MINUTES OF THE
FEDERAL INTERAGENCY COMMITTEE ON
EMERGENCY MEDICAL SERVICES (FICEMS)

DATE & TIME:		June 2, 2005 10:30 a.m.
LOCATION:		HHS, HRSA Parklawn Building Rockville, MD
MEMBER AGENCY REPRESENTATION:		**Department of Homeland Security** *Federal Emergency Management Agency (FEMA)* Mr. John Brasko, Acting Chairman United States Fire Administration Ms. Cathy Broughton United States Fire Administration Mr. John Hoyle Emergency Management Institute
		Department of Agriculture Mr. Derek Jones
		Department of Commerce (DOC) Jeannette Young Reese National Technical Information Service (NTIS) Wayne Strickland National Technical Information Service (NTIS)
		Department of Defense (DOD) Major Pam Evans, U.S. Northern Command Joint Medical Plans and Operations Office
		Department of Health and Human Services (DHHS) Ms. Nancy Romano, AS Subcommittee Chair National Institute for Occupational Safety and Health (NIOSH)* Mr. Richard Current

		Ms. Cheryl Anderson, HRSA Ms. Tina Turgel, HRSA, Mr. Terry Mullins, HRSA – Trauma EMS Technical Assistance Center Ms. Jocelyn Hulbert, HRSA – Trauma EMS Technical Assistance Center Ms. Blanca Fuertes, HRSA Ms. Hazel Perez, HRSA Ms. Karen Beckham, HRSA
		Department of Interior Mr. Dan Pontbriand National Park Service
		Department of Justice (DOJ) Mr. Jeff Ruppert
		Department of Labor No Representation
		Department of Transportation (DOT) Mr. Drew Dawson National Highway Traffic Safety Administration (NHTSA) Mr. Dave Bryson, NHTSA Ms. Susan McHenry, NHTSA Ms. Laurie Flaherty, NHTSA Ms. Kelly McGuire, NHTSA Mr. Greg Mango, NHTSA Mr. Robert Squire, NHTSA Mr. Kenny Oland, NHTSA Mr. Mike Parson, NHTSA Mr. Gamunu Wijetunge, NHTSA
		Department of Veteran Affairs No Representation

		Federal Bureau of Investigation (FBI) No Representation
		Federal Communications Commission No Representation
		General Services Administration (GSA) Mr. John McDonald
OTHER ATTENDEES PRIVATE SECTOR:		**American Ambulance Association** Mr. Kurt Krumperman*
		American Integrated Training Systems Mr. Billy Rutherford
		American Society Testing & Materials (ASTM) Mr. Pete Chambers
		Emergency Responder Safety Institute Mr. James Garcia
		National Volunteer Fire Council (NVFC) Mr. Craig Sharman
		VFSI Mr. Rick Patrick
		IAFC Mr. Bill Bullock
		American Medical Response Mr. Ron Thackery Mr. Mark Van Arnam
		Montgomery Count Fire and Rescue Mr. John Kinsley
		Safety Technologies International, Inc. Mr. Dennis Ottey
		Members of the Public Mr. Chris Zervas

Dial-In Participants

I. ANNOUNCEMENTS/HANDOUTS

Mr. John Brasko, Acting Chairman, welcomed the group and thanked HRSA for hosting the meeting. Ms. Cheryl Anderson of HRSA extended a welcome to the attendees and provided a general overview of the facility.

Handouts:

- Pediatric Emergency Care Applied Research Network Newsletter
- Road Safety Advanced Technology Vehicle Safety Systems pamphlet
- American Medical Response organizations flyer introducing the Safest Ambulance on the Streets.

II. REVIEW OF PAST MEETING MINUTES

Mr. Brasko requested a review and comments to the March meeting minutes. No comments were made and a motion was made to approve the minutes as drafted. The motion was passed and the FICEMS minutes for the March meeting were approved and published.

III. OLD BUSINESS

- The only open action item from the March meeting was to follow up with HRSA to host the June meeting. This action item was complete and as a result all ongoing action items from previous minutes have been reviewed and are complete. Please reference prior minutes for action items and resolution. There were no reports of old business or open action items.

IV. SUBCOMMITTEE REPORTS

Ambulance Safety

Ms. Nancy Romano, Chairman – Ambulance Safety (AS) Subcommittee - Ms. Romano reported that the AS Subcommittee will be working with Dave Bryson of NHTSA to provide information for NHTSA's collaborative efforts including the 2005 Ambulance Safety conference. Ms. Romano provided an overview of the agenda items for the AS Subcommittee meeting later in the day. Ms. Romano also introduced Ron Thackery and Mark Van Arnam of AMR. Mr. Thackery provided a brief overview of American Medical Response (AMR) next generation ambulance of which a prototype was onsite outside the building for attendees to tour and learn more about.

V. MEMBER AGENCY REPORTS

NHTSA: Mr. Drew Dawson/ Ms. Susan McHenry/Mr. Dave Bryson/ Ms. Laurie Flaherty/ Mr. Gamunu Wijetunge/ Mr. Greg Magno/ Mr. Mike Parsons.

- Mr. Dawson reported that the NHTSA reauthorization legislation was still in committee.
- Ms. McHenry reported that the National EMS database project will be housed through the NHTSA Center for statistics and analysis. The project will take approximately 1-2 years to get up and running and begin collecting data from NEMSIS and the Technical Information Center.
- Mr. Dave Bryson provided an update on the National Ambulance Safety Conference. OPM is expected to award the contract for the conference management support within the next 30-60 days. As a result, the conference will likely occur in late summer or early fall.
- The National EMS Safety Review Team will hold a meeting June 13th through the 15th at the Holiday Inn in Old Town Alexandria.
- Ms. Flaherty reported that the update of the current 911 system to a digital and web based infrastructure will be implemented in a 3 phased approach. First will be the research phase, followed by the concept of operations, and the migration plan.
- The Enhanced 911 system initiative is underway as a joint effort between NHTSA and NTIA.
- Mr. Wijetunge provided an update on the EMS Workforce Project. As part of a joint effort with HRSA, NHTSA has contracted with the University of California to perform qualitative and quantitative analysis of the current EMS workforce data. The findings will be used to develop policy direction for the EMS workforce of the future.

- Mr. Bryson introduced the two members of the NHTSA organization that will become regular participating members of the FICEMS community. The office of Safety Recall was represented by Mr. Greg Mango and Mr. Bob Squire and the Special Crash Investigations Office was represented by Mr. Mike Parsons and Mr. Kenny Oland.

HRSA – Ms. Tina Turgel/Ms. Blanca Fuertes/Ms. Cheryl Anderson/ Mr. George Brown

- Ms. Turgel reported that the EMS for Children program has been zeroed out of the FY2006 budget. HRSA is still hopeful that some or all of the moneys will be restored.
- Despite a lack of funding at this time, grant notices are being sent out as if money will be reissued.
- Ms. Fuertes reported on the status of the Rural EMS and Trauma Technical Assistance Center (REMSTTAC) contract for rural and EMS technical assistance. HRSA is in the process of defining the tasks to best fulfill the mission in assisting rural communities in the development and implementation of EMS response systems.
- Mr. Brown indicated that the rural AD grant project has been successful in funded 48 states in small and rural communities to provide EMS training.
- Ms. Anderson provided an update on the Model Trauma Systems Planning and Evaluation document (MTSPE). The document will be piloted in three states this summer and the document is planned for release by the Spring of 2006. Ms. Anderson agreed to forward the draft document to the FICEMS community for review and comment.
- The Trauma-EMS Systems Program is in the midst of a Performance Assessment Rating Tool (PART) Review and has prepared by reviewing other HRSA Program assessments including those of EMSC, TBI and Poison Control.
- The National Trauma Data Standardization Project continues to progress and should be finalized in the Spring of 2006.

GSA: Mr. John McDonald

Mr. McDonald reported that the ordering season for Emergency vehicles through GSA has ended for this FY. GSA anticipates a new ambulance vehicle chassis will be available beginning next year.

NIOSH: Nancy Romano/Paul Moore

- Ms. Romano announced that a teleconference was scheduled for the week of June 13th to discuss Human Factors involved in ground transportation.
- Mr. Paul Moore reported on the status of the Crash test data analysis for the Division of Safety. The preliminary results are in and being analyzed, but due to some legal issues, the results will not be available until this fall at the earliest.
  The Division is also in the process of the start-up for the Phase II ambulance to be outfitted with a new restraint system. The new restraint system is recommended as a result of a human factoring study using mannequins and these restraint systems in crash tests.

FEMA, Emergency Management Institute, John Hoyle

Mr. Hoyle reported on the formulation of a joint FEMA/HHS committee designed to address surge capacity and mass casualty planning capabilities and approaches. This

is a very high level committee that is tasked with briefing the Presidents cabinet on a weekly basis.

USDA: Mr. Derek Jones

Mr. Jones indicated that the USDA Rural Development Program issues grants and loan programs to rural communities for the purchase of EMS equipment, vehicles, renovations, care centers, training etc.

DOC/NTIS: Mr. Wayne Strickland/Jeanette Young-Reese

- Mr. Strickland indicated that NTIS maintains a database of ambulance safety related information at the state and local levels. This information is available on CD/ROM for $20 or is available for download from the NTIS web site.

VI. REPORTS – OTHER INTERESTED PARTIES

National Park Service: Mr. Dan Pontbraind

Mr. Pointbraind reported that the NPS interest in the FICEMS community stems from the fact that they receive more than 10,000 basic life support calls annually, and roughly 2,000 advanced life support calls annually. The majority of these calls are in rural and wilderness environments.

