A Historical Perspective of Trauma System Development in the United States

Richard J. Mullins, MD

From the Department of Surgery, Oregon Health Sciences University, School of Medicine, Portland, Oregon.

Injury is a leading cause of death and disability and, thus, a major health care problem for society. When citizens under the age of 34 years die in North America, the cause of death is most often a traumatic event, e.g., unintended injury, homicide, or suicide. Although injury-related mortality ranks lower on the list of causes of death for geriatric patients, actual death rates attributable to trauma among older citizens are several-fold greater than mortality rates in younger age groups. Falls replace motor vehicle crashes as the most common mechanism of injury in the geriatric population. At all ages in our society, injury represents a major proportion of overall mortality and disability rates.

The burden of death from injury encompasses more than the grief from loss of an individual. Injury in North America is an economic drain. Trauma-related deaths deprive our society of individuals who, in many cases, are educated and able citizens, active in the most productive period of life. It is expensive to provide health care to injured patients in a hospital, and those costs are expanded by provision of additional care after hospital discharge. For many survivors of serious injury, proper recovery depends on a period of rest and rehabilitation, adding to expense while perpetuating loss in productivity. Control of the cost of injury will always first depend on effective injury prevention. However, for those injured who need acute care, reducing the economic burden will not only require cost-effective delivery of optimal acute care, but also timely treatment and maximal recovery.

Survival among severely injured patients requires specialist care delivered promptly and in a coordinated manner. Many injured patients have multiple injuries, and each injury requires effective treatment if the individual is to survive and achieve optimal recovery. Care of seriously injured patients starts at the scene of injury, continues through the emergency department, and is expanded in the hospital, often in the operating room and intensive care unit (ICU). Optimal acute care of injured patients depends on teamwork, smooth transitions, and the proper sequence of interventions. In the care of injured patients, the capability and knowledge of experts is not enough; practitioners require a system of supporting equipment, resources, and personnel.

Physicians, surgeons, health care professionals, politicians, epidemiologists, and others have called for public health policies that attempt to solve the national problem of death and disability from injury. Most individuals who die from injury do so immediately and never have a chance to benefit from acute care. Thus, prevention will be a primary venue for reducing the burden of injury-related death and disability. Seriously injured patients who survive the initial injury insult require prompt and effective acute care. Trauma systems continue to be proposed as a public health policy that benefits the injured population by providing immediate, coordinated care. Since the 1960s, advocates of trauma systems have debated definitions of their structure, and their role in health care. The discrepancies in the demarcation of these definitions reflects the diversity of influence posed by those attempting to direct public health policy regarding trauma care.
As a foundation for an analysis of the efficacy of trauma systems, one must understand the defining characteristics and purpose of trauma systems. History points out that a trauma system's characteristics are largely determined by the time period and intended scope of the system's influence. Trauma systems in the 1970s intended to prevent needless death in seriously injured patients. Twenty years later, trauma systems intend to benefit a wider population with the goal that all injured patients should achieve optimal recovery. The idea of an inclusive trauma system considerably expands its intended purpose, making traditional measures of effectiveness (i.e., patient survival at hospital discharge) too simplistic. Quality, timeliness of recovery, and patient satisfaction are important measures of outcome. Payors also demand evidence that trauma systems are cost-effective. Thus, the definition of a trauma system may evolve in the next decade, and economic measures may become the principle criterion.

The concepts and definitions of trauma systems and their components have evolved over decades of time and will continue to evolve in the future. One must understand the processes of change and the forces behind them to place the published literature in context and understand what we have learned from decades of investigation. To aid the reader in this process, the remainder of this study offers a historical perspective of trauma system development in the United States.

