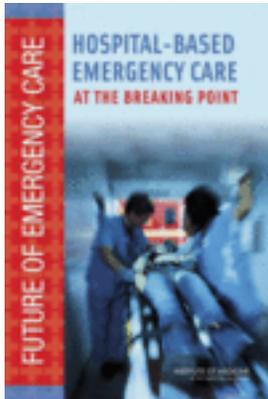


Free Executive Summary



Hospital-Based Emergency Care: At the Breaking Point

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

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Today our emergency care system faces an epidemic of crowded emergency departments, patients boarding in hallways waiting to be admitted, and daily ambulance diversions. Hospital-Based Emergency Care addresses the difficulty of balancing the roles of hospital-based emergency and trauma care—not simply urgent and lifesaving care, but also safety net care for uninsured patients, public health surveillance, disaster preparation, and adjunct care—in the face of increasing patient volume and limited resources. This new book considers the multiple aspects to the emergency care system in the United States by exploring its strengths, limitations, and future challenges. The wide range of issues covered includes: The role and impact of the emergency department within the larger hospital and health care system. Patient flow and information technology. Workforce issues across multiple disciplines. Patient safety and the quality and efficiency of emergency care services. Basic, clinical, and health services research relevant to emergency care. Special challenges of emergency care in rural settings. Hospital-Based Emergency Care 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

Hospital-based emergency and trauma care are critically important to the health and well-being of Americans. In 2003, nearly 114 million visits were made to hospital emergency departments (EDs)—more than 1 for every 3 people in the United States. About one-quarter of those visits were due to unintentional injuries, the leading cause of death for people aged 1 through 44. While most Americans encounter the ED only rarely, they count on it to be there when they need it.

Over the last several decades, the role of hospital-based emergency and trauma care has evolved. EDs continue to focus on their traditional mission of providing urgent and lifesaving care, but have taken on additional responsibilities to meet the needs of communities, providers, and patients. Today, their complex role also encompasses safety net care for uninsured patients, public health surveillance, disaster preparedness, and serving as an adjunct to community physician practices. In some rural communities, the hospital ED may be the main source of health care for a widely dispersed population. While the demands on emergency and trauma care have grown dramatically, however, the capacity of the system has not kept pace. Balancing these roles in the face of increasing patient volume and limited resources has become increasingly challenging. The situation is creating a widening gap between the quality of emergency care Americans expect and the quality they actually receive.

STUDY CHARGE

The Institute of Medicine's (IOM) Committee on the Future of Emergency Care in the United States 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 pediatric emergency care, prehospital emergency care, and hospital-based emergency and trauma care. This is the third of three reports presenting the committee's findings and recommendations in these three areas. Summarized below are the committee's findings and recommendations for meeting the challenge of high demand for emergency care and achieving the vision of a 21st-century emergency care system.

THE CHALLENGE OF HIGH DEMAND AND INADEQUATE SYSTEM CAPACITY

Between 1993 and 2003, the population of the United States grew by 12 percent, hospital admissions increased by 13 percent, and ED visits rose by more than 2 million per year from 90.3 to 113.9 million—a 26 percent increase (see Figure ES-1). Not only is ED volume increasing, but patients coming to the ED are older and sicker, and require more complex and time-consuming workups and treatments. Moreover, during this same period, the United States experienced a net loss of 703 hospitals, 198,000 hospital beds, and 425 hospital EDs, mainly in response to cost-cutting measures and lower reimbursements by managed care, Medicare, and other payors. By 2001, 60 percent of hospitals were operating at or over capacity.

