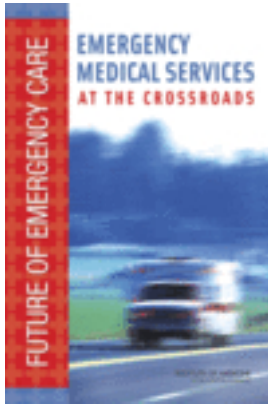


Free Executive Summary

Emergency Medical Services: At the Crossroads



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

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Emergency Medical Services (EMS) is a critical component of our nation's emergency and trauma care system, providing response and medical transport to millions of sick and injured Americans each year. At its best, EMS is a crucial link to survival in the chain of care, but within the last several years, complex problems facing the emergency care system have emerged. Press coverage has highlighted instances of slow EMS response times, ambulance diversions, trauma center closures, and ground and air medical crashes. This heightened public awareness of problems that have been building over time has underscored the need for a review of the U.S. emergency care system. Emergency Medical Services provides the first comprehensive study on this topic. This new book examines the operational structure of EMS by presenting an in-depth analysis of the current organization, delivery, and financing of these types of services and systems. By addressing its strengths, limitations, and future challenges this book draws upon a range of concerns:

- The evolving role of EMS as an integral component of the overall health care system.
- EMS system planning, preparedness, and coordination at the federal, state, and local levels.
- EMS funding and infrastructure investments.
- EMS workforce trends and professional education.
- EMS research priorities and funding.

Emergency Medical Services is one of three books in the Future of Emergency Care series. This book will be of particular interest to emergency care providers, professional organizations, and policy makers looking to address the deficiencies in emergency care systems.

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Summary

Emergency medical services (EMS) is 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 a 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 emergency medical 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.

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 comprise 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 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 among 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 systemwide 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, lifesaving care within minutes; and advances in resuscitation and lifesaving 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 handoffs 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 systems, 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. The reason for this lack of knowledge is that there are no nationally agreed-upon measures of EMS quality and virtually no accountability for the performance of EMS systems. While most Americans assume that their communities are served by competent EMS systems, 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 devoted 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 accorded 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 police officers, 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; 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.

CHARGE TO THE COMMITTEE

The Committee on the Future of Emergency Care in the United States Health System was formed by the Institute of Medicine (IOM) 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.

ACHIEVING 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 systemwide 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, systemwide 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 for emergency care has been promoted for years, and was highlighted in the 1996 report of the National Highway Traffic Safety Administration *Emergency Medical Services Agenda for the Future*. In 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) gave statutory authority to what had been 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 committee sees it as a valuable complement to but not a substitute for a lead agency, as some have suggested it should be.

The committee believes a true federal lead 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 release 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 emergency medical services and emergency and trauma care for adults and children, including medical 9-1-1 and emergency medical dispatch, prehospital emergency medical services (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 design and monitor the transition to its assumption of the responsibilities outlined above. The working group should include representatives from federal and state agencies and professional disciplines involved in emergency and trauma care (3.5).¹

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 could act as a credible forum for monitoring and advising the working group during the transition.

System Finance

While the proposed lead agency would help 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 made primarily through public and private insurance reimbursements and local subsidies. A large percentage of EMS transports are for elderly patients, making Medicare a particularly important payer.

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 working group with expertise in emergency care, trauma, and emergency medical services**

¹The committee's recommendations are numbered according to the chapter of the main report in which they appear. Thus, for example, recommendation 2.1 is the first recommendation in Chapter 2.

systems to evaluate the reimbursement of emergency medical services and make recommendations with regard to including readiness costs and permitting payment without transport (3.7).

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 the use of regionalization of services to direct such 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 the National Highway Traffic Safety Administration, in partnership with professional organizations, convene a panel of individuals with multidisciplinary expertise to develop evidence-based categorization systems for emergency medical services, emergency departments, and trauma centers based on adult and pediatric service capabilities (3.1).**

This information, in turn, could be used to develop protocols that would guide EMS personnel in the transport of patients. More research and discussion are 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 facility offering 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 (3.2).** These 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 EMTs and paramedics differ substantially 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 call 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. The range of responsibilities assigned to EMTs and paramedics, known as their scope of practice, varies significantly across the states as well. 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 emergency medical services personnel, with state licensing reciprocity (4.1)**. 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 emergency medical services providers (4.3)**. Further, to improve EMS education nationally, the committee recommends that **states require national accreditation of paramedic education programs (4.2)**. The federal government should provide technical assistance and possibly financial support to state governments to help with this transition.