**HISTORY OF TRAUMA SYSTEMS**

**Military Models of Systems of Trauma Care**

The essential characteristics of trauma systems in the United States were developed by the military in the first seven decades of the 20th century. In the first world war, timely evacuation of the wounded through echelons of treatment facilities—each with greater capability—was established as a standard protocol. The first tier was evacuation of wounded from the battlefield, an often dangerous procedure performed by corpsmen and stretcher bearers, predecessors of modern-day emergency medical technicians. Initial treatments were administered at battalion aid stations near the battle front where patients were given pain medications, external hemorrhage was controlled, and fractures were splinted. Seriously wounded men were evacuated to clearing stations where surgeons performed emergency surgery, principally debridement of wounds. Survivors were transported to evacuation hospitals safely located remote from the battlefield, where definitive care was delivered, and, ideally, patients recovered until they could be returned to the ranks. This system of evacuation through echelons of increasingly capable medical care became a model for trauma systems. In France, casualties could suddenly number in the thousands, and triage, i.e., sorting of the injured based on priorities, became standard practice. Military medical units also developed systems to incorporate reserves ready to respond to a surge in need. As the military's system for providing care to injured became established, survival of wounded men improved.

In World War II, a patient's passage through echelons of care became quicker, resuscitation routinely included blood transfusion, and surgical therapy was more effective, all of which contributed to improved survival for seriously wounded soldiers. In World War I, the time interval from injury to treatment averaged 12 to 18 hours, but motorized transportation in World War II reduced the time between injury and definitive treatment by 50%.

The systematic approach to delivery of trauma care also acquired an additional phase, i.e., resuscitation. Initial treatment of shock conducted in specially designed tents before surgery saved lives. As new surgical therapies enabled definitive repair of organs in the chest, abdomen, head, and extremities, prioritization became more complex. Within this system of care, the challenge was not how to treat injuries, but which injury to treat first. In the all-encompassing effort of the second world war, many civilian anesthesiologists, surgeons, and
physicians called to service observed the benefits of a systematic approach to trauma care and returned to their communities with heightened expectations.

Initially in the Korean War and extensively in the Viet Nam War, rapid evacuation by means of helicopter accomplished delivery of wounded men still alive with grievous injuries to acute care hospitals. The military system of care acquired a new paradigm: seriously wounded soldiers were not required to survive transport through echelons of increasingly capable medical treatment; instead, moribund soldiers arrived within minutes to fully capable hospitals. Hospitals and staffs prepared for immediate response, including vigorous resuscitation and definitive surgical intervention. This standard of timely and effective care was cited in 1961 by Frank H. Van Wagoner, formerly Chief Surgical Consultant to The Surgeon General, Department of the Army, when he reported the results of a study of active-duty Army personnel who had died after unintended injury in the United States. He concluded that soldiers were dying needlessly, victims of "therapeutic failures" either because of delayed diagnoses or inappropriate treatment.³ As a consequence of the candid media coverage of the war in Viet Nam, public awareness grew concerning the system of trauma care available in the military, which routinely saved the lives of seriously wounded soldiers.

Tradition of Trauma Care in Municipal Hospitals

Although much has been learned from the military experience, large municipal hospitals in major cities have had equivalent influence on the treatment of injured patients throughout this century. In these teaching hospitals, the care of injured patients has been a priority, and they have developed many innovations in patient treatment. If urban trauma systems are defined as optimal care delivered by competent professionals in an institution committed to acute care, then de facto trauma systems existed in many major cities in the United States throughout the 20th Century. Large municipal hospitals-usually affiliated with a medical school and virtually always serviced by house officers-provided emergency care to indigent urban populations.⁴ University faculty working at these hospitals maintained a tradition of publishing clinical research on trauma management. Through this scholarship, options for management of patients sustaining complex injuries were debated and principles were established. In these urban hospitals with special interests in trauma care, injured patients received timely treatment in a systematic manner.⁵ In addition, many physicians and surgeons-in-training acquired considerable experience in these urban trauma hospitals.