U.S. Northern Command Joint Medical Plans and Operations Office: Major Pam Evans

Ms. Evans offered any and all assistance from the DOD community can be coordinated through her, and she will put FICEMS in touch with the appropriate subject matter expert.

National Ambulance Association: Kurt Krumperman

Mr. Krumperman indicated his interest in contributing to a number of the initiatives being discussed at the FICEMS conference. Of particular interest is the surge capacity study.

Mr. Krumperman reported that there were a number of Bills before congress that was of interest to the FICEMS community. The first responders grant/bill passed the house and is with Congress requesting that 10% of the budget be designated for EMS which is a 6% increase. The other Bills presented to Congress are the Ambulance funded Medicare program and the Rural Ambulance funding Bill.

Emergency Responder Safety Institute: Mr. James Garcia

Mr. Garcia reported that he is working with CVFFA and USFA on responder safety initiatives.

American Integrated Training Systems (AITS): Mr. Billy Rutherford

As President of the BMW Bikers of Metropolitan Washington, Mr. Rutherford complimented NHTSA for developing and making available the First There, First Care Bystander Care for the Injured, that includes the unique aspects of motorcycle rider injuries. Ms. Laurie Flaherty, NHTSA Program Manager, did an outstanding job of managing the development of this program. The Fairfax City Fire Department is conducting classes on this program at the Fairfax City Fire Station at no cost to the

participants. This training was coordinated by Fairfax City Fire Department, Assistant Chief Dave Bryson.

United States Fire Administration: Mr. John Brasko

Mr. Brasko reported that the USFA has initiated a Firefighter Fatality awareness program called "Everybody Comes Home". The program is designed to promote awareness to the public as well as provide training to the Fire response community to practice safety in responding to emergency situations.

VII. ACTION ITEMS REVIEW

The action item for Natek to follow-up with HRSA to host the June meeting was considered closed as a result of the successful hosting of the June meeting by HRSA.

Review of Action Items from this meeting:

- Cheryl Anderson, HRSA is requested to email the updated Model Trauma plan to the FICEMS community for review and comment. (attached)

VIII. NEW BUSINESS

NHTSA offered to host the September 2005 FICEMS meetings. Details of the location and logistics will be provided as they become available.

IX. SUBCOMMITTEE MEETINGS FOLLOWING THIS MEETING

Ambulance Safety Subcommittee meets at 1:00

X. NEXT MEETING

September 1, 2005, 10:30 a.m.

Proposed Location:
National Highway Transportation Administration
Washington, D.C.

XI. ADJOURNMENT

Meeting adjourned at 12:00 p.m.

Model Trauma System Planning and Evaluation

Trauma Systems Collaborating with Public Health for Improved Injury Outcomes

U.S. Department of Health and Human Services
Health Resources and Services Administration
Trauma-EMS Systems Program

DRAFT 3-2-05

Model Trauma System Planning and Evaluation

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BACKGROUND

In FY 2001, Congress appropriated funding for the Health Resources and Services Administration (HRSA) to administer the Trauma-Emergency Medical Services (EMS) Systems Program through Title XII of the Public Health Service Act. The Program proposed that the legislatively required 1992 *Model Trauma Care Systems Plan* needed to be updated. Some of the original authors of the *HRSA Model Plan* recommended that the revision be framed to coordinate with the 10 Essential Public Health Services developed by the U.S. Centers for Disease Control and Prevention (CDC) with the public health community in the mid-1990s. (More information on the Essential Public Health Services can be accessed on the Internet World Wide Web at http://www.phppo.cdc.gov/nphpsp/10EssentialPHServices.asp.) The Federal program's *National Trauma-EMS Stakeholder Group* endorsed this recommendation. *Model Trauma System Planning and Evaluation,* a guide to modern statewide trauma system development, is the outcome of this recommendation.

INTRODUCTION

This document, *Model Trauma System Planning and Evaluation,* is designed to provide trauma care professionals, public health officers, and health policy experts with direction to use the public health approach, a scientifically proven method, when developing trauma systems. This step can be accomplished by incorporating the core functions and essential services described by the public health professional community into the planning and implementing of trauma systems. This new model plan offers guidance to States and communities promoting effective collaboration between public health systems and trauma systems, all whose charge includes the health and welfare of the public. Nothing in this new model plan should suggest that public health and trauma system planning and evaluation should be combined. Rather, the approach taken by Federal, State, and local public health planners in designing and evaluating systems is the same approach that should be used to design trauma systems.

This model emphasizes a public health system approach to trauma system development. The system is inclusive, engaging not only health care facilities to the level of their capabilities, but also the full range of public health services available in the communities served. The overall goal is a collaboration of these two systems of health care and related services to reduce the incidence and severity of injury, as well as to improve the outcomes for those who are injured. (For the purposes of this document, injury or injury prevention includes both intentional and unintentional.) *Model Trauma System Planning and Evaluation* outlines a structure for trauma system development within the public health system framework:

- Trauma care professionals will be introduced to the use of the public health system framework as a guide for State and regional trauma system development.
- Public health professionals will be introduced to an understanding of an inclusive trauma system organized within the commonly accepted parameters of the public health approach.
- Health care policy makers will be introduced to collaborative opportunities in which the public health system and the

trauma care system can partner to reduce the total burden of injury in the community.

Although intended primarily for State and regional trauma system managers, the document will also be useful to local trauma center managers and includes:

- A description of the three core functions and the 10 Essential Public Health Services
- Trauma system benchmarks and indicators, and a description of how they fit into the public health framework
- A trauma system self-assessment tool, structured around the three core functions of public health, with benchmarks, indicators, and a scoring system to rank the stage of system development and to guide the next appropriate steps

Additional resources provided in the Appendices include:

- Injury statistical tables
- A table, "Trauma System Historical Information"
- Acknowledgments pages citing primary authors, contributors, and others to whom the Federal program is grateful
- An extensive "Trauma System Manager's Glossary of Terms, Acronyms, and Abbreviations," which lists key words and phrases pertinent to trauma systems, trauma centers, trauma care, and related activities (in progress)

STATEMENT OF THE PROBLEM

Injuries, intentional and unintentional, continue to be a significant public health concern in the United States. The years of potential lives lost before the age of 65 from injury in this nation is staggering. Unintentional injury accounts for more than 2 million years of potential life lost, and suicides and homicides account for an additional 1.3 million years.[1]

Injuries are responsible for millions of medical visits in the United States, with an estimated episode of injury care rate of 90 per 1,000 persons. The number of emergency department visits for injury treatment is estimated to be over 40 million annually. See Appendix A for an example of CDC annual data citing the 10 leading causes of nonfatal injuries treated in hospital emergency departments.[2] Of the injuries that resulted in hospitalization, 58% were unintentional injuries and 30% were related to falls.[3] More than 16% of all hospitalizations for unintentional injuries among children 14 years and under result in permanent disability.[4] **Disabling injury** results in varying degrees of permanent impairment and/or renders injured persons unable to effectively maintain their previous lifestyle.

Traumatic injury refers to physical injuries that pose discernible risk for death or long-term disability. Trauma is estimated to be responsible for over 160,000 deaths annually in the United States and for an estimated mortality rate of 55 per 100,000 populations.[5] These figures are not decreasing; rather, they are on the rise (see Appendix B). Trauma is the leading cause of death for Americans under 44 years of age (including homicides) and is among the top 10 causes of death for all other age groups.[6] See Appendix C for the 2001 10 leading causes of deaths from intentional and unintentional injury by age group.[7]

In addition to the medical, psychosocial, and financial burdens placed on individuals, families, and hospitals, society at large is profoundly affected by injury. The financial cost of injuries is estimated at more than $224 billion annually. This estimate includes direct medical care, rehabilitation, lost wages, and lost productivity. The Federal government expenditure on injury-related medical cost approaches an estimated $13 billion each year, with an additional $18.4 billion allocated to death and disability benefits. Insurance companies and other private sources pay additional costs estimated at $161 billion.[8]

When the national effort to be prepared for all types of disasters, including terrorist events, is considered, the need for effective injury response (trauma) systems is clearly evident. Even with current efforts to minimize injury, it continues to be "the neglected disease of modern society," as it was described in the 1966 white paper *Accidental Death and Disability: The Neglected Disease of Modern Society.*[9] Trauma care of persons with multiple, severe injuries is believed to be as available and reliable nationwide as police and fire protection. Unfortunately, this belief is not universally true. Although great strides have been made during the past generation in extending emergency medical and trauma care to the citizens of our Nation, most States are realizing that they need to create, further develop, or enhance their State's ability to care for trauma patients through system development. However, large areas of the United States (particularly rural and frontier areas) continue to lack consistent access to these services. In many regions of the country, access to health and emergency care is poorly coordinated.

Why does such a gap between trauma care expectations and outcomes continue to persist? One possible answer is the public's lack of understanding about this gap. The resources have not been harnessed to mount a comprehensive injury response strategy. There is a need for better public and policy-maker education on the role of EMS and the Trauma System, the levels of care provided, and the varied resources available. Such a strategy would link the expertise of the public system disease prevention with the expertise of the trauma care system in its diagnosis and treatment.[10]

HHS Healthy People Documents and Trauma Systems

The importance of injury as a public health concern is emphasized in the national health objectives developed by the Department of Health and Human Services (HHS) entitled *Healthy People 2010.*[11] Before the 2010 document, national trauma and emergency medical services were not recognized in prior Healthy People documents (2000). The 2010 document has two overarching goals:

1. To assist individuals of all ages in increasing life expectancy and improving the quality of life
2. To eliminate health disparities among different segments of the population

A number of the 467 objectives in the twenty-eight chapters are issues of importance to trauma care professionals. For example, one chapter is devoted entirely to injury and violence prevention.

