

Future of Emergency Care Series

Emergency Medical Services At the Crossroads

Committee on the Future of Emergency Care in the United States Health System

Board on Health Care Services



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Summary

Emergency medical services (EMS) are a critical component of the nation's emergency and trauma care system. Hundreds of thousands of EMS personnel provide more than 16 million medical transports each year. These personnel deal with an extraordinary range of conditions and severity on daily basis from mild fevers to massive head traumas. The work they do is challenging, stressful, at times dangerous, and often highly rewarding. EMS encompasses the initial stages of the emergency care continuum. It includes emergency calls to 9-1-1; dispatch of emergency personnel to the scene of an illness or trauma; and triage, treatment, and transport of patients by ambulance and air medical service. The speed and quality of EMS services are critical factors in a patient's ultimate outcome. For patients who cannot breathe, are in hemorrhagic shock, or are in cardiac arrest, the decisions made and actions taken by EMS personnel may determine the outcome as much as the subsequent hospital-based care and may mean the difference between life and death.

THE DEVELOPMENT OF THE EMS SYSTEM

The modern EMS system in the United States developed only within the past 50 years, yet its progress has been dramatic. In the 1950s, EMS provided little more than first aid and it was not uncommon for the local ambulance service to be comprised of a mortician and a hearse. In the late 1950s, researchers demonstrated the effectiveness of mouth-to-mouth ventilation and in 1960 cardiopulmonary resuscitation (CPR) was shown to be effective in restoring breathing and circulation. These clinical advances led to the realization that rapid response of trained community members to emergency situations could significantly improve patient outcomes. Over time, local communities began to develop more sophisticated EMS capacity, although there was significant variation nationwide. Increased recognition of the importance of EMS in the 1970s led to strong federal leadership and funding that resulted in considerable advances, including the nationwide adoption of the 9-1-1 system, the development of a professional corps of emergency medical technicians (EMTs), and the establishment of more organized local EMS systems.

Federal funding for EMS, however, declined abruptly in the early 1980s. Since then, the push to develop more organized systems of EMS service delivery has diminished and EMS systems have been left to develop haphazardly across the United States. There is now enormous variability in the design of EMS systems across states and local areas. Nearly half of these systems are fire-based, meaning that EMS care is organized and delivered through the local fire department. Other systems are operated by municipal or county governments, or may be delivered by private companies, including for-profit ambulance providers and hospital-based systems. Adding to this diversity, there are more than 6,000 9-1-1 call centers across the country, each run differently by police, fire, county or city government, or other entities.

Given the wide variation in EMS system models, there is broad speculation about which systems perform best and why. However, there is little evidence to support alternative models. For the most part, systems are left to their own devices to develop the arrangement that appears to work best for them.

Fire-based systems across the United States are in transition. The number of fires is decreasing while the number of EMS calls is increasing, raising questions about system design and resource allocation. An estimated 80 percent of fire service calls are now EMS related. While there is little evidence to guide localities in designing their EMS systems, there is even less information on how well any system performs and how to measure that performance.

A key objective of any EMS system is to ensure that each patient is directed to the most appropriate setting based on his or her condition. Coordination of the regional flow of patients is an essential tool in ensuring the quality of prehospital care, and also plays an important role in addressing system wide issues related to hospital and trauma center crowding. Regional coordination requires that many elements within the regional system—community hospitals, trauma centers, and particularly prehospital EMS—work together effectively to achieve this common goal. Yet only a handful of systems around the country coordinate transport effectively. There is often very little information sharing between hospitals and EMS regarding emergency and trauma center patient loads or the availability of emergency department (ED) beds, operating suites, equipment, trauma surgeons, and critical specialists—information that could be used to balance the patient load among EDs and trauma centers in a region. The benefits of better regional coordination of patients have been demonstrated, and the technologies needed to facilitate such approaches currently exist.

Strengths of the Current System

EMS care has made important advances in recent years. Emergency 9-1-1 services now link virtually all ill and injured Americans to immediate medical response; through organized trauma systems, patients are transported to advanced, life-saving care within minutes; and advances in resuscitation and life-saving procedures yield outcomes unheard of a decade ago. Automatic crash notification technology, while still nascent, allows for immediate emergency notification of crashes in which vehicle air bags have deployed. And medical equipment, including air ambulance service, has extended the care available to emergency patients, for example, by bringing rural residents within closer range of emergency and trauma care facilities.