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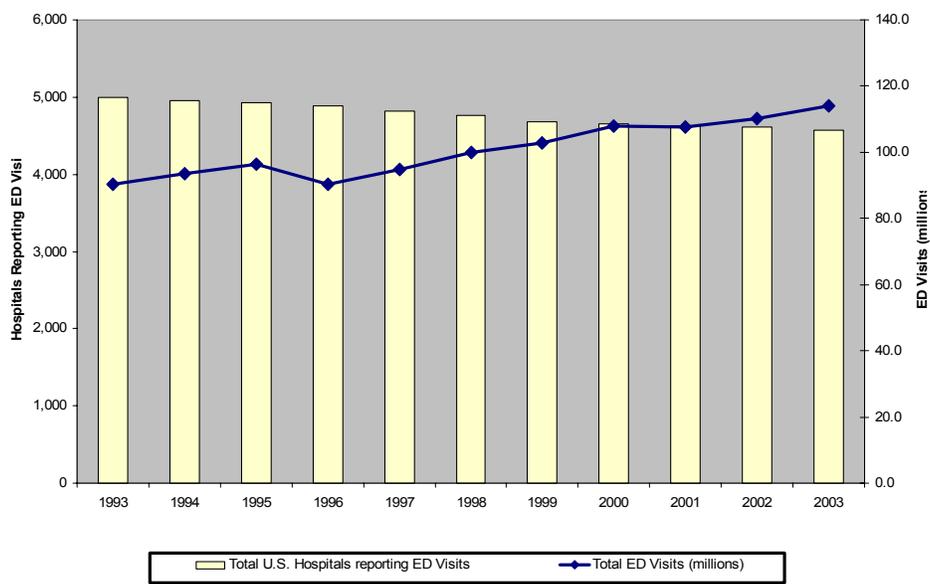


FIGURE ES-1 Hospital emergency departments versus numbers of visits.
SOURCE: AHA Hospital Statistics, 2005; NHAMCS, 1993–2003.

The high demand for hospital-based emergency and trauma care reflects several trends. First, EDs have become one of the nation’s principal sources of care for patients with limited access to other providers, including the 45 million uninsured Americans. Indeed, the Emergency Medical Treatment and Active Labor Act of 1986 prevents hospitals from restricting access to uninsured patients by requiring hospitals to provide a medical screening examination to all patients and stabilize or transfer patients as needed. With limited access to community-based primary and specialty care, many turn to the emergency system when in medical need, often for conditions that have worsened because of a lack of regular primary care.

Medicaid beneficiaries also turn to the ED. In fact, Medicaid enrollees visit the ED at a higher rate than any other category of patient (81 visits per 100 enrollees)—double the rate of the uninsured population and nearly four times that of privately insured patients. Although Medicaid enrollees are insured, the low rates of provider reimbursement in many states limit the number of office-based practitioners who are willing to accept them as patients.

In addition, the ED often serves as primary care provider, a role for which it is not optimally designed. Rather, the ED is designed for rapid, high-intensity responses to acute injuries and illnesses. Physicians in the ED face constant interruptions and distractions, and typically lack access to the patient’s full medical records. Because nonemergency patients are usually low triage priorities, they often experience extremely long wait times as they are passed over for more urgent cases.

Costs are another concern. When an ED is not busy, the cost of treating an additional nonemergency patient is probably quite low. But while the literature on this issue is mixed, a number of studies suggest that nonemergency care in the ED is more costly than that in alternative settings. Indeed, ED charges for minor problems have been estimated to be two to five times higher than those of a typical office visit. When the ED is at full capacity, treating additional patients who could be cared for in a different environment means fewer resources in

terms of physicians, nurses, ancillary personnel, equipment, and time and space available to respond to the emergency cases.

By law, the front door of the ED is always open. When a hospital's inpatient beds are full, as is frequently the case, ED providers cannot transfer the most severely ill and injured patients to an inpatient unit. As a result, ED patients who require hospitalization begin to back up in the ED. The aggregate result of this imbalance between public demand and hospital capacity is an epidemic of overcrowded EDs, frequent "boarding" of patients waiting for inpatient beds, and ambulance diversion:

- **Overcrowding**—ED overcrowding is a nationwide phenomenon, affecting rural and urban areas alike. In one study, 91 percent of EDs responding to a national survey reported overcrowding as a problem; almost 40 percent reported that overcrowding occurred daily. Overcrowding induces stress in providers and patients, and can lead to errors and impaired overall quality of care.

- **Boarding**—A consequence of crowded EDs is the practice of boarding, or holding patients in the ED until an inpatient bed is unavailable. It is not unusual for patients in a busy hospital ED to be boarded for 48 hours or more. In a nationwide survey of nearly 90 EDs across the country, conducted on a typical Monday evening, 73 percent of hospitals reported boarding two or more patients. Boarding not only compromises the patient's hospital experience, but also adds to an already stressful work environment for physicians and nurses, and enhances the potential for errors, delays in treatment, and diminished quality of care.