Specific Trauma-EMS Objectives

Trauma-EMS systems play an important role in responding to injury as a public health threat. Their role has been formally recognized through the inclusion of four national Trauma-EMS objectives in the *Healthy People 2010* document. Although these

will be revised in future Healthy People documents, the following reflect the current objectives:

(1.10) Reduce the proportion of persons who delay or have difficulty in obtaining emergency medical care. (i.e., underinsured and uninsured).

(1.11) Increase the proportion of persons who have access to rapidly responding prehospital emergency medical services. (i.e., prehospital emergency medical care providers who are appropriately trained and properly equipped).

(1.13) Increase the number of Tribes, States, and the District of Columbia with trauma care systems that maximize survival and functional outcomes of trauma patients and help prevent injuries from occurring.

(1.14) Increase the number of States and the District of Columbia that have implemented guidelines for prehospital and hospital pediatric care.

Future Healthy People documents should expand only national objectives related to trauma care.

HISTORICAL DEVELOPMENTS

The Trauma Care Approach

The Highway Safety Act of 1966[12] and the Emergency Medical Services Systems Act of 1973[13] represented the first systematic attempts to apply lessons learned by physicians serving in the military during the armed conflicts of Korea and Vietnam to domestic emergency medical and trauma care. Programs funded by these Acts led to education and training programs for emergency medical technicians and the model development of regional trauma and emergency medical services. Early efforts to organize the provision of trauma care focused on individual patients. Injured patients cared for in developing trauma centers received a quality of care superior to that received at hospitals without such expertise.[14] The model of trauma care system that developed emphasized hospital-based acute care rather than a statewide, inclusive, integrated system of trauma care delivery.

The Trauma Systems Planning and Development Act of 1990[15] represented the next major step in the modern evolution of health policy related to trauma care. This Act directed HRSA to develop the *Model Trauma Care Systems Plan* in 1992.[16] The 1992 plan emphasized the need for a fully *inclusive* trauma care system, one that involved not only trauma centers, but also all health care facilities according to availability of trauma resources. The American College of Surgeons (ACS) Committee on Trauma's *Resources for Optimal Care of the Injured Patient* continues to provide detailed descriptions of the organization, staffing, facilities, and equipment needed to provide state-of-the-art treatment for the injured patient at every phase of trauma system participation.[17] Although few States and regions have a fully inclusive trauma system at present (one that fully integrates all hospital and prehospital trauma care into the trauma system), they have made substantial progress toward this goal since 1992.

The HRSA 2002 *National Assessment of State Trauma System Development, Emergency Medical Services Resources, and Disaster Readiness for Mass Casualty Events* revealed that few existing trauma systems meet all the historical criteria used by

trauma system researchers and identified in the HRSA *1992 Model Trauma Care System Plan (MTCSP).* These historical criteria were considered necessary for a truly comprehensive and fully functional system.[18] The findings demonstrated growth in the major areas, although clearly, more work and research are needed to continue the national development of trauma systems. This assessment also demonstrated that the more comprehensive a State's trauma system development, the more ready the State was to medically handle all types of disasters.

The concept of the fully inclusive trauma care system advanced the idea that trauma care should be community based rather than trauma center based. However, the fully inclusive trauma systems envisioned in the *1992 MTCSP* did not include the potential roles of injury prevention and public health in trauma care. The importance of reducing the risk of major trauma, combined with providing appropriate treatment and resources for acute care, demonstrates the value of the public health system approach in trauma system design. See Appendix D for further trauma system historical information.

Emerging Linkages Between Public Health and Trauma Systems

The increased incidence of major trauma in the late 1980s and early 1990s led public health professionals to recognize obvious parallels between the epidemiologic behaviors of illnesses and injuries. It also led these professionals to champion a public health approach to injury prevention and control. Injury prevention leaders recognized that public health strategies tested during the years of communicable disease eradication could be successfully applied to the prevention of injury.[19] As a result, these leaders developed the methods used for effective injury prevention programs.

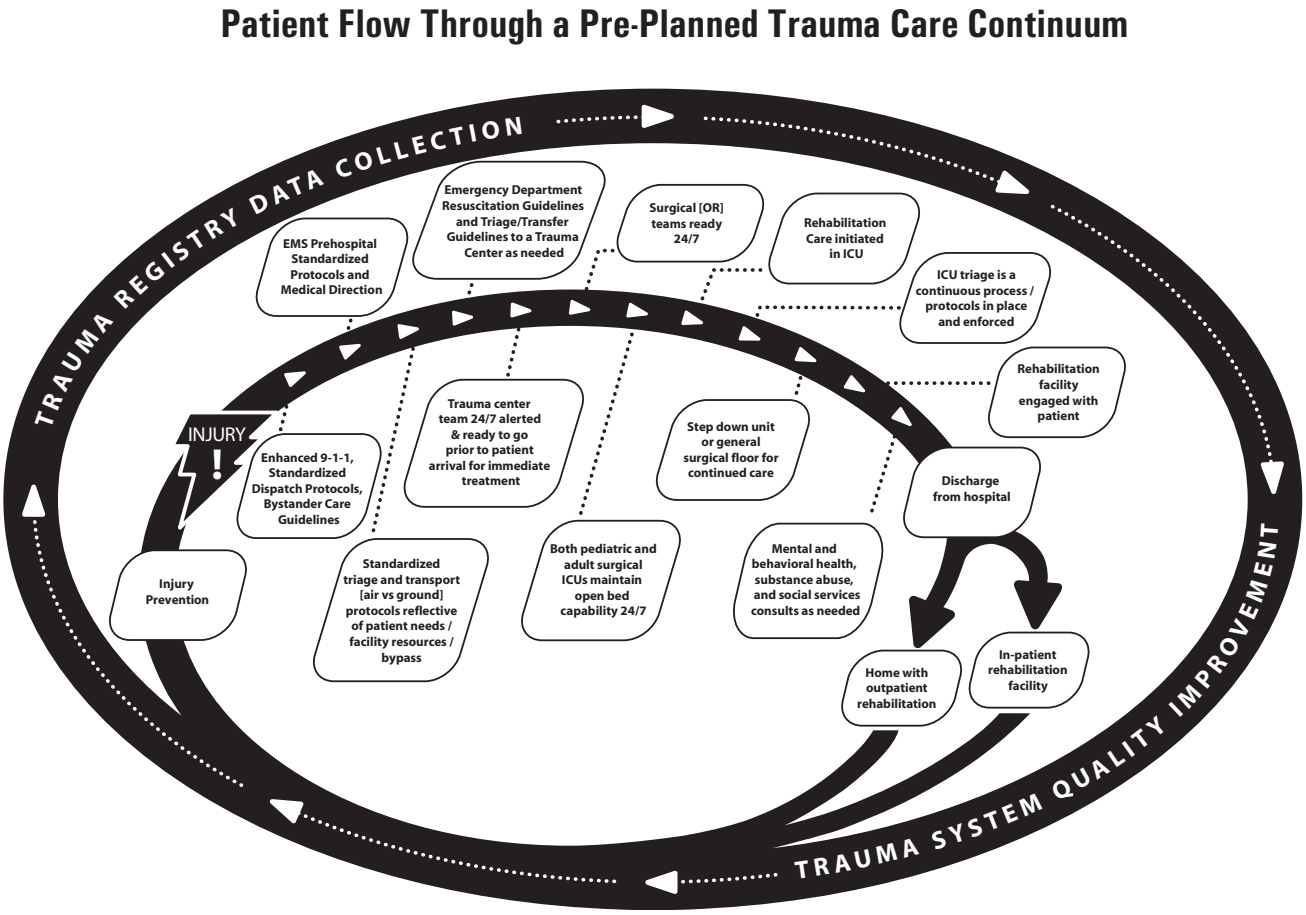
Additionally, the tragic events of September 11, 2001, prompted a reassessment of the strengths and weaknesses of the emergency care and public health systems. Not only did an awareness of the need for prepared and fully interoperable emergency medical, trauma care, and disaster response systems increase, but recognition of the importance of the public health infrastructure in responding to terrorist threats for all hazards became evident. Upon review of the public health infrastructure, a broader understanding emerged of the need for emergency care and public health systems to work in a more collaborative, cooperative environment. This renewed spirit of cooperation created a synergy among the two groups working jointly to reduce the burden of injury in communities. Previous efforts at building a strong interface between public health and emergency medical services became more important post 9-11-01, and a new era of strengthened collaboration was realized.

The Trauma System Approach

A trauma care delivery system consists of an organized approach to facilitate and coordinate a multidisciplinary system response to provide care for those who experience severe injury. The system encompasses a continuum of care that enables injured persons to return to society at their most productive level. This continuum of care includes, but is not limited to, intentional and unintentional injury prevention, emergency medical services 911/dispatch and medically supervised trauma care intervention, ground versus air transportation, emergency department trauma care, trauma center organized teams, surgical intervention, intensive and general in-hospital care, rehabilitative services, and mental health and social services.

See Figure 1, which illustrates the pre-planned, seamless *flow* of trauma care delivery for those experiencing severe injury.