However, after their training, competent and experienced trauma surgeons sometimes found it impossible to deliver optimal care to injured patients outside urban trauma hospitals. A surgeon's individual effort was not enough when a systematic approach to trauma care did not exist in an area. The problem of preventable deaths among injured patients treated in community hospitals was widely and repeatedly reported.⁶⁷⁸ The concept evolved that hospitals with special commitment to trauma care were superior and that a trauma system could improve outcome if injured patients were preferentially transported to those hospitals.

NAS/NRC 1966 Report on Accidental Death

Injury in America has been increasingly subjected to public scrutiny over the past 40 years. Local, state, and federal governmental agencies have declared death and disability from injury a public health problem. Consequently, government initiatives patterned after methods that enable control of epidemics such as poliomyelitis have legislated and funded health care policies targeted toward injury. Since the 1960s, the government has intervened to support research, promulgated regulations, and budgeted support for development of emergency medical systems intended to reduce the burden
of injury. Much of the progress toward development of trauma systems has been made as a result of federal government policy and funding.

Many authors have identified the publication of *Accidental Death and Disability: The Neglected Disease of Modern Society* in 1966 as the inaugural event in what was to become a sustained effort sponsored by government to control "accidental injury" as a health problem. The document was prepared after 3 years of deliberations by individuals appointed to the Committee on Shock and the Committee on Trauma of the Division of Medical Sciences of the National Academy of Sciences/National Research Council. In this publication, strong government leadership was proposed as essential in the effort to solve the "neglected epidemic" of death and disability from injury. The authors detailed the problem's enormous magnitude: the tragedy of early death among the young, the burden of disability, and costs of billions of dollars. The authors emphasized that the scope of the problem was all the more alarming when contrasted with the public's apathetic attitude toward trauma care.

Rejecting a prevailing sentiment of indifference, the authors proposed a broad program of concerted action. The Committees called for training, education, and research to improve the expertise and fund of knowledge available regarding treatment of injury in particular and emergency medical care in general. This manuscript envisioned a cooperative effort of medical professionals and the lay public, with government—both national and local—to respond to this problem by providing guidance and allocating money. *Accidental Death and Disability* publically announced trauma care as a political issue.

*Accidental Death and Disability* made recommendations for improving the care of seriously injured patients. Optimal treatment had to start in the prehospital phase, and the authors recommended creation of established standards for ambulance services, including vehicle construction and credentialing of fully trained ambulance attendants. They identified radiocommunication technology as essential for timely dispatch to a call for help. Tardy and inadequate physician responses to trauma care could be remedied by the emergence of a new specialty of medicine—physicians with "special training in immediate care." This prediction helped inspire a new medical practice specialty: Emergency Medicine. The document called for outside agencies with regulatory authority to categorize hospital capabilities. Four categories were described, ranging from first aid facilities to fully capable centers able to manage all patients. The committees felt hospitals and care providers should be held accountable for patient outcomes, and thus registries of valid and reliable data, including information from autopsies, should be developed. The report argued that investment in prevention of injury through sponsored research, public education, or government regulation could pay enormous dividends. Finally, the committee members stated that the budget for injury research was inadequate, and they called for the establishment of a National Institute of Trauma within the Public Health Service. This recommendation originally made in 1966 has been often repeated over the past 30 years, and still no actions have succeeded toward this end.

Congress responded to the *Accidental Death and Disability* report by enacting legislation. The *National Highway Safety Act of 1966* (Public Law 89-564) profoundly influenced several aspects of the injury problem in America. The Department of Transportation was given authority, money, and instruction to implement the law. Injury to occupants of motor vehicles was to be reduced, and research resulted in development of effective car safety devices. The bill identified systematic changes that could improve the care of injured patients, including expanded capability for radiocommunication and use of helicopters for medical evacuation of injured patients to hospitals. As emphasized in the document, "Coordination, transportation, and communication are necessary to
bring the injured person and definitive medical care together in the shortest practical time...."

Funding of ambulance services was made part of a National Highway Traffic Safety Program.