- **Ambulance diversion**—Another consequence of crowding is ambulance diversion—when EDs become saturated to the point that patient safety is compromised, ambulances are diverted to alternative hospitals. Once a safety valve to be used in extreme situations, this has now become a commonplace event. A recent study reported that 501,000 ambulances were diverted in 2003, an average of 1 per minute. According to the American Hospital Association, nearly half of all hospitals, and close to 70 percent of urban hospitals, reported time on diversion in 2004. Ambulance diversions can lead to catastrophic delays in treatment for seriously ill or injured patients. It also frequently leads to treatment in facilities with inadequate expertise and resources appropriate to the patient's severity of illness, placing the patient at significant risk.

FINDINGS AND RECOMMENDATIONS

This section presents the committee's key findings and recommendations for meeting the challenge of increased demand and inadequate capacity and improving the quality of hospital-based emergency and trauma care. These findings and recommendations address the need to enhance operational efficiency, the burden of uncompensated care, the use of information technology, inadequate disaster preparedness, the emergency care workforce, and research needs in emergency care.

Enhanced Operational Efficiency

Hospital EDs and trauma centers have little control over external forces that contribute to crowding, such as increasing numbers of uninsured or the growing severity of patients' conditions. There is, however, a great deal they can do manage the impact of these forces. Innovations in industrial engineering that have swept through other sectors of the economy, from banking, to air travel to manufacturing, have failed to take hold in health care delivery—a sector

of the economy that now consumes 16 percent of the nation's gross domestic product and is growing at twice the rate of inflation.

Tools derived from engineering and operations research have been directed successfully at the problem of hospital efficiency in general and ED crowding in particular. A wide range of tools have been developed and tested for addressing patient flow—defined as the movement of patients through the hospital system—generally with good success. Efficient patient flow can increase the volume of patients treated and discharged and minimize delays at each point in the delivery process, while improving the quality of care. For example, while controlled studies have yet to be conducted, a growing body of experience suggests that using queuing theory to smooth the peaks and valleys of patient admissions can eliminate bottlenecks, reduce crowding, improve patient care, and reduce costs. The committee recommends that **hospital chief executive officers adopt enterprise-wide operations management and related strategies to improve the quality and efficiency of emergency care.**

A particularly promising technique for managing patient flow is the use of clinical decision units (CDUs), also known as observation units. The technique was developed as a means of monitoring patients with chest pain who had a low to intermediate probability of acute myocardial infarction. By observing patients for up to 23 hours, ED staff were able to rule out many patients at risk of AMI while using fewer resources than would have been consumed if these same patients had been admitted to the ICU or an inpatient telemetry unit. Today, the Centers for Medicare and Medicaid Services (CMS) reimburses CDU stays for only three conditions: chest pain, asthma, and congestive heart failure. Because of the demonstrated success of CDUs, the committee recommends that **the Centers for Medicare and Medicaid Services remove current restrictions on the medical conditions that are eligible for separate CDU payment.**

Incentives to Reduce Crowding and Boarding

While hospitals can use many approaches to reduce crowding and boarding, there are limited financial incentives for hospitals to do so. Hospitals are not reimbursed for difference in costs that is often associated with admissions from the ED. Further, hospitals do not face significant negative financial consequences from operating crowded EDs. In 2004, following a July 2002 alert that tied treatment delays to more than 50 hospital deaths, the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), instituted new guidelines that would have required accredited hospitals to take serious steps to reduce crowding, boarding, and diversion. Under industry pressure, however, these requirements were withdrawn and replaced with a weaker standard. The committee recommends that **the Joint Commission on the Accreditation of Healthcare Organizations reinstate strong standards that directly address ED crowding, boarding, and diversion.** Furthermore, because the practices of boarding and diversion are so antithetical to quality medical care, the strongest possible measures should be taken to eliminate them. The committee recommends that **hospitals end the practices of boarding patients in the ED and ambulance diversion, except in the most extreme cases, such as a community mass casualty event. The Centers for Medicare and Medicaid Services should convene a working group that includes experts in emergency care, inpatient critical care, hospital operations management, nursing and other relevant disciplines to will develop boarding and diversion standards, as well as guidelines, measures, and incentives for implementation, monitoring, and enforcement of these standards.**

Leadership in Improving Hospital Efficiency

Beyond the use of incentives, the committee looks to hospital executives, including both CEOs and mid-level managers, to provide visionary leadership in promoting the use of patient flow and operations management approaches to improve hospital efficiency. Hospital leaders should be open to learning from the experiences of industries outside of health care, and should be bold and creative in applying these and other new ideas. To foster the development of hospital leadership in improving hospital efficiency, the committee recommends that **training in operations management and related approaches be promoted by professional associations; accrediting organizations, such as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the National Committee for Quality Assurance (NCQA); and educational institutions that provide training in clinical, health care management, and public health disciplines.**

Use of Information Technology

Opportunities to improve patient flow, operational efficiency and quality of care can be enhanced by appropriate information technologies. Hospitals, however, lag behind other industries in the use of information technologies (IT), particularly those used to support process management.