Figure 1. Trauma Care Continuum



Many components make up a statewide trauma care system. Detailed planning is required for all components to interface successfully and health professionals to interact properly, enabling the trauma system to work effectively. This statewide network, or system, of health care delivery requires a multidisciplinary team approach. Such an approach is a requirement for an inclusive, seamless system of health care delivery in which all involved health care providers function in pre-planned concert with one another. Emergency care providers match patients, through protocols and medical supervision, with the correct medical facility equipped with the right resources to best meet the patient's needs. This approach may mean bypassing the closest medical facility.

A trauma system is a partnership between public and private entities to address injury as a community health problem. These entities have common interests (e.g., right patient, right hospital, and right time) and interdependent goals (e.g., injury prevention strategies for the community, and quality care in all settings, that is, prehospital, hospital, and rehabilitation). The *goals of a trauma care system are:*

- To decrease the incidence and severity of trauma
- To ensure optimal, equitable, and accessible care for all persons sustaining trauma
- To prevent unnecessary deaths and disabilities from trauma
- To contain costs while enhancing efficiency
- To implement quality and performance improvement of trauma care throughout the system
- To ensure certain designated facilities have appropriate resources to meet the needs of the injured

Without a statewide system, the level and quality of care rendered at any given time may vary on a regional basis within a State, or even on a daily or hourly basis within the same region. A mature trauma system seeks to *minimize quality of care variations by*:

- Managing, at the State level, the coordination and facilitation of statewide trauma system development
- Establishing, consistently using, and maintaining common standards of trauma care
- Assessing, planning, coordinating, monitoring, and ensuring consistent and optimal care
- Applying scientifically evaluated injury prevention strategies that target specific at-risk populations, the mechanisms that wound them, and their injury environments
- Using data systems to enhance care
- Providing sustained funding for system maintenance
- Setting priorities for injury prevention initiatives
- Providing statewide ongoing technical assistance to all regions within a State
- Establishing effective evaluation processes to continuously improve trauma care performance

An effective trauma system comprises both patient care and social components:

- Patient care includes such operational and clinical components as human resources in the prehospital, hospital, and posthospital care (rehabilitation) environments.
- Social components include legislation, prevention programs, education, research, economics, and value, or the degree of quality in relation to cost.

Various institutional or individual providers in a number of settings administer and deliver the patient care and social components, which shape each trauma system. Society must recognize the importance of building and maintaining the State trauma system and must be willing to continue its progress through ongoing support and funding.

The Public Health System

Public health is "what we as a society do collectively to assure the conditions in which people can be healthy."[20, 21] The public health system exists to ensure a safe and healthy environment for all citizens in their homes, in schools, in workplaces, and in such public spaces as medical care facilities, transportation systems, commercial locations, and recreational sites. To achieve the best population health, the public health system functions through "activities undertaken within the formal structure of government and the associated efforts of private and voluntary organizations and individuals."[22]

"The public health system is a complex network of individuals and organizations that have the potential to play critical roles in creating conditions for health." The collaborative effort between these individuals and organizations is the framework needed to influence social policy that supports health.[23] The primary strategy of the public health approach is the following:

- Identify a problem based on data.
- Devise and implement an intervention.
- Evaluate the outcome.

The public health approach is a proven, systematic method for identifying and solving problems. Improvements in the public health system, in partnership with the health care system, can be accomplished through "informed, strategic, and deliberate efforts to positively affect health."[24]

Core Public Health Functions Integrated Into Trauma Systems of Care

The application of the public health model to trauma systems is based on the concept that injury as a disease can be prevented and/or its negative impacts decreased by primary, secondary, or tertiary prevention efforts. Such actions, that is, preventing or decreasing the morbidity and mortality from injury, are similar to those taken for infectious diseases. Thus, injury prevention is an essential component of the trauma system continuum of care. This concept provides support for public health system collaboration on targeted risk reduction programs for injury prevention, including major trauma. Specialized trauma care is not enough to minimize the burden of injury to society at large. It must be combined with other risk reduction strategies to reduce the overall burden of physical injury.

Many experts in trauma care and injury prevention recognize the need for excellent trauma care and effective injury prevention programs to reduce injury deaths and disabilities. This goal can be accomplished when private-public partnerships between trauma system managers, health care providers, and public health agencies emphasize optimal approaches for the three phases of injury prevention that include treatment of the seriously injured. Key objectives in reducing the burden of injury and in making improvements in the trauma care of persons with serious injury include forging effecting collaborations among trauma

system agencies, community health care facilities, and public health departments. Injury will be significantly reduced through planned interventions that are based on public health strategies. The application of the public health approach to trauma system development will result in the following:

- Recognition that injury continues to be a public health problem of monumental importance despite significant efforts at trauma system development.
- Identification and management of injury- and trauma system-related problems, using data-driven problem identification and evaluation methods as employed by public health professionals.
- Access to local, regional, and State public health professionals with injury prevention training and experience, as well as a broader range of strategies for primary and secondary prevention. Trauma care professionals are traditionally educated in tertiary prevention.
- Expansion of the focus of outreach for trauma system injury prevention to include primary prevention. Trauma centers and trauma systems usually address secondary and tertiary injury prevention.

For additional benefits, see Table 1.

Table 1. Potential Benefits of Collaboration Between the Trauma System and the Public Health System

Benefits to the Trauma System	Benefits to the Public Health System
• Access to a well-established and accepted conceptual model for health care system assessment, planning, intervention, and evaluation • Potential communications infrastructure (notification systems) • Access to all-hazards information • Personnel mobilization • Population-based data • Resources for disaster preparedness • Opportunity to integrate the trauma system into other community health efforts to promote overall health • A more precise identification of populations at risk and a targeting of specific issues, based on these data, to reduce injuries • Framework for injury prevention strategies	• Access to a well-established health system infrastructure • Health system response that differentiates facilities by level of resource availability • Existing protocols and guidelines for the care process • Access to patient outcome data • Existing performance improvement process • Additional resources for injury prevention efforts • Resources to provide all-hazards care • Recognition that injury continues to be a public health problem despite significant efforts at trauma system development

THE THREE PHASES OF INJURY PREVENTION

Disease or injury prevention efforts can be categorized by three phases: primary, secondary, or tertiary. Each phase focuses on efforts to stop, reduce, or optimize outcomes at a particular point in the sequence of an injury event: pre-event, at the time of the event, and post-event. Injury prevention strategies that consider and address all three phases provide more opportunities to control the number of injury events in a population.

Primary Prevention—Pre-Event

Primary prevention involves activities that seek to completely **avoid the occurrence of the injury** or injury-producing event. These activities are actions that are taken in anticipation of potential injury events and that eliminate or reduce the risk for injury. Examples of primary prevention activities of trauma systems include any of the following:

- Supporting graduated driver's licensing
- Educating the community about the problems of drinking and driving
- Assisting community-based coalitions with targeted social marketing campaigns
- Working with community organizations to provide alternative social activities for youth
- Implementing programs to prevent youth violence
- Establishing suicide prevention programs
- Implementing gang diversion programs for youth defenders
- Sponsoring bicycle rodeos to teach children how to ride bicycles safely
- Educating senior citizens on fall prevention

Leaders of the region or community public health department usually coordinate and target these efforts.

Secondary Prevention—At the Time of the Event

Secondary prevention seeks to maximally **reduce the severity of the injury-producing event** at the time of occurrence, such as through the use of safety devices. Examples of secondary prevention activities of trauma systems include the following:

- Supporting efforts, such as seat belt laws, to increase the number of persons using safety restraints
- Promoting the correct installation and use of child safety seats
- Sponsoring bicycle helmet distribution and incentive programs to increase helmet use
- Promoting use of trigger locks on handguns
- Promoting the proper storage of guns

- Supporting fire education programs that teach participants to “stop, drop, and roll”
- Supporting efforts toward instituting motorcycle helmet laws
- Supporting efforts to provide a safe haven for victims of domestic violence

Tertiary Prevention—Post-Event

Tertiary prevention acts to substantially **diminish the impact of the injury** through actions to further reduce the severity of the injury, and to optimize the patient’s outcome. Examples of tertiary prevention activities of trauma systems include the following:

- Ensuring a timely dispatch and response to the injury scene for trauma system access
- Ensuring that the injured patient is properly cared for by emergency medical personnel who follow triage and transport guidelines, treatment protocols, and medical direction
- Delivering the injured patient to a trauma facility with the appropriate resources
- Providing emergency department, surgical, and in-hospital care to the patient
- Providing appropriate rehabilitation, mental health, and patient and family support services while planning for community and home reintegration

Plans for Injury Prevention (Intentional and Unintentional)

A proven epidemiologic disease model for the investigation and control of injury and its associated factors is the Haddon Matrix.[25, 26]

This model analyzes each event in terms of a host, an agent, and the environment:

- The Host is generally the person at risk.
- The Agent is energy (e.g., mechanical, thermal, and electrical) that is transmitted to the host through a vehicle or vector (animal or human).
- The Environment is the surroundings or context (physical and social) in which the Host and Agent interact. The physical environment is the setting where the injury occurs. The social environment includes the legal norms and behaviors in the community.

In Table 2, each cell or factor in the matrix identifies the interacting factors that contribute to the injury process. Thus, each factor describes an opportunity to reduce injury related to a particular phase of prevention. The matrix provides a way for a community to look at a type of injury event and to consider all the potential opportunities for intervention.