Systemic Problems

Despite the advances made in EMS, sizable challenges remain. At the federal policy level, government leadership in emergency care is fragmented and inconsistent. As it is currently organized, responsibility for prehospital and hospital-based emergency and trauma care is scattered across multiple agencies and departments. Similar divisions are evident at the state and local levels. In addition, the current delivery system suffers in a number of key areas:

- **Insufficient coordination**-EMS care is highly fragmented, and often there is poor coordination among providers. Multiple EMS agencies-some volunteer, some paid, some fire-based, others hospital or privately operated-frequently serve within a single population center and do not act cohesively. Agencies in adjacent jurisdictions often are unable to communicate with each other. In many cases, EMS and other public safety agencies cannot talk to one another because they operate with incompatible communications equipment or on different frequencies. Coordination of transport within regions is limited, with the result that the management of the regional flow of patients is poor and patients may not be transported to facilities that are optimal and ready to receive them. Communications and hand-offs between EMS and hospital personnel are frequently ineffective and omit important clinical information.
- **Disparities in response times**-The speed with which ambulances respond to emergency calls is highly variable. In some cases this variability has to do with geography. In dense population centers, for example, the distances ambulances must travel are small, but traffic and other problems can cause delays, while rural areas involve longer travel times and sometimes difficult terrain. Determining the most effective geographic deployment of limited resources is an intrinsic problem in EMS. But speed of response is also affected by the organization and management of EMS services, the communications and coordination between 9-1-1 dispatch and EMS responders, and the priority placed on response time given the resources available.
- **Uncertain quality of care**-Very little is known about the quality of care delivered by EMS services. The reason for this lack of knowledge is that there are no nationally agreed-upon measures of EMS quality, no nationwide standards for the training and certification of EMS personnel, no accreditation of institutions that educate EMS personnel, and virtually no accountability for the performance of EMS systems. While most Americans assume that their communities are served by competent EMS services, the public has no idea whether this is true, and no way to know.
- **Lack of readiness for disasters**-Although EMS personnel are among the first to respond in the event of a disaster, they are the least prepared component of community response teams. Most EMS personnel have received little or no

disaster response training for terrorist attacks, natural disasters, or other public health emergencies. Despite the massive amounts of federal funding directed to homeland security, only a tiny proportion of those funds has been directed to medical response. Furthermore, EMS representation in disaster planning at the federal level has been highly limited.

- **Divided professional identity**-EMS is a unique profession, one that straddles both medical care and public safety. Among public safety agencies, however, EMS is often regarded as a secondary service, with police and fire taking more prominent roles; within medicine, EMS personnel often lack the respect afforded to other professionals, such as physicians and nurses. Despite significant investments in education and training, salaries for EMS personnel are often well below those for comparable positions, such as policemen, firefighters, and nurses. In addition, there is a cultural divide among EMS, public safety, and medical care workers that contributes to the fragmentation of these services.
- **Limited evidence base**-The evidence base for many practices routinely used in EMS is limited. Strategies for EMS have often been adapted from settings that differ substantially from the prehospital environment and, consequently, their value in the field is questionable, and some may even be harmful. For example, field intubation of children, still widely practiced, has been found to do more harm than good in many situations. While some recent research has added to the EMS evidence base, a host of critical clinical questions remain unanswered because of limited federal research support, as well as inherent difficulties associated with prehospital research due to its sporadic nature and the difficulty of obtaining informed consent for the research.

The committee addresses these problems through a series of recommendations that encompass a wide range of strategic and operational issues, from workforce training to additional investment in research to the development of national standards for EMS system performance.

Committee Charge

The Committee on the Future of Emergency Care in the U.S. Health System was formed in September 2003 to examine the emergency care system in the United States; explore its strengths, limitations, and future challenges; describe a desired vision of the system; and recommend strategies for achieving that vision. The committee was also tasked with taking a focused look at the state of hospital-based emergency care, prehospital emergency care, and pediatric emergency care. This report, one of a series of three, is focused on the committee's findings and recommendations with respect to prehospital EMS.