Information technologies have broad application to hospitals and health systems, but their use involves unique needs and approaches in emergency care. Information is critically important for rapid decision-making in emergency and trauma care. But emergency physicians are all too often deprived of critical patient information; indeed, it has been said that EDs operate on information “fumes.” The following information technologies could significantly enhance emergency care: (1) dashboard systems that track and coordinate patient flow, (2) communications systems that enable ED physicians to link to patients’ records or providers, (3) clinical decision-support programs that improve decision making, (4) documentation systems for collecting and storing patient data, (5) computerized training and information retrieval, and (6) systems to facilitate public health surveillance. Given their demonstrated effectiveness in the emergency care setting, the committee recommends that **hospitals adopt robust information and communications systems to improve the safety and quality of emergency care and enhance hospital efficiency.** The committee recognizes that the appropriate prioritization of and investment in these approaches will vary based on each institutions’ resources and needs.

The Burden of Uncompensated Care

In most hospitals, if reimbursements fail to cover ED and trauma costs, these costs are subsidized by admissions that originate in the ED. But uncompensated care can be an extreme burden at hospitals that have large numbers of uninsured patients. Many hospital ED and trauma center closures are attributed to financial losses associated with emergency and trauma care. Public hospitals and tertiary medical centers bear a large share of this burden, as surrounding community hospitals often transfer their most complex, high-risk patients to the large safety net hospitals for specialized care. Often, the condition of these patients has deteriorated considerably since their arrival at the referring hospital. Hospitals receive Disproportionate Share Hospital (DSH) payments from both Medicare and Medicaid to compensate for these losses, but these payments are inadequate for hospitals with large safety net populations. As a result, the emergency and trauma care safety net system is at risk in many regions. To ensure the continued

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viability of a critical public safety function, the committee recommends that **Congress establish dedicated funding, separate from DSH payments, to reimburse hospitals that provide significant amounts of uncompensated emergency and trauma care for the financial losses incurred by providing those services.**

The committee believes that accurate determination of the optimal amount of funding to allocate for this purpose, which could run into the hundreds of millions of dollars, is beyond its expertise, but that the government must begin to address this issue immediately. The committee therefore recommends that **Congress initially appropriate \$50 million for the purpose, to be administered by the Centers for Medicare and Medicaid Services. CMS should establish a working group to determine the allocation of these funds, which should be targeted to providers and localities at greatest risk; the working group should then determine funding needs for subsequent years.**

Inadequate Disaster Preparedness

On September 10, 2001, the cover story of US News and World Report described an emergency care system in critical condition due to demands far in excess of its capacity. While the article focused on the day to day problems of diversion and boarding, the events of the following day brought home the frightening realization to many—if we cannot take care of our emergency patients on a normal day, how will we manage a large scale disaster? More than four years after 9/11, Hurricane Katrina revealed how far there is to go in this regard. While Katrina was unusual in its size and scope, the capacity of the emergency care system to effectively respond to smaller disasters is very much in question.

Surge Capacity

Hospitals in many large cities are operating at or near full capacity. A multiple car highway crash can create havoc in an ED. Few hospitals have the capacity to handle a major mass casualty event. One reason for this lack of capacity is the small amount of funding for bioterrorism and other threats that has gone directly to hospitals. For example, hospital grants from the Health Resources and Services Administration's Bioterrorism Hospital Preparedness Program in 2002 were typically between \$5,000 and \$10,000—insufficient to equip even one critical care room.

Training

Training for ED workers in disaster preparedness is also deficient. In 2003, hospital training varied widely among staff: 92 percent of hospitals trained their nursing staff in responding to at least one type of threat, but residents and interns received any such training at only 49 percent of hospitals (although this represented an improvement over the situation prior to the terrorist attacks of 2001).