Medical Direction

Substantial variation also exists nationwide in the way 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 reflect 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 emergency medical services (4.4)**.

Coordination

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. Yet coordination among 9-1-1 dispatch, prehospital EMS, air medical providers, and hospital and trauma centers is frequently lacking. Moreover, 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 often is 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 when 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 the side of the street on which the incident occurred.

Communications and Data Systems

Communication between EMS and other health care and public safety providers remains highly limited. 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, 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, by fire departments, by private companies, or through other arrangements. This makes communications and data integration difficult, even among EMS providers within a given local area. Communication 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 discussed above, the

committee recommends that **hospitals, trauma centers, emergency medical services agencies, public safety departments, emergency management offices, and public health agencies develop integrated and interoperable communications and data systems (5.2).**

In addition, as the development of a National Health Information Infrastructure moves forward in the United States, representatives of prehospital emergency care should be involved at every level. The initial focus of this effort was on hospitals, ambulatory care providers, pharmacies, and other, more visible components of the health care system. Given the role played by prehospital EMS providers in providing essential and often lifesaving treatment to patients, however, their omission from this initiative has been a significant oversight. Therefore, the committee recommends that **the Department of Health and Human Services fully involve prehospital emergency medical services leadership in discussions about the design, deployment, and financing of the National Health Information Infrastructure (5.3).**

Air Medical Services

The number of air medical providers has grown substantially since they first emerged 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 has 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 (5.1).**

Accountability

Accountability has failed to take hold in emergency care to date because responsibility for the services provided 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 (3.3).**

Because of the need for an independent, national process that involves the 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 among the various 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, the data 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 indicate that the current system is not well prepared for such events. 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 Bio-terrorism 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 (6.1).**

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 that consider emergency medical care a low priority. To address the serious deficits in health-related disaster preparedness, **Congress should substantially increase funding for emergency medical services–related disaster preparedness through dedicated funding streams (6.2).**

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 for all the relevant professional categories of emergency medical services personnel incorporate disaster preparedness into their curricula and require the maintenance of competency in these skills (6.3).** 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 made 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 (7.3).** 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 emergency medical services research, with an emphasis on systems and outcomes research (7.1).**

Achieving the Vision

As noted above, there is substantial variation among emergency and trauma care systems in states and regions across the country. Differences exist 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 among fire departments, EMS, hospitals, trauma centers, and emergency management. Thus no single approach to enhancing emergency care systems 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 coordinated, regionalized, and accountable emergency and trauma care systems throughout the country, and appropriate \$88 million over 5 years to this program (3.4). 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 40 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 improving the nation's EMS capabilities. But in some important ways, the quality of 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 stands in the way of further progress and improved quality of care. The opportunity now exists to move toward a more integrated and accountable EMS system through fundamental, systemic changes. Failing to seize this opportunity and continuing on the current path risks further entrenchment of the fragmentation that stands in the way of system improvement and higher-quality care.

FUTURE OF EMERGENCY CARE

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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The serpent has been a symbol of long life, healing, and knowledge among almost all cultures and religions since the beginning of recorded history. The serpent adopted as a logotype by the Institute of Medicine is a relief carving from ancient Greece, now held by the Staatliche Museen in Berlin.

*“Knowing is not enough; we must apply.
Willing is not enough; we must do.”*

—Goethe



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IN THE UNITED STATES HEALTH SYSTEM

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- BRENT R. ASPLIN**, Associate Professor of Emergency Medicine, University of Minnesota and Department Head, Regions Hospital Emergency Department, St. Paul
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- ROBERT C. GATES**, Project Director, Medical Services for Indigents, Health Care Agency, Santa Ana, California
- MARIANNE GAUSCHE-HILL**, Clinical Professor of Medicine and Director, Prehospital Care, Harbor-UCLA Medical Center, Torrance, California
- JOHN D. HALAMKA**, Chief Information Officer, Beth Israel Deaconess Medical Center, Boston, Massachusetts
- MARY M. JAGIM**, Internal Consultant for Emergency Preparedness Planning, MeritCare Health System, Fargo, North Dakota
- ARTHUR L. KELLERMANN**, Professor and Chair, Department of Emergency Medicine and Director, Center for Injury Control, Emory University School of Medicine, Atlanta, Georgia
- WILLIAM N. KELLEY**, Professor of Medicine, Biochemistry & Biophysics, University of Pennsylvania School of Medicine, Philadelphia