THE VISION OF A 21ST CENTURY EMERGENCY CARE SYSTEM

While today's emergency care system offers significantly more medical capability than was available in years past, it continues to suffer from severe fragmentation, an absence of system wide coordination and planning, and a lack of accountability. To overcome these challenges and chart a new direction for emergency care, the committee envisions a system in which all communities will be served by well planned and highly coordinated emergency care services that are accountable for their performance.

In this new system, dispatchers, EMS personnel, medical providers, public safety officers, and public health officials will be fully interconnected and united in an effort to ensure that each patient receives the most appropriate care, at the optimal location, with the minimum delay. From the patient's point of view, delivery of services for every type of emergency will be seamless. The delivery of all services will be evidence-based, and innovations will be rapidly adopted and adapted to each community's needs. Ambulance diversions—instances where crowded hospitals essentially close their doors to new ambulance patients—will never occur, except in the most extreme situations. Standby capacity appropriate to each community based on its disaster risks will be embedded in the system. The performance of the system will be transparent, and the public will be actively engaged in its operation through prevention, bystander training, and monitoring of system performance.

While these objectives involve substantial, system wide change, they are achievable. Early progress toward the goal of more integrated, coordinated, regionalized emergency care systems has become derailed over the last 25 years. Efforts have stalled because of deeply entrenched political interests and cultural attitudes, as well as funding cutbacks and practical impediments to change. These obstacles remain today, and they represent the primary challenges to achieving the committee's vision. However, the problems are becoming more apparent, and this provides a catalyst for change. The committee calls for concerted, cooperative efforts at multiple levels of government and the private sector to finally break through and achieve the goals outlined above. Presented below are the committee's findings and recommendations for achieving its vision of a 21st century emergency care system.

Federal Lead Agency

Responsibility for all aspects of emergency care is currently dispersed among many federal agencies within the Department of Health and Human Services, Department of Transportation, and Department of Homeland Security. This situation reflects the unique history and the inherent nature of emergency care. As described above, unlike other sectors of the medical provider

community, EMS has one foot planted firmly in the public safety community, along with police, fire and emergency management. In addition, the early development of the modern EMS system grew out of concerns regarding the epidemic of highway deaths in the 1960s. Thus, while EMS is a medical discipline, the National Highway Traffic Safety Administration became its first federal home, and it has remained the informal lead agency for EMS ever since. The need for a formal lead agency has been promoted for years, and was highlighted in the 1996 report *EMS Agenda for the Future*. In 2005 the Emergency Medical Services Support Act gave statutory authority to an informal planning group, the Federal Interagency Committee on EMS (FICEMS). While this group holds promise for improving coordination across federal emergency care agencies, the IOM committee sees FICEMS as a valuable complement to a lead agency, but not a substitute for it, as some have suggested.

The committee believes that a true lead federal agency is required if its vision of a coordinated, regionalized, and accountable emergency care system is to be fully realized. It therefore recommends that **Congress establish a lead agency for emergency and trauma care within 2 years of the publication of this report. This lead agency should be housed in the Department of Health and Human Services, and should have primary programmatic responsibility for the full continuum of EMS, emergency and trauma care for adults and children, including medical 9-1-1 and emergency medical dispatch, prehospital EMS (both ground and air), hospital-based emergency and trauma care, and medical-related disaster preparedness. Congress should establish a working group to make recommendations regarding the structure, funding, and responsibilities of the new agency, and develop and monitor the transition. The working group should have representation from federal and state agencies and professional disciplines involved in emergency and trauma care.**

This lead agency would be designed to create a large, combined federal presence to increase the visibility of emergency and trauma care within the government and to the public; coordinate programs to eliminate overlaps and gaps in funding; create unified accountability for the performance of the emergency care system; and bring together multiple professional groups and cultures for interaction and collaboration that would model and reinforce the integration of services envisioned by the committee. As an established planning group with representation from the appropriate agencies, FICEMS can act as a credible forum for monitoring and advising the working group during the transition.

System Finance

While the lead agency will help to rationalize the federal grant payments allocated to the emergency care system, these grants make up a small share of total payments to EMS providers. Payments for EMS are primarily made through public and private insurance reimbursements and local subsidies. A large percentage of EMS transports are for elderly patients, making Medicare a particularly important payor.