Protection of Hospitals and Staff

Protecting hospitals and their staff from biological or chemical events poses extraordinary challenges. The outbreak of severe acute respiratory syndrome (SARS) in Toronto revealed the difficulties associated with containing even a small outbreak—particularly when health professionals themselves become both victims and spreaders of disease. One of the most important tools in such an event is negative pressure rooms that prevent the spread of airborne

pathogens. Unfortunately, the number of such rooms is limited, and is generally restricted to a handful of tertiary hospitals in each major population center. The committee believes that this lack of adequate negative pressure suites is a critical vulnerability of the current system, and that the existing capacity could be quickly overwhelmed by either a terrorist event or a major outbreak of avian influenza or some other airborne disease, posing an extreme danger to hospital workers and patients.

Staff must also be protected through appropriate personal protective equipment. Current training and equipment in this regard are inadequate. In 2005, the Occupational Safety and Health Administration developed guidelines for use of personal protective equipment, but more needs to be done.

Approaches to Improve Disaster Preparedness

To address the above concerns about surge capacity, training, and protection of hospitals and staff, the committee recommends that **Congress significantly increase total disaster preparedness funding in FY 2007 for hospital emergency preparedness in the following areas: strengthening and sustaining trauma care systems; enhancing ED, trauma center, and inpatient surge capacity; improving EMS response to explosives; designing evidence-based training programs; enhancing the availability of decontamination showers, standby ICU capacity; negative pressure rooms, and appropriate personal protective equipment; conducting international collaborative research on the civilian consequences of conventional weapons (CW) terrorism.**

In addition, to further address the need for competency in disaster medicine across disciplines, the committee recommends that **all institutions responsible for the training, continuing education, and credentialing and certification of professionals involved in emergency care (including medicine, nursing, EMS, allied health, public health, and hospital administration) incorporate disaster preparedness training into their curricula and competency criteria.**

The Emergency Care Workforce

Emergency care is delivered in an inherently challenging environment, often requiring providers to make life-and-death decisions, with little time and information. Emergency care providers wage battles on many fronts, including: scheduling diagnostic tests; obtaining timely laboratory results and drugs; getting patients admitted to the hospital; finding specialists willing to come in during the middle of the night; and finding psychiatric centers, skilled nursing facilities, or specialists who are willing to accept referrals. ED staff often confront violence and deal with an array of social problems that confound their attempts to heal their patients. As a result, providers on the front lines of emergency care are increasingly exhausted, stressed out, and frustrated by the deteriorating state of emergency care and the safety net it supports.

On-Call Specialists

One of the most troubling trends is the increasing difficulty of finding specialists to take emergency call. Providing emergency call has become unattractive to many specialists in critical fields such as neurosurgery and orthopedics. Specialists have difficulty collecting payment for on-call services, in part because many emergency and trauma patients are uninsured; nearly 80 percent of specialists in one survey had difficulty obtaining payment for their services.

Liability concerns also discourage many specialists from taking emergency call. Procedures performed on emergency patients are inherently risky and expose specialists to an increased likelihood of litigation. Patients are often sicker and emergency procedures are frequently performed in the middle of the night or on weekends, when the hospital's staffing and capabilities are not at their peak. A national survey of neurosurgeons found that 36 percent had been sued by patients seen through the ED. These factors drive premiums for those for physicians taking emergency call well above those for physicians who do not. The problem has been exacerbated by recently revised guidelines under the Emergency Medical Treatment and Active Labor Act that make it easier for on-call physicians to limit their emergency practices.

Hospitals are using a number of different strategies to stabilize the services of on-call physicians. One promising approach is to regionalize the services of certain on-call specialties, so that every hospital need not maintain on-call services for every specialty. Such regionalization would rationalize the limited supply of specialists by ensuring coverage at key tertiary and secondary locations based on actual need, replacing the current haphazard approach that is based on many factors other than need. For example, one county is developing a community-wide cooperative that will contract collectively for the services of certain specialists. The committee recommends that **hospitals, physician organizations, and public health agencies collaborate to regionalize critical specialty care on-call services.**