Three states, Maryland, Florida, and Illinois, capitalized on federal programs funded by the National Highway Safety Act of 1966 and pioneered development of regional emergency services programs, including trauma systems. In April of 1969, under the leadership of R. Adams Cowley at the Maryland Institute for Emergency Medicine, the University of Maryland hospitals and the State Police cooperated in a unique program. Police transport of patients by helicopter from the scene of injury to a dedicated trauma center achieved the dual goals of rapid evacuation and timely treatment of shock. In addition, helicopters enabled transfer of seriously injured patients from regional hospitals to the shock-trauma center in Baltimore. Implementation of this first trauma system resulted in a reduction of the mortality rate of seriously injured patients.12

In Jacksonville, Florida, Waters and Wells reported a 38% reduction in frequency of traffic accident deaths after implementation of an emergency medical care system. This system emphasized prehospital resources, rescue squads with trained crews, and improved communication intended to ensure more rapid responses to events such as motor vehicle collisions.13

Illinois developed a landmark statewide trauma system in the early 1970s, an extension of the concept of a special trauma care unit inaugurated by surgeons at Cook County Hospital in Chicago in 1966.5 The Illinois trauma system was developed as a political activity under the authority of the state government and with the active participation of the governor. Described in a series of published articles by Boyd et al., the Illinois trauma care plan was designed as a comprehensive system with essential components.14,15 The five components of the Illinois trauma system were categorization of selected hospitals as trauma centers, technology enabling instantaneous communication within the system, design of ambulances for safe transportation of injured patients, special training of health professionals, and a program for evaluation of care which depended upon information in trauma registries. The Illinois trauma system was evaluated by using rigorous epidemiologic methods by Mullner and Goldberg, who concluded the system had reduced death rates for critically injured patients in rural but not urban regions of the state.16 In Maryland, Florida, and Illinois, public funds were converted into successful investments as the characteristics of regional trauma systems were defined. The systems in these states were prototypes and became compelling examples of successful health care policy because, in each case, evidence indicated that implementation of a trauma system saved lives.

Trauma systems were specifically given an additional boost of funds by federal legislation in the 1970s. Public Law 93-154, Emergency Medical Services Systems Act of 1973, authorized the Secretary of Health Education and Welfare to provide grants to states, units of local government, or other "regional arrangements or consortium" to develop and operate emergency medical services (EMS). Revised and refunded in 1976 as Public Law 94-573, the Emergency Medical Services Amendments provided explicit language that called for statewide EMS systems to serve rural and other medically underserved areas. This legislation specified resources be committed to improving access to care and training of physicians in emergency medicine. Expenditure of 300 million dollars over 8 years led to establishment of 304 EMS regions in the United States.

As federal funding supported development of emergency medical systems, including trauma systems, throughout the 1970s, professional organizations exercised leadership by advocating standards for hospital categorization. In 1971, the American Medical Association proposed a scheme for
A more specific application of categorization defined criteria by which hospitals could be classified to care for injured patients was published by Detmer et al. in 1977 and defined four categories of hospitals, borrowing from the American Medical Association recommendations. Area emergency service hospitals were fully capable of providing definitive care to all patients; general emergency service hospitals had similar capabilities as area emergency service hospitals, but the level of expertise was less, and transfer of the most seriously injured patients to a hospital with a higher categorization was expected; community emergency service hospitals had limited capability and emphasized rendering emergency resuscitative interventions; finally, their scheme included the designation "uncategorized" to indicate that some hospitals did not meet minimal standards. Defining the key characteristics of a trauma center became the principal emphasis in evaluation of the systematic care of injured patients during the 1970s. It was during this period of federal support for EMS that the Committee on Trauma of the American College of Surgeons assumed a leadership role in trauma system development. With publication of the first edition of *Optimal Hospital Resources for Care of the Seriously Injured* in 1976, the Committee on Trauma provided a summary document of the essential characteristics of trauma centers and emphasized that trauma centers must operate in the context of a trauma system. The Optimal Resource Document and its subsequent editions have been regularly cited by local authorities designing trauma systems.