Table 2. Application of the Haddon Matrix for a Motor Vehicle Crash

Phase of Prevention	Human/Host	Vehicle/Agent	Environment	
			Physical	Social
Pre-Event	Age Driving experience Alcohol or drug use Speed	Defects Brakes Tires Collision Avoidance Warning System	Visibility Congestion Surface/pavement Road design	Driving while intoxicated laws Speed limits Driver training and licensure
Event	Seat belt use Helmet use Tolerance	Airbags Contact surfaces Crash-worthiness of the vehicle	Guardrails Medians Breakaway posts	Road and environmental design policies
Post-Event	Age Pre-existing physical condition	Fuel Integrity System Fire	EMS System First responder Bystander care Proximity to medical care Medical and rehabilitative services	Financial, legal, and social resources

Variations of the Haddon Matrix provide additional key values for a community to consider when choosing intervention strategies. When potential interventions or policy changes are considered, the community can identify social values (e.g., intervention effectiveness, cost, freedom, and feasibility) to guide their selection of policy options and interventions that are more likely to be supported. Potential values that can be considered include the following:[27]

- *Effectiveness.* Does the intervention work when applied?
- *Cost.* Are these expenses associated with the intervention or cost of injury to society?
- *Freedom.* May some restrictions or compromises be required for an intervention?
- *Equity.* Are people treated universally the same? Or, will intervention for some persons lead to equal protection?
- *Stigmatization.* Should a group, for example, low income or sex offending, be specially identified to be targeted for the intervention?
- *Preferences of the affected community or individuals.* Have the socio-cultural aspects of the community been considered in the selection of an intervention?

- *Feasibility.* Is the intervention possible from a political, technical, or financial perspective?

Another approach to the Haddon Matrix assists in identifying the four fundamental strategies used by public health professionals for illness and injury prevention:[28]

1. Engineering, automation, and technological innovation
2. Enactment and enforcement of legislation and regulations
3. Education of the public in safe behaviors
4. Economic incentives and disincentives for healthy and unhealthy activities

These fundamental tactics serve as the model for effective injury prevention planning at the national, regional, and local levels.

Trauma Systems and Injury Prevention

Historically, trauma centers provided care to patients with major injuries and focused mostly on tertiary prevention. The trauma system, in contrast, should contribute to reducing the entire burden of injury in a State, region, or community. Therefore, it should integrate all three phases of injury prevention into planning and practice. The trauma system should produce improved health status outcomes, such as reduced injury occurrence and improved clinical outcomes for injured patients.

Improving the injury health status of a community is far more complex and extensive than just ensuring good trauma care of injured patients. The population cared for in the trauma system is diverse, that is, with wide variations in State and regional areas by age, ethnicity, and geography. To be most effective, injury prevention resources need to be targeted and customized to specific population groups. Only with the full mobilization of the community's health care and public health resources, including the trauma system, will injury prevention efforts be effective.

PUBLIC HEALTH SYSTEM SERVICES AND FUNCTIONS

The public health system provides a conceptual framework for trauma system development, management, and ongoing performance improvement.

Ten Essential Services

All HHS agencies endorsed the 10 Essential Public Health Services below:[29]

1. Monitor health status to identify community health problems.
2. Diagnose and investigate health problems and health hazards in the community.
3. Inform, educate, and empower people about health issues.
4. Mobilize community partnerships to identify and solve health problems.
5. Develop policies and plans that support individual and community health efforts.
6. Enforce laws and regulations that protect health and ensure safety.
7. Link people to needed personal health services and ensure the provision of health care when otherwise unavailable.
8. Assure a competent public health and personal health care workforce.
9. Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
10. Conduct research to attain new insights and innovative solutions to health problems.

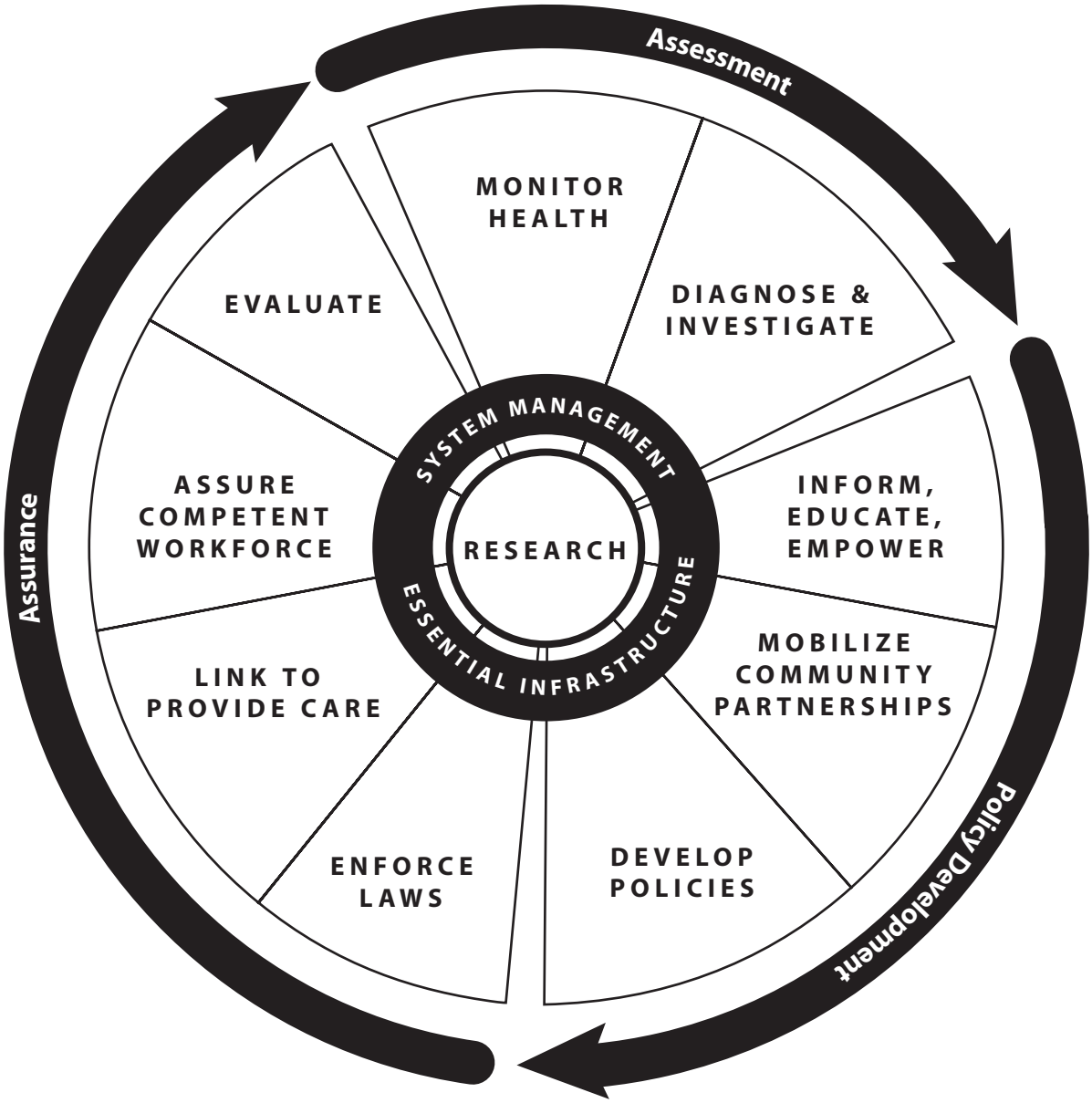
Three Core Functions

These 10 essential services fall into the three core functions of public health. They are assessment, policy, and assurance:[30]

- **Assessment** is the regular and systematic collection and analysis of data from a variety of sources to determine the status and cause of a problem and to identify potential opportunities for interventions.
- **Policy development** uses the results of the assessment in an organized manner to establish comprehensive policies intended to improve the public's health.
- **Assurance,** agreed-on goals to improve the public's health, is achieved by providing services directly, by requiring services through regulation, or by encouraging the actions of others (public or private).

See Figure 2 for the model describing these public health functions and services.

Figure 2. HHS Core Functions and Essential Services of Public Health



The fundamental concepts of public health are not new to trauma professionals. For example, the 1992 *Model Trauma Care System Plan* identified core components of trauma system design. These core components are fundamentally congruent with the ten essential services provided by the public health system. The three core functions of the public health system (assessment, policy development, and assurance) suggest the process for trauma system quality and performance improvement. See Table 3 for a crosswalk demonstrating similarities between the public health and trauma systems.

Table 3. Comparison of Public Health Core Functions and 1992 Model Trauma Care System Components

Public Health Core Functions		Trauma System Components	
Core Function	Essential Service	1992 Core Component	Subcomponents
Assessment	Monitor health Diagnose and investigate	Evaluation	Needs assessment Data collection Research
Policy Development	Inform, educate, and empower Mobilize community partnerships	Public information and education	Injury prevention Trauma system committee (stakeholder groups)
	Develop policies	Legislation Regulations	Trauma system planning and operations Regulations and rules
Assurance	Enforce laws		Lead agency at State level
	Ensure links to or provision of care	Prehospital care	Communications Triage and transport, medical direction, and treatment protocols
		Definitive care	Facilities (designation), interfacility transfer, and rehabilitation
	Ensure competent workforce	Human resources	Workforce resources and educational preparation
	Evaluation	Evaluation	Data collection Research Interdisciplinary review committee

System Development and Management

Ensuring improved outcomes for the injured is a complex process balanced among the lead authority, care providers, the legal system, and the public. A comprehensive inclusive trauma system requires an extensive collaboration between agencies and organizations beyond those that provide direct clinical care. Combining the expertise of many professionals from agencies and organizations enables both effective leveraging of all resources for primary and secondary prevention and their coordination with the trauma system in tertiary prevention.

A description of the core functions of assessment, policy development, and assurance appears below with specific examples showing how the public health approach can be applied to trauma system development.