Exposure of Emergency Providers to Medical Malpractice Claims

As noted above, physicians providing emergency and trauma care face extraordinary exposure to medical malpractice claims—far higher than those not providing such care. Safety net providers are especially affected by the liability problem: as on-call panels diminish at community hospitals, these hospitals increasingly export their sickest patients to the large safety net hospitals, which have no choice but to accept them. The result is even higher concentrations of uninsured, high-risk patients. Protections must be instituted so that emergency providers and EDs do not become the dumping ground for the liability crisis. Although the public is largely unaware of the situation, this crisis has already seriously eroded the capacity of emergency and trauma care across many cities. Therefore, the committee recommends that **Congress appoint a commission to examine the impact of medical malpractice lawsuits on the declining availability of providers in high-risk emergency and trauma care specialties, and to recommend appropriate state and federal actions to mitigate the adverse impact of these lawsuits and ensure quality of care.**

The Rural Workforce

Rural EDs face persistent shortages of emergency and trauma physicians, as well as on-call specialists. With such shortages likely to continue, it is important to find alternative ways of enhancing emergency services in rural areas. One approach is to increase collaboration between rural hospitals and regional academic health centers to foster training, resource sharing, and coordination of care. **The committee recommends that states link rural hospitals with academic health centers to enhance opportunities for professional consultation, telemedicine, patient referral and transport, and continuing professional education.**

Need for Emergency Care Research

Although emergency medicine and trauma surgery are relatively young specialties, researchers have made important contributions to both basic science and clinical practice that have dramatically improved emergency care, and have resulted in significant advances in general medicine. Examples are assessment and management of cardiac arrest, including the development and refinement of guidelines for cardiopulmonary resuscitation (CPR), the pharmacology of resuscitation, understanding and treatment of hemorrhagic shock, and electrocardiogram (EKG) analysis of ventricular fibrillation. Because emergency and trauma care are young fields, however, they are not strongly represented in the political infrastructure of the National Institutes of Health (NIH), its various institutes, and its study sections. As a result, scant resources are allocated to advance the science of emergency care, and few training grants are offered to develop researchers who want to focus on emergency care. For example, only .05 percent of NIH training grants awarded to medical schools go to departments of emergency medicine—an average of only \$51.66 per graduating resident. In contrast, internal medicine receives approximately \$5,000.00 per graduating resident.

The current uncoordinated approach to organizing and funding emergency and trauma care has been inadequate. There are well-defined emergency and trauma care research questions that would benefit from a coordinated and well-funded research strategy. Therefore the committee recommends that **the Secretary of the Department of Health and Human Services (DHHS) 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. This study should include consideration of training of new investigators, development of multi-center research networks, funding of General Clinical Research Centers (GCRCs) that specifically include an emergency and trauma care component, involvement of emergency and trauma care researchers in the grant review and research advisory processes, and improved research coordination through a dedicated center or institute. Congress and federal agencies involved in emergency and trauma care research (including the Department of Transportation, the Department of Health and Human Services, the Department of Homeland Security, and Department of Defense) should implement the study's recommendations.**

ACHIEVING THE VISION OF A 21ST-CENTURY EMERGENCY CARE SYSTEM

Hospital-based emergency and trauma care are part of an interdependent system of emergency services; thus optimizing emergency care requires improvements in both hospital-based care and the larger system. To that end, the committee developed a vision for the future of emergency care that centers around three goals: coordination, regionalization, and accountability. Many elements of this vision have been advocated previously; however, progress toward achieving these elements has been derailed by deeply entrenched parochial interests and cultural attitudes, as well as funding cutbacks and practical impediments to change. Concerted, cooperative efforts at all levels of government—federal, state, regional, local—and the private sector are necessary to finally break through and achieve this vision.

Coordination

One of the most long-standing problems with the emergency care system is that services are fragmented. EMS, hospitals, trauma centers, and public health have traditionally worked in silos. For example, public safety and EMS agencies often lack common radio frequencies and protocols for communicating with each other during emergencies. Similarly, emergency care providers lack access to patient medical histories that could be useful in decision-making.

Ensuring that each patient is directed to the most appropriate setting, including a level I trauma center, when necessary, requires that many elements within the regional system—community hospital, trauma centers, and particularly prehospital EMS—coordinate the regional flow of patients effectively. In addition to improving patient care, coordinating the regional flow of patients is a critical tool in reducing overcrowding in EDs.