In 1981, federal funding sharply declined for development of regional emergency medical systems, and trauma systems in particular. The *Omnibus Budget Reconciliation Act of 1981* terminated federal government support of EMS and changed the method of funding allocation by providing money to states in block grants intended to support preventive measures and health services. The states were granted considerable discretion regarding what programs to support, and in many states EMS management organizations lost funding and closed. Local and state government initiative compensated for the decline in the federal government's support for trauma systems. Progress in trauma system development occurred in the early 1980s when public demand for improvements in the care of injured patients emerged.

**Orange County and the 1979 Public Demand for Reform**

In Orange County, California, in the late 1970s, a sequence of events established a paradigm for change. Disclosure to the public of a need for improved care for injured patients led to demand for development of a trauma system. The process began when West et al. published a study indicating that injured patients in Orange County received care inferior to that delivered in the city of San Francisco. West et al. found that two thirds of patients without brain injuries who died in 39 hospitals in Orange County died possibly or frankly preventable deaths because they received delayed or inadequate care, and these observations were confirmed in a second, more rigorous study. As a consequence of these reports, public opinion favored implementation of a trauma system in Orange County, with designation of one Level I and four Level II trauma centers. Follow-up studies of the impact of implementation of the system indicated that frequency of preventable deaths declined substantially.

The sequence of events that led to the Orange County Trauma System were public disclosure of a need, regional government's implementation of a trauma system, and report of benefit after system implementation. This sequence became a template for development of other trauma systems. Neuman et al. reported that preventable deaths were a prevalent problem in San Diego in 1979. A follow-up audit was performed in 1982, confirmed there was a problem, and led to 1984 legislation providing
the Department of Health Services of the County of San Diego authority to proceed with a regionalized trauma care plan. A subsequent evaluation discovered that preventable deaths declined with trauma system implementation. Similarly, a published report by Lowe et al. reported a high prevalence of preventable deaths in Portland, Oregon, and recommended a trauma system to triage seriously injured patients to designated trauma centers. In 1985, Oregon's legislature granted broad powers to the State Health Division for the purposes of developing a statewide trauma system. The Health Division exercised its authority in two actions: only two of five applicant trauma centers were designated in Portland, and a novel categorization of Level IV trauma centers was developed in rural communities, which enabled even remote trauma centers to be included in the statewide trauma system. Subsequent evaluation of the Oregon Trauma System provided evidence that seriously injured patients were triaged more commonly to tertiary care trauma centers, and odds of death declined statewide and in Portland. Thus, the Orange County paradigm of implementation of trauma systems as a public health care policy in response to a demonstrated need as developed by West et al. was successfully applied to other regions in the 1980s.

Government Calls for Research into Trauma System Efficacy

In 1983, Congress authorized the Department of Transportation to request a study of the problem of injury in America by the National Research Council. A committee was selected and instructed that the project was intended as a 20-year follow-up analysis to the 1966 study. The study was published as *Injury in America: A Continuing Public Health Problem*. The study concluded that injury remained a problem, and despite considerable effort, substantial funding, and research supporting the effectiveness of trauma system implementation, only a modicum of progress had been made. Committee members recommended researching the epidemiology of injury and to use the results to develop injury prevention programs. Committee members strongly and successfully urged that a federally funded Center for Injury Control be established within the Centers for Disease Control of the Department of Health and Human Services. Funding for research into all aspects of injury-prevention, prehospital care, acute care, and rehabilitation-"commensurate with the importance of injury" was requested as a prudent investment that could lead to progress against the burden of injury on America. The comprehensive solution to injury control was evident in the Committee's recommendation that a major research priority be given to rehabilitation and recovery. The Center for Injury Control was reviewed in 1988, and an assessment published as *Injury Control 1988* concluded that the Center had successfully established intramural and extramural research programs in several areas of scholarship. The review committee recommended the Center for Injury Control make trauma systems a research priority.