Assessment Examples

An analysis of population-based records providing vital statistics determined that a large number of youth are dying in motor vehicle crashes. Most deaths were among inexperienced drivers who were not wearing seat belts (according to EMS, public safety, and emergency department records, respectively), and ejection from the vehicle was a causative factor in their deaths (according to medical examiner records). Alcohol was also a factor in many crashes.

Policy Development Examples

In response to the problem identified by the assessment above, policy development may include the following:

- Using data to develop policies, and to inform and educate the public
- Having trauma care professionals join forces with community-based prevention coalitions to conduct social marketing campaigns discouraging drinking and driving and encouraging the use of seat belts as well as bicycle helmet and all-terrain vehicle (ATV) helmet legislation
- Passing legislation for graduated driver's licensing for teens, mandatory seat belt use, and primary seat belt legislation
- Adopting *zero tolerance* for youth drinking
- Working with community leaders to develop alternative social activities for youth
- Developing a trauma system plan for the region

Assurance Examples

In response to the problems identified by the assessment and the policy developed to address them, assurance may include:

- Enforcing driving laws related to safety belts, drinking and driving, and graduated driver's licenses
- Enforcing laws on the provision of alcohol to minors and on the possession of alcohol by minors

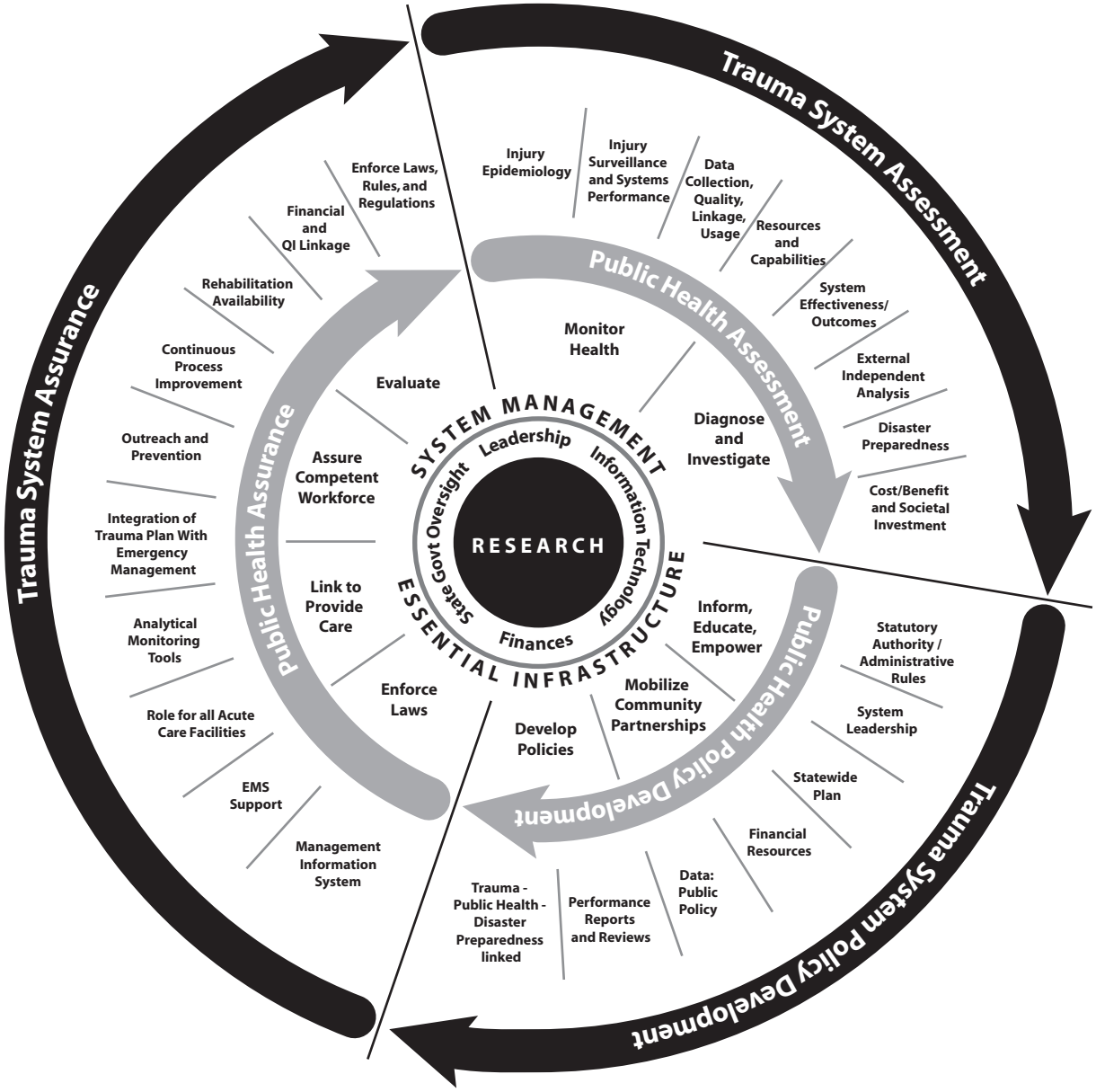
- Enforcing primary seat belt laws with ticketing for unrestrained motor vehicle drivers and passengers of all ages
- Monitoring the adherence to triage and transport guidelines and to the quality of clinical care (prehospital and posthospital) provided to injured patients
- Designating and verifying trauma centers
- Enforcing gun laws

Figure 3 combines public health functions (PH), trauma system functions (TS), and examples (EX) in one wheel. It demonstrates how the conceptual public health model applies to trauma system planning.

Figure 3. Core Functions and Essential Services of the Trauma System Integrated With Public Health

Figure 4 illustrates key words for each trauma system benchmark in the outer ring as written for each area: Assessment, Policy, and Assurance.

Figure 4. Core Functions, Essential Services, and Benchmarks



APPLICATION OF THE CORE FUNCTIONS OF PUBLIC HEALTH TO TRAUMA SYSTEMS

A natural affinity exists between public health professionals and trauma care professionals in their similar approaches to problem solving. What remains is for State, regional, and local leaders in public health and trauma care to form and maintain coalitions and to establish goals and objectives for statewide injury prevention planning, implementation, and evaluation. Each partner also needs to continue focusing on what it does best:

- *For the public health system.* Population-based data collection, management, and analysis; primary and secondary prevention efforts
- *For the trauma care system.* Patient care data collection and multidisciplinary trauma patient care (prehospital emergency care, in-hospital acute care, and posthospital and rehabilitative care); tertiary prevention efforts

The systems need to collaborate with each other to ensure full statewide coordination of injury prevention efforts that benefit the public at large and individual patients. A mutually cooperative interface between public health professionals and trauma system professionals will serve to benefit the community both in daily responses to injury and trauma care while better preparing both groups in working collaboratively in times of disasters.

Using the broader systems approach, centered on the three core functions of public health, will result in trauma systems that have the following characteristics:

- More focused on the health of all residents
- Integrated with other community health programs
- Oriented toward improving health status outcomes

Once this step is accomplished, emphasis will then be shifted to developing a comprehensive, coordinated, continuous, and community-based injury prevention system.

To promote the future development of trauma systems using the three core functions of public health, new benchmarks and indicators for State and regional trauma system planning and self-assessment are contained in the following sections.

Core Function: Assessment

Assessment

Regular systematic collection, assembly, analysis, and dissemination of information on the health of the community.

State trauma system **assessment** includes four key elements:

1. Using population and patient data from a wide variety of sources to analyze and to describe the status of injury morbidity, mortality, and distribution within a specific jurisdiction.

2. Obtaining information about the trauma system structure and processes, including clinical care, for a given jurisdiction and comparing this with uniform trauma system standards.

3. Obtaining information about risk management and response to major or catastrophic (man-made and natural) events.

4. Preparing a "gap analysis" risk assessment, using objective data to describe the significant injury issues to be addressed by the trauma system and the injury prevention and control system. (A gap analysis is the difference between trauma system standards and the compliance of the trauma system with those standards…i.e., the "gap." The gap analysis helps to determine system needs.)

Assessing the Injury Problem

Today, injury is no longer considered an accident but a predictable and preventable disease. States, collaborating with local public health departments, should monitor, evaluate, and report on the state of injury prevention efforts in their area of authority. Locally generated injury prevention reports should identify interval trends and opportunities for improvement. For example, measures or indicators of overall injury prevention in a community could include incidence and prevalence rates, rates of occurrence of different types of injury (e.g., head, orthopedic, or spinal cord), and case-fatality rates.[31] An injury prevention report of a State or local community could be an effective assessment tool for the trauma system.

Trauma systems will benefit from the expertise of public health epidemiologists who can assist with the following:

- The assessment of health status problems
- The definition and evaluation of system performance indicators and outcome measurements
- The identification of surveillance systems and other data sources

Epidemiologic investigations using population-based data could assess patterns of injury resulting in adverse health outcomes. Such investigations could track trends in acute care, posthospital complications, and long-term outcomes. These resources will assist in targeting injury prevention strategies and in assessing the effectiveness of injury prevention programs.

Historically, a trauma registry has been perceived as the "gold standard" for assessing trauma system performance. It is the appropriate tool to perform the evaluation of care provided to major trauma patients seen in the tertiary trauma care setting, and it is an important part of quality improvement. Even though these data are very useful, their scope is limited because a trauma registry is not population based and it does not address system-wide performance. Multiple and varying population-based data and information systems will provide better assessment tools to evaluate the complete picture of injury occurrence at the State, regional, and local levels and will allow for better planning of prevention strategies.