PETER M. LAYDE, Professor and Interim Director, Health Policy Institute and Co-Director, Injury Research Center, Medical College of Wisconsin, Milwaukee

EUGENE LITVAK, Professor of Health Care and Operations Management Director, Program for Management of Variability in Health Care Delivery, Boston University Health Policy Institute, Massachusetts

RICHARD A. ORR, Associate Director, Cardiac Intensive Care Unit, Medical Director, Children's Hospital Transport Team of Pittsburgh and Professor, University of Pittsburgh School of Medicine, Children's Hospital of Pittsburgh, Pennsylvania

JERRY L. OVERTON, Executive Director, Richmond Ambulance Authority, Virginia

JOHN E. PRESCOTT, Dean, West Virginia University School of Medicine, Morgantown

NELS D. SANDDAL, President, Critical Illness and Trauma Foundation, Bozeman, Montana

C. WILLIAM SCHWAB, Professor of Surgery, Chief, Division of Traumatology and Surgical Critical Care, Department of Surgery, University of Pennsylvania Medical Center, Philadelphia

MARK D. SMITH, President and CEO, California Healthcare Foundation, Oakland

DAVID N. SUNDWALL, Executive Director, Utah Department of Health, Salt Lake City

**SUBCOMMITTEE ON PREHOSPITAL
EMERGENCY MEDICAL SERVICES**

SHIRLEY GAMBLE (*Chair*), Chief Operating Officer, United Way Capital Area, Austin, Texas

ROBERT R. BASS, Immediate Past President, National Association of State EMS Officials and Executive Director, Maryland Institute for Emergency Medical Services Systems, Baltimore

KAYE BENDER, Dean, Professor, and Associate Vice Chancellor for Nursing, University of Mississippi Medical Center, Jackson

A. BRENT EASTMAN, Chief Medical Officer, N. Paul Whittier Chair of Trauma, ScrippsHealth, San Diego, California

HERBERT G. GARRISON, Professor of Emergency Medicine, East Carolina University, Greenville, North Carolina

ARTHUR L. KELLERMANN, Professor and Chair, Department of Emergency Medicine and Director, Center for Injury Control, Emory University School of Medicine, Atlanta, Georgia

MARY BETH MICHOS, Chief, Department of Fire and Rescue, Prince William County, Prince William, Virginia

FRED A. NEIS, Director, H*Works, The Advisory Board Company, Washington, District of Columbia

JERRY L. OVERTON, Executive Director, Richmond Ambulance Authority, Virginia

NELS D. SANDDAL, President, Critical Illness and Trauma Foundation, Bozeman, Montana

DANIEL W. SPAITE, Tenured Professor of Emergency Medicine, Department of Emergency Medicine, The University of Arizona College of Medicine, Tucson

Study Staff

ROBERT B. GIFFIN, Study Co-Director and Senior Program Officer

SHARI M. ERICKSON, Study Co-Director and Program Officer

MEGAN MCHUGH, Senior Program Officer

BENJAMIN WHEATLEY, Program Officer

ANISHA S. DHARSHI, Research Associate

SHEILA J. MADHANI, Program Officer

CANDACE TRENUM, Senior Program Assistant

Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

DENIS A. CORTESE, Mayo Clinic, Rochester, Minnesota

THEODORE R. DELBRIDGE, Department of Emergency Medicine,
Brody School of Medicine at East Carolina University, Greenville,
North Carolina

DIA GAINOR, Emergency Medical Services Bureau, Idaho Department of
Health and Welfare, Boise

RONALD MAIO, Department of Emergency Medicine and University of
Michigan Injury Research Center, University of Michigan, Ann Arbor

GREGG MARGOLIS, National Registry of Emergency Medical
Technicians, Columbus, Ohio

RICARDO MARTINEZ, The Schumacher Group, Kennesaw, Georgia

MURRAY N. ROSS, Health Policy Analysis and Research, Kaiser
Permanente Institute for Health Policy, Oakland, California

JOHN SACRA, Medical Control Board, Emergency Medical Services
Authority, Tulsa, Oklahoma
JAMES W. VARNUM, Mary Hitchcock Memorial Hospital and
Dartmouth-Hitchcock Alliance, Lebanon, New Hampshire

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by **Enriqueta C. Bond**, Burroughs Wellcome Fund, and **Fernando Guerra**, San Antonio Metropolitan Health District. Appointed by the National Research Council and Institute of Medicine, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Foreword

The state of emergency care affects every American. When illness or injury strikes, Americans count on the emergency care system to respond with timely and high-quality care. Yet today, the emergency and trauma care that Americans receive can fall short of what they expect and deserve.

