMS patient care.

EMS must be designated as a subspecialty for physicians and other health professionals. The development of well-trained EMS researchers must be an integral component of the EMS subspecialty, just as it is in other subspecialties. Those with sub-specialty credentials should be integrally involved in advancing the knowledge base of EMS.

EMS field providers and managers, as part of their routine education, must learn the importance and principles of conducting EMS-related systems research. The objectives need not be to develop EMS researchers, but to help personnel understand the research that is being conducted and enable them to participate and be supportive.

EMS researchers must enhance the quality of published research. Study methods should employ systems analysis methods and meaningful outcome criteria, and determine cost-effectiveness. Research meetings should include forums to educate those wanting to improve their research skills.

EMS systems, medical schools, other academic institutions, and private foundations must develop collaborative relationships. Such relationships should facilitate implementation of significant EMS research projects required to determine, among other things, efficacy, effectiveness and cost-effectiveness.

State EMS lead agencies must evolve from being primarily regulatory to providing technical assistance. They should be involved in promoting public health services research, and facilitating the development of relationships and resources necessary for such studies.

EMS RESEARCH:

- Allocate federal and state funds for a major EMS systems research thrust
- Develop information systems that provide linkage between various public safety services and other health care providers
- Develop academic institutional commitments to EMS-related research
- Interpret informed consent rules to allow for the clinical and environmental circumstances inherent in conducting credible EMS research
- Develop involvement and/or support of EMS research by all those responsible for EMS structure, processes, and/or outcomes.
- Designate EMS as a physician subspecialty, and a subspecialty for other health professions
- Include research related objectives in the education process providers and managers
- Enhance the quality of published EMS research
- Develop collaborative relationships between EMS systems, medical schools, other academic institutions, and private foundations