EMS costs include the direct costs of each emergency response, as well as the readiness costs associated with maintaining the capability to respond quickly, 24-hours a day, 7-days a week costs that are not adequately reimbursed by Medicare. In addition, by paying only when a patient is transported, Medicare limits the flexibility of EMS in providing the most appropriate care for each patient. The committee recommends that **the Centers for Medicare and Medicaid Services convene an ad hoc work group with expertise in emergency care, trauma, and EMS systems to evaluate the reimbursement of EMS and make recommendations regarding inclusion of readiness costs and permitting payment without transport.**

Regionalization

Because not all hospitals within a community have the personnel and resources to support the delivery of high-level emergency care, critically ill and injured patients should be directed specifically to facilities that have such capabilities. That is the goal of regionalization. There is substantial evidence that regionalization of services to direct patients to designated hospitals with greater experience and resources improves outcomes and reduces costs across a range of high-risk conditions and procedures. Thus the committee supports further regionalization of emergency care services. However, use of this approach requires that prehospital providers, as well as patients and caregivers, be clear on which facilities have the necessary resources. Just as trauma centers are categorized according to their capabilities (i.e., level I-level IV/V), a standard national approach to the categorization of EDs that reflects their capabilities is needed so that the categories will be clearly understood by providers and the public across all states and regions of the country. To that end, the committee recommends that **the Department of Health and Human Services and National Highway Traffic Safety Administration, in partnership with professional organizations, convene a panel of individuals with multidisciplinary expertise to develop an evidence-based categorization system for EMS, EDs, and trauma centers based on adult and pediatric service capabilities.**

This information, in turn, could be used to develop protocols that would guide EMS personnel in the transport of patients. More research and discussion is needed, however, to determine under what circumstances patients should be

brought to the closest hospital for stabilization and transfer as opposed to being transported directly to the highest level of care, even if that facility is farther away. Therefore, the committee also recommends that **the National Highway Traffic Safety Administration, in partnership with professional organizations, convene a panel of individuals with multidisciplinary expertise to develop evidence-based model prehospital care protocols for the treatment, triage, and transport of patients.** The transport protocols should also reflect the state of readiness of facilities within a region at a given point in time, including real-time, concurrent information on the availability of hospital resources and specialty care.

National Standards for Training and Credentialing

The education and training requirements for the EMTs and paramedics are substantially different from one state to the next and consequently, not all EMS personnel are equally prepared. For example, while the National Standard Curricula developed by the federal government calls for paramedics to receive 1,000-1,200 hours of didactic training, states vary in their requirements from as little as 270 hours to as much as 2,000 hours in the classroom. In addition, the range of responsibilities afforded to EMTs and paramedics, known as their scope of practice, varies significantly across the states. National efforts to promote greater uniformity have been progressing in recent years, but significant variation remains.

The National EMS Scope of Practice Model Task Force has created a national model to aid states in developing and refining their scope-of-practice parameters and licensure requirements for EMS personnel. The committee supports this effort and recommends that **state governments adopt a common scope of practice for EMS personnel, with state licensing reciprocity.** In addition, to support greater professionalism and consistency among and between the states, the committee recommends that **states accept national certification as a prerequisite for state licensure and local credentialing of EMS providers.** Further, to improve EMS education nationally, the committee recommends that **states require national accreditation of paramedic education programs.** The federal government should provide technical assistance and possibly financial support to state governments to help with this transition.

Medical Direction

In addition, substantial variation exists nationwide in how medical oversight and review are conducted; in many localities, physicians with little or no training and experience in out-of-hospital medical care provide this service. The committee

believes that physicians who provide medical direction for EMS systems should meet standardized minimum requirements for training and certification that are reflective of their responsibilities. The specialty of emergency medicine currently offers 1- and 2-year fellowships in EMS to residency-trained emergency physicians, but there is no recognized subspecialty of EMS. Therefore, the committee recommends that **the American Board of Emergency Medicine create a subspecialty certification in EMS.**

Coordination

Coordination among 9-1-1 dispatch, prehospital EMS, air medical providers, and hospital and trauma centers is frequently lacking. EMS personnel arriving at the scene of an incident often do not know what to expect regarding the number of injured or their condition. EMS personnel are frequently unaware which hospital EDs are on diversion and which are ready to receive the type of patient they are transporting. In addition, deployment of air medical services is often not well coordinated. While air medical providers are not permitted to self-dispatch, a lack of coordination at the ground EMS and dispatch level sometimes results in multiple air ambulances arriving at the scene of a crash even when all are not needed. Similarly, police, fire, and EMS personnel and equipment often overcrowd a crash scene because of insufficient coordination regarding the appropriate response.