Emergency care is a window on health care, revealing both what is right and what is wrong with the care delivery system. Americans increasingly rely on hospital emergency departments because of the skilled specialists and advanced technologies they offer. At the same time, the increasing use of the emergency care system represents failures of the larger health care system—the growing numbers of uninsured Americans, the limited alternatives available in many communities, and the inadequate preventive care and chronic care management received by many. The resulting demands on the system can degrade the quality of emergency care and hinder the ability to provide urgent and lifesaving care to seriously ill and injured patients wherever and whenever they need it.

The Committee on the Future of Emergency Care in the United States Health System, ably chaired by Gail Warden, set out 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's efforts build on past contributions of the National Academies, including the landmark National Research Council report *Accidental Death and Disability: The Neglected Disease of Modern Society* in 1966, *Injury in America: A Continuing Health Problem* in 1985, and *Emergency Medical Services for Children* in 1993.

The committee's task in the present study was to examine the full scope of emergency care, from 9-1-1 and medical dispatch to hospital-based emergency and trauma care. The three reports produced by the committee—*Hospital-Based Emergency Care: At the Breaking Point*, *Emergency Medical Services at the Crossroads*, and *Emergency Care for Children: Growing Pains*—provide three different perspectives on the emergency care system. The series as a whole unites the often fragmented prehospital and hospital-based systems under a common vision for the future of emergency care.

As the committee prepared its reports, federal and state policy makers were turning their attention to the possibility of an avian influenza pandemic. Americans are asking whether we as a nation are prepared for such an event. The emergency care system is on the front lines of surveillance and treatment. The more secure and stable our emergency care system is, the better prepared we will be to handle any possible outbreak. In this light, the recommendations presented in these reports take on increased urgency. The guidance they offer can assist all of the stakeholders in emergency care—the public, policy makers, providers, and educators—to chart the future of emergency care in the United States.

Harvey V. Fineberg, M.D., Ph.D.
President, Institute of Medicine
June 2006

Preface

Emergency care has made important advances in recent decades: emergency 9-1-1 service now links virtually all ill and injured Americans to immediate medical response; organized trauma systems transport patients to advanced, lifesaving care within minutes; and advances in resuscitation and lifesaving procedures yield outcomes unheard of just two decades ago. Yet just under the surface, a growing national crisis in emergency care is brewing. Emergency departments (EDs) are frequently overloaded, with patients sometimes lining hallways and waiting hours and even days to be admitted to inpatient beds. Ambulance diversion, in which overcrowded EDs close their doors to incoming ambulances, has become a common, even daily problem in many cities. Patients with severe trauma or illness are often brought to the ED only to find that the specialists needed to treat them are unavailable. The transport of patients to available emergency care facilities is often fragmented and disorganized, and the quality of emergency medical services (EMS) is highly inconsistent from one town, city, or region to the next. In some areas, the system's task of dealing with emergencies is compounded by an additional task: providing nonemergent care for many of the 45 million uninsured Americans. Furthermore, the system is ill prepared to handle large-scale emergencies, whether a natural disaster, an influenza pandemic, or an act of terrorism.

This crisis is multifaceted and impacts every aspect of emergency care—from prehospital EMS to hospital-based emergency and trauma care. The American public places its faith in the ability of the emergency care system to respond appropriately whenever and wherever a serious illness

or injury occurs. But while the public is largely unaware of the crisis, it is real and growing.

The Institute of Medicine's Committee on the Future of Emergency Care in the United States Health System was convened in September 2003 to examine the emergency care system in the United States, to create a vision for the future of the system, and to make recommendations for helping the nation achieve that vision. The committee's findings and recommendations are presented in the three reports in the *Future of Emergency Care* series:

- *Hospital-Based Emergency Care: At the Breaking Point* explores the changing role of the hospital ED and describes the national epidemic of overcrowded EDs and trauma centers. The range of issues addressed includes uncompensated emergency and trauma care, the availability of specialists, medical liability exposure, management of patient flow, hospital disaster preparedness, and support for emergency and trauma research.