The National Highway Traffic Safety Administration has been a leader in EMS development for 30 years. In 1988, the administration provided an assessment of the 10 essential components of a fully established system to states with EMS. These components included regulation and policy, training, communications capability, medical direction, and an active trauma system. The National Highway Traffic Safety Administration has continued to provide leadership with the publication of *EMS Agenda for the Future*, prepared as a "vision to the future." This document emphasizes that EMS in general, and trauma systems in particular, must be community-based and committed to all aspects of the problems of responding to emergency care.

1990 Trauma Systems Development Act
New federal funding was specifically allocated by Congress to support publicly administered trauma systems in 1990. The *Trauma Care Systems and Development Act* (Public Law 101-590) intended to provide health care planning support by developing a Model Trauma Systems plan. The plan was developed under the direction of staff at the Health Resources and Services Administrations with input from a coalition of trauma systems experts. States that wished to develop trauma systems were allocated funds if they developed proposals consistent with the model plan. The program was not successful in some opinions because of limited funding and federal insistence on rigid adherence to the model plan. In 1995, Congress failed to reauthorize funding under the act.

## 1993 National Survey Of Trauma Systems

In 1993, Bazzoli et al. conducted a survey of trauma system administrators in every state to examine the status of trauma systems. Twenty states reported the existence of trauma system administrations with legal authority; however, only five states met all eight of the authors' criteria for fully implemented trauma systems. A common deficiency for trauma system planners was reluctance to enforce limitations on the number of trauma centers based on need. Bazzoli et al. hypothesized political obstacles as one explanation for disappointing trauma system development progress. The authors recommended continued research into development of methods to evaluate trauma system effectiveness. Such research would guide design of optimal comprehensive trauma systems and provide compelling evidence of the value of trauma systems to health systems planners.

## Financial Crisis for Trauma Systems

Declining health care reimbursement in the 1990s has threatened urban, suburban, and rural trauma systems as financially viable health care policies. Although trauma systems have required providers to meet expensive standards of commitment, payment for services has declined; and as trauma system designers have required that injured patients receive immediate care at any time, trauma centers have not required patients to prove means to pay for care. The open-ended commitment of trauma centers to deliver care and retrospectively seek payment has contrasted with the trend of federal programs to control health care costs with prospective payment systems. In 1982, the Health Care Financing Administration introduced diagnosis-related groups to assign a fixed reimbursement for Medicare beneficiaries; this system of prospective payment has been adopted by other payors. Prospective payment systems are cost-containment strategies that provide disincentives when expensive care is delivered and incentives when less expensive care can accomplish the same end. In a trauma system, patients with the most severe injuries are triaged to trauma centers, whereas those with less severe injuries may be treated in noncategorized acute care hospitals. This means that two patients with the same diagnosis-related groups but substantially different needs generate insufficient revenue for the trauma center but a profit for the noncategorized acute care hospital. The hospital administration and professional staff of some trauma centers have responded to the financial risk of operating a trauma center by closure. Dailey et al. reported in the period 1985 to 1990 that 10% of trauma centers ceased to operate as categorized trauma centers. Usually, "closure" meant these acute care hospitals (the majority were for-profit institutions) continued to function as acute care hospitals but discarded their categorizations as trauma centers.

Indigent care is an additional burden for many trauma centers, particularly in large cities where a substantial proportion of indigent patients have sustained penetrating injuries. Public hospitals designated as metropolitan trauma centers, and the providers who work at them, are often burdened with disproportionate shares of unreimbursed care. When indigent patients do not pay, the trauma center...
center and professional staff must either write off the costs or are compensated with supplemental indigent care payments—usually as lump sums—from regional government. In the current fiscal environment, trauma centers receiving many seriously injured patients are at risk for bankruptcy. Such a crisis was precipitated in 1992 in Los Angeles. Los Angeles County and University of Southern California medical center (LAC+USC)—a Level I trauma center serving much of the city's indigent population—faced bankruptcy, and the Los Angeles County Board of Supervisors proposed closure of the medical center. The political response culminated in a federal emergency bail-out plan announced by President Clinton. This incident demonstrated how participation in an effective trauma system could be fiscal suicide.