Unfortunately, only a handful of systems around the country coordinate transport effectively at the regional level. Short of formally instituting diversion, there is typically little information sharing between hospitals and EMS regarding overloaded EDs and trauma centers and the availability of ED beds, operating suites, equipment, trauma surgeons, and critical specialists—information that could be used to balance the load among EDs and trauma centers regionwide. Too often a hospital's location places it in a logistical situation in which it is overloaded with emergencies and trauma cases while an ED several blocks away may be working at a comfortable 50 percent capacity. There is little incentive for ambulances to drive by a hospital to take patients to a facility that is less crowded.

The benefits to patients of better regional coordination have been demonstrated. The technologies needed to facilitate such coordination exist, and police and fire departments are ahead in this regard. The main impediment appears to be entrenched interests and a lack of vision to motivate change in the current system.

The committee envisions a system in which all patients receive well-planned and coordinated emergency care services. Dispatch, EMS, ED 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. From the standpoint of patients, delivery of emergency care services should be seamless.

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 those facilities with 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 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 providers in the transport of patients and improve the regional coordination of patient flow. These protocols should be based on current and emerging evidence about the appropriate models for transport given the patient's condition and location, and should include protocols that, given appropriate information about the status of facilities, direct patients to less crowded local EDs rather than to the highest-level center. **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.**

Accountability

Without accountability, participants in the emergency care system need not accept responsibility for failures and can avoid making changes to improve the delivery of care. 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 policymakers 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 with 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 providers within the system, as well as that of the system as a whole. Measures should also be sensitive to the interdependence among the components of the system; for example, EMS response times may be related to EDs going on diversion.

Using the measures developed through such a national, evidence-based, multi-disciplinary 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. Dissemination can take various forms, including public report cards, annual reports, and state public health reports. Because of the potential sensitivity of performance data, they it should initially be reported in the aggregate rather than at the level of the individual provider. Individual providers should have full access to their own data so they can understand and improve their individual performance, as well as contribute to the overall system. Over time, individual provider information should become an important part of the public information on the system. These performance measures should ultimately become the basis for pay-for-performance initiatives as those reimbursement techniques mature.

Achieving the Vision

States and regions face a variety of different situations, including 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. A number of different avenues should be explored and evaluated to determine what types of systems are best able to achieve the three 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 and trauma care.

Supporting System Integration

Reducing fragmentation at the state and local level will require federal leadership and support. But today, the federal agencies that support and regulate emergency services mirror the fragmentation of emergency services at the state and local levels. Prehospital EMS, hospital-based emergency care, trauma care, injury prevention and control, and medical disaster preparedness are scattered across numerous agencies within DHHS, DOT, and DHS.

Strong federal leadership for emergency and trauma care is at the heart of the committee's vision for the future, and continued fragmentation of responsibility at the federal level is unacceptable. A lead federal agency could better move the emergency and trauma care system toward improved integration, unify decision-making and funding decisions, and represent all emergency and trauma care patients, providers, and settings, including prehospital EMS, (both ground and air), hospital-based emergency and trauma care, pediatric emergency and trauma care, rural emergency and trauma care, and medical disaster preparedness. The committee therefore recommends that **Congress establish a lead agency for emergency and trauma care within two years of this report. The lead agency will be housed in the Department of Health and Human Services, and will 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 will 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 care.**

Future of Emergency Care Series

Hospital-Based Emergency Care

At the Breaking Point

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

Board on Health Care Services

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

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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.

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Willing is not enough; we must do.”*
—Goethe



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vi

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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:

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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 **Don E. Detmer**, American Medical Informatics Association. Appointed by the National Research Council and the 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.

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viii

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FOREWORD

The state of emergency care affects every American. When illness or injury strikes, Americans count on the 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 our delivery system. Americans rely on hospital emergency departments in growing numbers because of the skilled specialists and advanced technologies they offer. At the same time, the increasing use of the emergency care system also 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. These demands can degrade the quality of emergency care and hinder its ability to provide urgent and life-saving 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 emergency care system; and recommend strategies required to achieve that vision. Their efforts build on past contributions, including the landmark National Research Council report, *Accidental Death and Disability: The Neglected Disease of Modern Society* in 1966, *Injury in America* in 1985, and *Emergency Medical Services for Children* in 1993.

The committee's task 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 in the series—*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 policymakers turned their attention to the possibility of an avian flu pandemic. Americans are asking, “Are we, as a nation, prepared?” The emergency care system is on the front lines of surveillance and treatment. The more secure and stable our emergency care system, the better prepared we will be to handle any possible outbreak. In this light, the recommendations presented in these reports take on urgency. The guidance offered here can assist all of the stakeholders in emergency care—consumers, policymakers, providers, and educators—to chart the future of emergency care in the U.S.