- *Emergency Medical Services at the Crossroads* describes the development of EMS over the last four decades and the fragmented system that exists today. It explores a range of issues that affect the delivery of prehospital EMS, including communications systems; coordination of the regional flow of patients to hospitals and trauma centers; reimbursement of EMS; national training and credentialing standards; innovations in triage, treatment, and transport; integration of all components of EMS into disaster preparedness, planning, and response actions; and the lack of clinical evidence to support much of the care that is delivered.

- *Emergency Care for Children: Growing Pains* describes the special challenges of emergency care for children and considers the progress that has been made in this area in the 20 years since the establishment of the federal Emergency Medical Services for Children (EMS-C) program. It addresses how issues affecting the emergency care system generally have an even greater impact on the outcomes of critically ill and injured children. The topics addressed include the state of pediatric readiness, pediatric training and standards of care in emergency care, pediatric medication issues, disaster preparedness for children, and pediatric research and data collection.

THE IMPORTANCE AND SCOPE OF EMERGENCY CARE

Each year in the United States approximately 114 million visits to EDs occur, and 16 million of these patients arrive by ambulance. In 2002, 43 percent of all hospital admissions in the United States entered through the ED. The emergency care system deals with an extraordinary range of patients, from febrile infants, to business executives with chest pain, to elderly patients who have fallen.

EDs are an impressive public health success story in terms of access to

care. Americans of all walks of life know where the nearest ED is and understand that it is available 24 hours a day, 7 days a week. Trauma systems also represent an impressive achievement. They are a critical component of the emergency care system since approximately 35 percent of ED visits are injury-related, and injuries are the number one killer of people between the ages of 1 and 44. Yet the development of trauma systems has been inconsistent across states and regions.

In addition to its traditional role of providing urgent and lifesaving care, the emergency care system has become the “safety net of the safety net,” providing primary care services to millions of Americans who are uninsured or otherwise lack access to other community services. Hospital EDs and trauma centers are the only providers required by federal law to accept, evaluate, and stabilize all who present for care, regardless of their ability to pay. An unintended but predictable consequence of this legal duty is a system that is overloaded and underfunded to carry out its mission. This situation can hinder access to emergency care for insured and uninsured alike, and compromise the quality of care provided to all. Further, EDs have become the preferred setting for many patients and an important adjunct to community physicians’ practices. Indeed, the recent growth in ED use has been driven by patients with private health insurance. In addition to these responsibilities, emergency care providers have been tasked with the enormous challenge of preparing for a wide range of emergencies, from bioterrorism to natural disasters and pandemic disease. While balancing all of these tasks is difficult for every organization providing emergency care, it is an even greater challenge for small, rural providers with limited resources.

Improved Emergency Medical Services: A Public Health Imperative

Since the Institute of Medicine (IOM) embarked on this study, concern about a possible avian influenza pandemic has led to worldwide assessment of preparedness for such an event. Reflecting this concern, a national summit on pandemic influenza preparedness was convened by Department of Health and Human Services Secretary Michael O. Leavitt on December 5, 2005, in Washington D.C., and has been followed by statewide summits throughout the country. At these meetings, many of the deficiencies noted by the IOM’s Committee on the Future of Emergency Care in the United States Health System have been identified as weaknesses in the nation’s ability to respond to large-scale emergency situations, whether disease outbreaks, naturally occurring disasters, or

continued

acts of terrorism. During any such event, local hospitals and emergency departments will be on the front lines. Yet of the millions of dollars going into preparedness efforts, a tiny fraction has made its way to medical preparedness, and much of that has focused on one of the least likely threats—bioterrorism. The result is that few hospital and EMS professionals have had even minimal disaster preparedness training; even fewer have access to personal protective equipment; hospitals, many already stretched to the limit, lack the ability to absorb any significant surge in casualties; and supplies of critical hospital equipment, such as decontamination showers, negative pressure rooms, ventilators, and intensive care unit beds, are wholly inadequate. A system struggling to meet the day-to-day needs of the public will not have the capacity to deal with a sustained surge of patients.

FRAMEWORK FOR THIS STUDY

This year marks the fortieth anniversary of the publication of the landmark National Academy of Sciences/National Research Council report *Accidental Death and Disability: The Neglected Disease of Modern Society*. That report described an epidemic of automobile-related and other injuries, and harshly criticized the deplorable state of trauma care nationwide. The report prompted a public outcry, and stimulated a flood of public and private initiatives to enhance highway safety and improve the medical response to injuries. Efforts included the development of trauma and prehospital EMS systems, creation of the specialty in emergency medicine, and establishment of federal programs to enhance the emergency care infrastructure and build a research base. To many, the 1966 report marked the birth of the modern emergency care system.