Trauma systems depend on physician providers willing to make a commitment to the care of injured patients. These providers in urban, suburban, and rural hospitals encounter several disincentives. Forty-seven percent of trauma centers reported problems retaining surgical specialists and trauma surgeons on trauma call schedules in a 1994 survey. General surgeons reported undesirable working hours, patients rarely in need of operations, "negative patient factors," and low reimbursement as specific negative aspects. The future of trauma systems as a concept may depend on training a new generation of capable professionals as willing key participants.

**CONCLUSION**

At the end of the 20th century, the future of trauma systems seems to depend on finding fiscal solutions to providing the intensive level of care that trauma systems demand. Implementation of trauma systems now requires substantial further investment in acute care and rehabilitation if injured patients are to benefit. Some authors have suggested that properly delivered care in a trauma center—with more rapid recovery and fewer complications—may be expensive, but eventually results in cost reduction. It is clear that cost-efficient care must become a priority in trauma system evaluation if managed care providers are to be convinced to support them.

Trauma systems should be perceived as a public health care experiment. No one can dispute the value of the intentions of trauma systems. Also singular over the past 30 years of trauma system development has been the link between trauma system implementation and public policy. In the era of government-directed health care reform, trauma systems exemplify public assertion of control over a traditional prerogative of the medical profession (i.e., where a patient receives care). The designation of trauma centers networked as a trauma system is a paradigm of government influence over medical care. Ethical priorities, economic exigencies, and effectiveness in trauma care will be examined as the debate surrounding trauma systems moves into how to best spend decreasing medical care resources. These issues will influence other applications of public health care policy to clinical practice.

**SUMMARY**

The concept of a trauma system as public health policy has developed substantially during the 30 years since publication of *Accidental Death and Disability: The Neglected Disease of Modern Society*. The military experience with casualties established the public expectation that grievously injured citizens should be expected to survive if a system enables a team of experts to work smoothly together. The federal government has invested hundreds of millions of dollars in support of development of an infrastructure of emergency medical systems throughout the country, and trauma systems have benefited from timely prehospital care provided by trained professionals. State or
regional metropolitan governments have initiated establishment of trauma systems as fusions of health care and the politics of health care policy. Trauma systems can be considered an experiment in health care policy because they have characteristics uncommon with other areas of medical practice. Hospitals have been categorized by means of outside review based on their capabilities to provide trauma care, which has led to designation, whereby individuals are transported to trauma centers after serious injury rather than the hospitals they might normally choose. The performance of hospitals and health providers in a trauma system is subjected to outside review and some form of public accountability.

All of the effort, money, and work committed to trauma systems requires careful scrutiny to determine whether trauma systems are indeed beneficial. Have trauma systems reduced death, ameliorated disability, and successfully prevented the problems these public health policies intend to manage?

REFERENCES


This study was supported by grant R49/CCR-006283 from the US Public Health Service, Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, Atlanta, GA.

The author is solely responsible for the contents of the article, and the opinions do not necessarily represent the views of the Centers for Disease Control and Prevention.

This historical review was generated after the Academic Symposium to Evaluate Evidence Regarding the Efficacy of Trauma Systems, July 17-18, 1998, Skamania Lodge, Stevenson, Washington.

Address for reprints: Richard J. Mullins, MD, Oregon Health Sciences University, Department of Surgery, L223A, 3181 SW Sam Jackson Park Road, Portland, OR 97201-3098; email: mullinsr@ohsu.edu