Many of these problems are magnified in cases where incidents cross jurisdictional lines. Significant problems are often encountered near municipal, county and state border areas. In cases where a street delineates the boundary between two municipal or county jurisdictions, responsibility for care—as well as the protocols and procedures employed—may depend on which side of the street the incident occurred. Dispatch, EMS, ED and trauma care providers, public safety, and public health should be fully interconnected and united in an effort to ensure that each patient receives the most appropriate care, at the optimal location, with the minimum delay.

Communications and Data Systems

Communication between EMS and other health care and public safety providers is still very limited, however. Antiquated and incompatible voice communication systems often result in a lack of coordination among emergency personnel as they respond to incidents. Many EMS systems rely on voice communication equipment that was purchased in the 1970s with federal financial assistance and has never been upgraded. Similarly, the technologies that enable direct transmission of clinical information to hospitals prior to the arrival of an ambulance have not been uniformly adopted. Consequently, there is a growing

gap between the types of EMS data and information systems that are available and those that are commonly used in the field.

These problems are compounded by the significant variation in EMS operational structures at the local and regional levels. EMS agencies may be operated by local governments, fire departments, private companies, or through other arrangements. This makes communications and data integration difficult, even among EMS providers within a given local area. Communications among EMS, public safety, public health, and other hospital providers is even more problematic given the technical challenges associated with developing interoperable networks. As a result of these challenges and the need for improved coordination, the committee recommends that **hospitals, trauma centers, EMS agencies, public safety departments, emergency management offices, and public health agencies develop integrated and interoperable communications and data systems.**

In addition, as the development of a National Health Information Infrastructure (NHII) moves forward in the United States, representatives of prehospital emergency care should be involved at every level. The initial focus of this effort centered on hospitals, ambulatory care providers, pharmacies, and other, more visible components of the health care system. However, given the role played by prehospital EMS providers in providing essential, and often lifesaving treatment to patients, this has been a significant oversight. Therefore, the committee recommends that **the Department of Health and Human Services fully involve prehospital EMS leadership in discussions about the design, deployment, and financing of the National Health Information Infrastructure.**

Air Medical Services

The number of air medical providers has grown substantially since their inception in the 1970s. Today there are an estimated 650,700 medical helicopters operating in the United States, up from approximately 230 in 1990. These air ambulance operations have served thousands of critically ill or injured persons over the past several decades. However, questions remain regarding the clinical efficacy and appropriateness of sophisticated air ambulance care, as well as its cost-effectiveness, given that the cost can be more than five times greater than that of ground ambulance service. In addition, in recent years there have been a significant increase in fatal crashes involving air ambulances, resulting in heightened safety concerns. While the Federal Aviation Administration is responsible for safety inspections, helicopter licensure, and air traffic control, the committee recommends that **states assume regulatory oversight of the medical aspects of air medical services, including communications, dispatch, and transport protocols.**

Accountability

Accountability has failed to take hold in emergency care to date because responsibility is dispersed across many different components of the system, so it is difficult even for policy makers to determine where system breakdowns occur and how they can subsequently be addressed. To build accountability into the system, the committee recommends that **the Department of Health and Human Services convene a panel of individuals with emergency and trauma care expertise to develop evidence-based indicators of emergency care system performance.** Because of the need for an independent, national process that involves broad participation of every component of emergency care, the federal government should play a lead role in promoting and funding the development of these performance indicators. The indicators developed should include structure and process measures, but evolve toward outcome measures over time. These performance measures should be nationally standardized so that statewide and national comparisons can be made. Measures should evaluate the performance of individual components of the system, as well as the performance of the system as a whole. Measures should also be sensitive to the interdependence of these components. For example, EMS response times may be related to EDs going on diversion.