Since then, the National Academies and the Institute of Medicine (IOM) have produced a number of reports examining various aspects of the emergency care system. The 1985 report *Injury in America: A Continuing Health Problem* called for expanded research into the epidemiology and treatment of injury, and led to the development of the National Center for Injury Prevention and Control within the Centers for Disease Control and Prevention. The 1993 report *Emergency Medical Services for Children* exposed the limited capacity of the emergency care system to address the needs of children, and contributed to the expansion of the EMS-C program within the Department of Health and Human Services. It has been 10 years, however, since the IOM examined any aspect of emergency care in depth. Furthermore, no National Academies report has ever examined the full range of issues surrounding emergency care in the United States.

That is what this committee set out to do. The objectives of the study were to (1) examine the emergency care system in the United States; (2) explore its strengths, limitations, and future challenges; (3) describe a desired vision for the system; and (4) recommend strategies for achieving this vision.

STUDY DESIGN

The IOM Committee on the Future of Emergency Care in the United States Health System was formed in September 2003. In May 2004, the committee was expanded to comprise a main committee of 25 members and three subcommittees. A total of 40 main and subcommittee members, representing a broad range of expertise in health care and public policy, participated in the study. Between 2003 and 2006, the main committee and subcommittees met 19 times; heard public testimony from nearly 60 speakers; commissioned 11 research papers; conducted site visits; and gathered information from hundreds of experts, stakeholder groups, and interested individuals.

The magnitude of the effort reflects the scope and complexity of emergency care itself, which encompasses a broad continuum of services that includes prevention and bystander care; emergency calls to 9-1-1; dispatch of emergency personnel to the scene of injury or illness; triage, treatment, and transport of patients by ambulance and air medical services; hospital-based emergency and trauma care; subspecialty care by on-call specialists; and subsequent inpatient care. Emergency care's complexity can be also traced to the multiple locations, diverse professionals, and cultural differences that span this continuum of services. EMS, for example, is unlike any other field of medicine—over one-third of its professional workforce consists of volunteers. Further, EMS has one foot in the public safety realm and one foot in medical care, with nearly half of all such services being housed within fire departments. Hospital-based emergency care is also delivered by an extraordinarily diverse staff—emergency physicians, trauma surgeons, critical care specialists, and the many surgical and medical subspecialists who provide services on an on-call basis, as well as specially trained nurses, pharmacists, physician assistants, nurse practitioners, and others.

The division into a main committee and three subcommittees made it possible to break down this enormous effort into several discrete components. At the same time, the committee sought to examine emergency care as a comprehensive system, recognizing the interdependency of its component parts. To this end, the study process was highly integrated. The main committee and three subcommittees were designed to provide for substantial overlap, interaction, and cross-fertilization of expertise. The committee concluded that nothing will change without cooperative and visionary lead-

ership at many levels and a concerted national effort among the principal stakeholders—federal, state, and local officials; hospital leadership; physicians, nurses, and other clinicians; and the public.

The committee hopes that the reports in the *Future of Emergency Care* series will stimulate increased attention to and reform of the emergency care system in the United States. I wish to express my appreciation to the members of the committee and subcommittees and the many panelists who provided input at the meetings held for this study, and to the IOM staff for their time, effort, and commitment to the development of these important reports.

Gail L. Warden
Chair

Acknowledgments

The *Future of Emergency Care* series benefited from the contributions of many individuals and organizations. The committee and Institute of Medicine (IOM) staff take this opportunity to recognize and thank those who helped in the development of the reports in the series.

A large number of individuals assembled materials that helped the committee develop the evidence base for its analyses. The committee appreciates the contributions of experts from a variety of organizations and disciplines who gave presentations during committee meetings or authored papers that provided information incorporated into the series of reports. The full list of presenters is provided in Appendix C. Authors of commissioned papers are listed in Appendix D.

Committee members and IOM staff conducted a number of site visits throughout the course of the study to gain a better understanding of certain aspects of the emergency care system. We appreciate the willingness of staff from the following organizations to meet with us and respond to questions: Beth Israel Deaconess Medical Center, Boston Medical Center, Children's National Medical Center, Grady Memorial Hospital, Johns Hopkins Hospital, Maryland Institute for Emergency Medical Services Systems, Maryland State Police Aviation Division, Richmond Ambulance Association, and Washington Hospital Center.

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EMERGENCY MEDICAL SERVICES AT THE CROSSROADS