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

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x

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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, life-saving care within minutes; and advances in resuscitation and life-saving 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 caring for emergencies is compounded by an additional task: providing non-emergent 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 services; 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.

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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 life-saving 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 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.

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xii

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 variety of reports examining various aspects of the emergency care system. The 1985 report *Injury in America* 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 Emergency Medical Services for Children 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 also be 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 leadership 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.

We hope that the reports of the Future of Emergency Care Series stimulate increased attention and reform to 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 contributed input to the meetings, and to the IOM staff for their time, effort, and commitment to the development of these important reports.

Gail L. Warden
Chair

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xiv

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The Future of Emergency Care series benefited from the contributions of many individuals and organizations. The Committee and IOM staff take this opportunity to recognize and thank those who helped during the development of the reports.

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 EMS Services Systems, Maryland State Police Aviation Division, Richmond Ambulance Association, and Washington Hospital Center.

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xvi

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CONTENTS

SUMMARY	1
Study Charge, 1	
The Challenge of High Demand and Inadequate System Capacity, 1	
Findings and Recommendations, 3	
Achieving the Vision of a 21 st -Century Emergency Care System, 9	
1 INTRODUCTION	13
A Growing National Crisis, 14	
Impact on Quality and Patient Safety, 17	
Purpose of This Study, 20	
Study Approach, 23	
A Note about Terminology, 23	
Organization of the Report, 24	
2 THE EVOLVING ROLE OF HOSPITAL-BASED EMERGENCY CARE	29
An Imbalance between Demand and Capacity, 29	
The Emergency Department as a Core Component of Community Ambulatory Care, 33	
Reimbursement for Emergency and Trauma Care, 41	
The Financial Impact on Emergency and Trauma Care, 43	
The Challenges of Mental Health and Substance Abuse, 47	
Rural Emergency Care, 51	
3 BUILDING A 21ST-CENTURY EMERGENCY CARE SYSTEM	63
The Goal of Coordination, 64	
The Goal of Regionalization, 67	
The Goal of Accountability, 73	
Current Approaches, 79	
Federal, State, and Local Collaboration, 83	
Supporting System Integration, 85	
Federal Lead Agency, 86	
4 IMPROVING THE EFFICIENCY OF HOSPITAL-BASED EMERGENCY CARE	101
The ED in the Context of the Health Care Delivery System, 101	
Hospital-Based Emergency Care as a Complex System, 103	
Impediments to Efficient Patient Flow in the ED, 105	
Strategies for Optimizing Efficiency, 108	
Overcoming Barriers to Enhancing Efficiency, 118	
5 TECHNOLOGY AND COMMUNICATIONS	129
Information Technology in the Health Care Delivery System, 130	
Information Technology in the Emergency Department, 133	
Clinical Technology, 147	
Barriers to Information Technology Adoption, 151	
Prioritizing Investment in Emergency Care Information Technology, 155	
6 THE EMERGENCY CARE WORKFORCE	163
Physicians, 163	
Nurses and Other Critical Providers, 178	

PREPUBLICATION COPY: UNCORRECTED PROOFS

xvii

Enhancing Workforce Supply, 184
Building Core Competencies, 185
Provider Safety, 186
Interprofessional Collaboration, 189
Rural ED Providers, 192

- 7 DISASTER PREPAREDNESS 201**
Defining Disaster, 202
Critical Hospital Roles in Disasters, 205
Challenges in Rural Areas, 218
Federal Funding for Hospital Preparedness, 219
- 8 ENHANCING THE EMERGENCY CARE RESEARCH BASE 225**
Emergency Medicine Research, 226
Trauma and Injury Research, 235
Barriers to Emergency Care Research, 240

APPENDIXES

Appendix A: Committee and Subcommittee Membership, 249
Appendix B: Biographical Information for Main Committee and Hospital-Based Emergency Care Subcommittee, 251
Appendix C: List of Presentations to the Committee, 267
Appendix D: List of Commissioned Papers, 271
Appendix E: Statistics on Emergency and Trauma Care Utilization, 273
Appendix F: Historical Development of Hospital-Based Emergency and Trauma Care, 279
Appendix G: Summary of Recommendations from the *Future of Emergency Care* Series, 287