In an assessment of the health status of the State or the community, the data and information systems the trauma system may wish to access include the following:

- Vital statistics
- Hospital discharge
- Emergency department
- Rehabilitation facility
- Law enforcement
- State fire marshal
- Public health
- State and local police
- Death certificates
- Emergency medical service

A myriad of technological solutions for enhanced data collection and presentation are available. Ranging from Global Information System mapping; to probabilistic data linkage, a method of linking data between two or more sources using a computerized judgment process that a record from each data source refers to the same patient event; to real-time highway safety data; and others, the use of improved technologies and enhanced data analysis can assist with the development and evaluation of a data-driven trauma system.

The following examples of system-wide assessment data, organized by prevention phases, could guide community-wide programs to improve the "injury health" of the population.[32]

Primary prevention. Measures of primary prevention include, for example, the location, number, and type of primary prevention programs available or administered, the number of citizens who are the recipients of such programs, and the number of media presentations devoted to injury and injury prevention. These measures can be monitored in aggregate or by individual injury type. They may also be viewed on a per person or per injured person or even per person at risk (e.g., elder persons, children, and drivers) basis. Assessment data used to determine primary prevention interventions include such surveillance systems as hospital discharge data, death records, traffic records, or crime reports. Primary prevention programs should reflect the types of injury, injury rates, and the severity of injuries within a given area.

Secondary prevention. Measures focused on secondary prevention include, for example, the ratios of major to minor injuries; safety device use or proper use rates, or both (e.g., seat belts, helmets, car seats, and smoke detectors); existence of public protection laws; and enforcement and conviction rates for violations. These measures are best chosen based on the distribution of injuries or persons at risk or upon pre-intervention and post-intervention points in time.

Tertiary prevention. Measures of tertiary prevention focus on preventable deaths and inappropriate care rates, ratios of fatal to nonfatal injuries, number of health facility contacts, rates of selected complications, long-term functional or other outcomes at the end of the health encounter, and compliance rates with practice management guidelines or care protocols, both within and outside of acute care hospitals. The data used to determine and improve tertiary prevention are generally found in trauma registries that track clinical interventions and relate patient outcomes to interventions, time factors, and other aspects of traditional care of major trauma patients.

Behavior data sources. The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing survey of the health status and risk-taking behavior of the U.S. population conducted by the CDC in collaboration with State health departments. BRFSS provides information useful in determining the risk-taking behaviors and attitudes of the adult population of the system, whereas the Youth Risk Behavior Survey (YRBS) provides comparable youth information.[33, 34] The YRBS is conducted at schools and provides both national and State data. These tools for designing and assessing public health interventions could also be useful in designing trauma prevention programs and in assessing their impact.

Local public health departments may complete community-wide health assessments that characterize both the health status and the health system of an individual community. Collaboration between trauma system personnel and public health personnel in conducting community health assessments is important to defining injury. Joint assessments are an excellent means to increase awareness of the value of integrating the efforts of trauma and community health programs.

Assessing the System Resources, Infrastructure, Processes, and Performance

This assessment serves as the basis for future system planning, development, and resource utilization. This baseline assessment begins the important process of defining system gaps and of identifying opportunities for improvement.

Although the assessment of organizational capacity is an essential element in trauma system development, information is needed regarding the relationship between trauma system components and their impact on a community-wide reduction in injury morbidity and mortality. A specific method for performance improvement can assist in identifying those factors that contribute to improved health outcomes. Once developed, national performance and system-specific benchmarks and outcome indicators will aid in guiding trauma system assessment and improvement.

Benchmarks for the Assessment Phase

1. A thorough description of the epidemiology of injury in the system jurisdiction using both population-based data and clinical databases exists.
2. There is an established trauma management information system for ongoing injury surveillance and system performance assessment.

3. A resource assessment for the trauma system has been completed and is regularly updated.
4. An assessment of the trauma system disaster/emergency preparedness has been completed including coordination with the public health and EMS systems and the emergency management agency.
5. The system assesses and monitors its value to its constituents in terms of cost/benefit analysis and societal investment.

Core Function: Policy Development

Policy Development

Promoting the use of scientific knowledge in decision making, which includes:
- building constituencies,
- identifying needs and setting priorities,
- using legislative authority and funding to develop plans and policies to address needs, and
- ensuring the public's health and safety.

Policy development is a complex process involving the development of legal authority, the endorsement of elected officials, the availability of sufficient funding and human resources, the implementation of administrative rules, the engagement in community health development activities, and the use of media to inform and to educate the public as well as policy makers. Policy development includes nurturing leadership to develop policies and plans in support of community and State health development and monitoring implementation of these plans. Policy development is the first step in translating assessment results into system development.

State trauma system **policy development** includes five key elements:

1. Effectively using such key contacts as political leaders, partners, advocates, and constituents to organize groups, engage communities, form multidisciplinary committees, and coordinate with ongoing community health efforts for the purpose of:
   - Developing and implementing trauma plans
   - Communicating with elected officials and policy leaders regarding development and sustainability of the trauma system
2. Having sufficient legal authority, including statutes and administrative rules, to implement, monitor, assess, and ensure trauma system performance
3. Integrating State and local trauma plans and supporting component plans (e.g., communications and transportation) that are based on assessment and account for special populations, geographic considerations, and special focus areas such as:
   - Injury prevention
   - Disaster preparedness
   - Public health system preparedness
4. Using ongoing data collection and analysis:

- To drive continuing State and local assessment
- To guide long-term strategic planning and performance improvement
- To ensure integration of the trauma system with the public health system and the health care delivery system
- To ensure system effectiveness

5. Allocating sufficient resources (human, technology, and financial) to ensure that trauma planning and trauma policy practices meet the needs of the State's population and visitors.

Designation of a Lead Agency

A trauma system consists of hospitals (both designated trauma centers and other receiving facilities), personnel, emergency medical services, and public service agencies that have a pre-planned response to caring for injured patients. System development is best accomplished through the designation of a lead governmental agency with the *authority to develop policy*, including those for trauma system development, implementation, coordination, evaluation, and identification of additional funding sources. To fulfill policy responsibilities, the lead agency must receive sufficient funding and human resources.

Role of the Lead Agency in Policy Development

The State lead agency, working through multidisciplinary constituency groups, is ultimately responsible for both establishing system standards and evaluating system performance. This process is best accomplished when the lead trauma system development agency coordinates the system design and integrates it closely with other public health systems. A successful lead agency will:

- Mobilize community partnerships to identify the scope of the injury problem and to identify unique community-wide solutions to reduce the burden of injury
- Convene and facilitate partnerships among groups
- Form multidisciplinary teams
- Build coalitions and partnerships with public and private health and safety organizations that can assist in ensuring injury prevention

A key element to successful trauma system development is the integration of emergency medical services, public health, emergency management, and rehabilitation into trauma system plans. Input from these key participants at each stage of trauma system decision making is essential to establishing a workable system. Effective trauma systems require deliberate and clear integration of all components in each phase of care. These systems also draw on the capacity of health care providers to reduce mortalities and disabilities regardless of the severity of injuries.

This broad approach to planning a trauma system requires the full range of personnel and other resources to provide an inclusive system of trauma care. This approach integrates an emphasis on disease prevention and health promotion while maintaining attention to the traditional concepts of trauma care. The lead agency's policy development challenge is to meet the needs of multiple partners and constituencies while including the needs of diverse demographic groups (ethnic and racial) and special

populations (young and old) in a variety of geographic settings (e.g., rural, urban, and frontier) where resources, commitment, and need may vary. The trauma system formation and implementation will also require building a strong constituent base and partnerships that include the following groups: medical and surgical groups; health care and hospital organizations (integrating health insurance providers and Health Maintenance Organizations), injury prevention and control advocates, public health officials and elected officials, and community health coalitions at State and local levels. These multidisciplinary constituency groups, providers, and stakeholders are an important part of trauma system planning and development at each phase of system implementation and during ongoing performance evaluation. Establishing and maintaining linkages with public and private health system organizations throughout the planning and implementation of a trauma system will assist in:

- Sustaining the system
- Ensuring system advocates
- Providing for ongoing communication with elected and policy leaders

The importance of informing and educating trauma constituencies cannot be overemphasized. Community health development, targeted media messaging, provision of access to nonconfidential injury and trauma information to community health groups, and active stakeholder collaboration will aid in ensuring ongoing trauma system viability.

Enabling Legislation

Enabling legislation is the legislation that provides appropriate officials the authority to implement or enforce the law. It is essential to provide the authority to develop, maintain, and evaluate a State trauma system and its components. The legislation should support integrating emergency medical services, emergency preparedness, and public health systems so that a statewide comprehensive coordinated system of injury/disease prevention and health promotion can be implemented.

State Trauma System Plan

A State Trauma System Plan is a document in which the lead agency's guiding members envision the future and develop the necessary procedures and operations to achieve that expectation. The plan will provide direction and function as a communication tool so that all within the system are functioning with the same mindset, following the same guidelines, policies, and protocols and striving for the same goals and objectives. In States that support regional administrative staff, the regional plans should umbrella under the statewide plan, personalizing the plan to meet the needs of the individual region.