Using the measures developed through such a national, evidence-based, multidisciplinary effort, performance data should be collected at regular intervals from all hospitals and EMS agencies in a community. Public dissemination of performance data is crucial to driving the needed changes in the delivery of emergency care services. Because of the potential sensitivity of performance data, they should initially be reported in the aggregate rather than at the level of individual provider agencies. However, individual agencies should have full access to their own data so they can understand and improve their performance, as well as their contribution to the overall system.

Disaster Preparedness

Promoting an emergency and trauma care system that works well on a day-to-day basis is fundamental to establishing a system that will work well in the event of a disaster. But the frequency of ambulance diversions and extended off-load times for ambulance patients provides an indication that the current system is not well prepared. Moreover, EMS and trauma systems have to a large extent been overlooked in disaster preparedness planning at both the state and federal levels. Although they represent a third of the nation's first responders, EMS providers received only 4 percent of the \$3.38 billion distributed by the Department of Homeland Security for emergency preparedness in 2002 and 2003, and only 5 percent of the Bioterrorism Hospital Preparedness Grant, administered by the Department of Health and Human Services. The committee

recommends that **the Department of Health and Human Services, the Department of Transportation, the Department of Homeland Security, and the states elevate emergency and trauma care to a position of parity with other public safety entities in disaster planning and operations.**

While significant federal funding is available to states and localities for disaster preparedness, emergency care in general has not been able to secure a meaningful share of these funds because they have been folded into other public safety functions which consider emergency medical care a low priority. To address the serious deficits in health-related disaster preparedness, **Congress should substantially increase funding for EMS-related disaster preparedness through dedicated funding streams.**

In addition, there must be a coordinated and well-funded national effort to ensure effective training in disaster preparedness that involves both professional and continuing education. The committee recommends that **the professional training, continuing education, and credentialing and certification programs of all the relevant EMS professional categories incorporate disaster preparedness training into their curricula and require the maintenance of competency in these skills.** Doing so would ensure that emergency personnel would remain current in needed disaster skills and would bolster preparedness efforts.

Research

The National Institutes of Health and other agencies that have supported emergency and trauma care research have devoted relatively small amounts of funding to prehospital EMS, and the funding that has been available has not been spent in a coordinated fashion. To address this issue, the committee recommends that **the Secretary of the Department of Health and Human Services conduct a study to examine the gaps and opportunities in emergency and trauma care research, and recommend a strategy for the optimal organization and funding of the research effort.** Moreover, to address the sizable gaps in the knowledge base supporting EMS, the committee recommends that **federal agencies that fund emergency and trauma care research target additional funding at prehospital EMS research, with an emphasis on systems and outcomes research.**

Achieving the Vision

In states and regions across the country, there is substantial variation among emergency and trauma care systems. These systems differ along a number of dimensions, such as the level of development of trauma systems, the effectiveness of state EMS offices and regional EMS councils, and the degree of

coordination between fire, EMS, hospitals, trauma centers, and emergency management. As a result of this variation, there is no “one size fits all” solution to enhancing emergency care systems that will achieve the goals outlined above.

Instead, a number of different avenues should be explored and evaluated to determine what types of systems are best able to achieve these goals. The committee therefore recommends that **Congress establish a demonstration program, administered by the Health Resources and Services Administration, to promote regionalized, coordinated, and accountable emergency care systems throughout the country, and appropriate \$88 million over 5 years to this program.** Grants should be targeted at states, which could develop projects at the state, regional, or local level; cross-state collaborative proposals would also be encouraged. Over time, and over a number of controlled initiatives, such a process should lead to important insights about what strategies work under different conditions. These insights would provide best-practice models that could be widely adopted to advance the nation toward the committee’s vision for efficient, high-quality emergency care.

EMS is now at a crossroads. In the forty years since the publication of the landmark National Academies report, *Accidental Death and Disability: The Neglected Disease of Modern Society*, much progress has been made in the improvement of the nation’s EMS capabilities. But in some important ways, the delivery of those services has declined. This report documents both strengths and limitations of the current prehospital EMS system. The committee’s overall conclusion, however, is that today the system is more fragmented than ever, and the lack of effective coordination and accountability stand in the way of further progress and improved quality of care. EMS has an opportunity to move toward a more integrated and accountable system through fundamental, systemic changes. Or it can continue on its current path and risk further entrenchment of the fragmentation that stands in the way of system improvement.