Planning for the Plan

Before beginning to write a plan, there must be organizational commitment to both the plan as well as the process for its development. Once commitment is present, a work group must be identified. A multidisciplinary group no larger than 10–12 is recommended. Lead decision makers must ascertain who should be involved. A balance between management experience, clinical experience, skills for such a task, ability to work well with others, willingness to participate, and the individual's time

availability are some of the necessary considerations when selecting an effective work group. Once a team has been selected, there must be agreement on how the work group will function related to:

- The plan development process
- The quality of the work
- Responsibilities of work group members
- Timelines

The State Trauma System Plan is an integral component of policy development. The plan will:

- Provide guidance in comprehensive system development
- Address operational requirements
- Allow for local trauma system variations based on assessment results, for example rural versus urban needs and resources

The plan is:

- Inclusive of the operational components as they fall under assessment, policy, and assurance
- All-encompassing, ranging from injury prevention activities to prehospital trauma care, acute care facilities (designated trauma centers and receiving facilities) and posthospital care
- Integrated with the *State Health Plan* and with the State's *Emergency Preparedness Plan*
- Dynamic and should evolve with changing injury epidemiology and resource availability—both human and financial

In early stages of development, trauma plans may focus on guidelines for prehospital providers, communications among trauma team members, designation of trauma facilities, and/or evaluation of trauma system performance. To determine the impact of trauma system policies and care on morbidity and mortality, as the system matures, the plan ought to reflect:

- Process improvement
- Enhancement of system performance
- Evidence-based research
- Assistance with system updates
- Targeting of prevention intervention programs
- Revisions based on assessments/data-based need

The State, regional, and local plans should become part of the overall health improvement plan for the geographic area served.

Trauma Information System

Policy development includes the use of assessment results, trauma systems data, and management information data to drive public policy, to enhance system performance, and to provide guidance for injury prevention activities and education of trauma

care providers. A comprehensive trauma information system provides opportunities to:

- Review, and may link, multiple sources of data (e.g., trauma registry, emergency medical services, disaster after action reports, injury registry, death certificates, hospital administrative data sets, medical examiner's reports, and crash reports)
- Identify and evaluate system best practices
- Identify and evaluate gaps
- Review the utilization of trauma resources
- Track patient outcomes
- Develop performance standards
- Measure system performance against similar systems (benchmarking)

Policies and protocols derived from data-driven systems can be evaluated and tested to ensure effectiveness and to drive system improvements.

Policy development includes leadership, legislation, comprehensive planning, and evaluation. The purpose of policy development is to define and promote trauma systems by informing and educating State, regional, and local constituencies and policy makers; by mobilizing partners to solve injury/trauma system problems; and by developing policies and plans that support trauma system improvement. Successful trauma system development requires the commitment of sufficient fiscal and human resources and significant long-term commitment.

Benchmarks for the Policy Development Phase

1. Comprehensive State statutory authority and administrative rules exist to support trauma system leadership and to maintain trauma system infrastructure, planning, oversight, and future development.
2. Trauma system leadership (lead agency, trauma center personnel, and other stakeholders) is used to establish, maintain, and constantly evaluate and improve a comprehensive trauma system in cooperation with medical, professional, governmental, and citizen organizations. (Stress the process nature of this activity.)
3. The State lead agency has a comprehensive written trauma system plan based on national guidelines. The plan integrates the trauma system with emergency medical services, public health, emergency preparedness, and emergency management. The written trauma system plan is developed in collaboration with community partners and stakeholders.
4. Sufficient resources, including financial support and infrastructure, exist to support system planning, implementation, and maintenance.
5. Collected data are used to evaluate system performance and to develop public policy.
6. Trauma system leadership, including its multidisciplinary advisory committees, regularly reviews system performance reports.

7. The lead agency informs and educates State, regional, and local constituencies and policy makers to foster collaboration and cooperation for system enhancement and injury prevention and care.
8. The trauma, public health, and emergency preparedness systems are closely linked.

Core Function: Assurance

Assurance

Assuring constituents that services necessary to achieve agreed-on goals are provided by:

- encouraging actions of others (public or private),
- requiring action through regulation, or
- providing services directly.

Those essential public health services typically associated with **assurance** include:

1. Enforcing laws and regulations that protect health and ensure safety
2. Linking people to needed personal health services and ensuring the provision of health care when it is otherwise unavailable
3. Ensuring a competent public health and health care workforce through ongoing evaluation, education, and training
4. Evaluating effectiveness, accessibility, and quality of personal population-based health services
5. Researching existing practices, new insights, and innovative solutions to health problems

In a State trauma system, assurance frequently, although not always, equates with those activities associated with secondary and tertiary prevention. Assurance includes the following:

- Ensuring the right injured patients get to the right facility (patient triage and trauma facility designation)
- Complying with treatment protocols and interfacility transfer procedures
- Implementing performance/quality improvement

The core function of assurance is broad and also includes, for example, enforcing traffic laws or establishing a suicide prevention hotline. Assurance is driven by assessment results and is based on policies developed. The first two essential principles of assessment and policy development set the stage for process and quality improvement through an assurance process. The assurance process shapes the system as it matures and benefits from experience.

Enforcement and Regulation

The assurance process includes the legal requirements of enforcing laws and regulations that protect health and ensure safety. Because the trauma system must be grounded in legal authority, enforcement of laws and administrative rules that support the system is an important system component. The lead agency should define processes to monitor and identify non-compliance and should establish processes for reporting. Trauma system stakeholders can be used to gain information on the effectiveness of those processes and to identify process improvements. A trauma committee, through its multidisciplinary review processes, can assist the lead agency in the review of compliance with statutes, regulations, protocols, and system operational guidelines.

The lead trauma agency is the responsible entity for enforcing rules and regulations. To be effective, the agency's activities are best accomplished through clear-cut administrative procedures. A process that is customer focused for ease of use, cost, and quality of services eases the enforcement process.

Examples of system processes possibly requiring enforcement are the:

- Training of prehospital providers in rapid recognition and assessment of the major trauma patient
- Compliance with triage guidelines
- Appropriate use of air medical transportation guidelines

- Return of patients from the tertiary trauma facility to the community hospital

Enforcement is effective if there are:

- Well-written statutes and regulations
- Collaboration and consensus among stakeholders
- System participant willingness to comply

Often cooperation is best achieved through mutual understanding of the goals of the trauma system and the complexities differing organizations face in meeting the trauma patient needs.

To achieve the core function of assurance, the entire trauma system community must collaborate with other partners in compliance and enforcement activities. For instance, the public health community may lend strong support to the enforcement of laws regarding primary or secondary prevention (speeding, seat belts, motorcycle helmets, and others). The lead agency provides technical assistance and support to the local trauma system and to others in the enforcement of trauma system laws and rules, including appropriate training of the trauma system community. The lead agency is also responsible for consistent enforcement of trauma system requirements. These requirements may include, for example, trauma center training of persons responsible for trauma system enforcement activities and providing technical assistance to local governing bodies in developing, if appropriate, local trauma system regulations and ordinances, accreditation, and designation.

The lead agency should ensure a mechanism exists to improve enforcement functions based on data and should ensure that laws and rules are scientifically sound. Part of the enforcement function would include applying the provisions of such laws as the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and ensuring the confidentiality of patient care information.[35] To effectively implement trauma system enforcement activities, operational policies and procedures must be established that protect patient and system information so that in-depth analysis of the quality of services can be achieved within the limits set by law.

Patient Destination and Hospital Care

Linking the trauma patient to appropriate care is a critical component of a trauma system as is ensuring ongoing resources for system implementation. Access to and availability of quality trauma care services for the State's population should be addressed. Adequate resources, combined with sufficient legal authority and ongoing collaboration, should assist the lead agency in ensuring reasonable statewide access to trauma care services.

The State lead agency will designate and verify trauma care facilities. Designation will be based on both national standards, such as those promulgated by the ACS, and calculated need in the specified geographic area. The lead agency also will ensure that the trauma care facilities are appropriately staffed and equipped, taking into consideration the volume of patients per center and the constellation of injury types by region, while assuring the most cost-effective system.

Linking trauma patients to appropriate care is a critical trauma system activity, just as ensuring ongoing resources for trauma

system implementation is. One requirement for designation as a trauma facility is the ability to meet the needs of special populations. Consideration must be given to the transfer of special need patients (e.g., burn, spinal injury, and children) to specialty care centers when needed, either within the State or out of State. The key to developing the trauma system is to ensure that arrangements for patients with special needs are addressed as part of the plan and are routinely assessed through ongoing system evaluation.

Enforcement of trauma treatment, triage, and transfer protocols will assist in ensuring that injured patients receive the appropriate medical care at the right facility and in the right time frame based on their injuries. When injured patients arrive at a medical facility that cannot provide the appropriate level of definitive care, an organized and regularly monitored system must ensure that patients are expeditiously transferred to the appropriate trauma facility.

EMS Systems and Assurance

An integral component of developing an effective trauma system is the essential role of EMS systems. Coordination of the trauma and EMS systems begins with the communications system. The trauma system must be supported by a communications system that provides immediate citizen access (E-911) and the dispatch of appropriate medical resources (ambulances and helicopters) with pre-arrival instructions to the calling party. The system must also be supported by online or offline bidirectional voice communication that allows field-to-medical receiving facility medical directions even during interfacility transfers and mass casualty or disaster incidents.

Additional examples of emergency medical services and trauma system integration include the following:

- Ensuring that medical direction policies and procedures for the care of the injured patient are integrated into existing EMS protocols
- Providing for system-wide prehospital triage criteria to ensure that the trauma patient gets to the appropriate trauma facility
- Providing well-coordinated transportation services to ensure that EMS providers arrive at the scene promptly and transport the patient expeditiously to the correct hospital by the correct mode of transportation

It is critical that each of these system components be regularly evaluated and updated as necessary to achieve the most integrated and effective system of care. One measure of assurance would be reviewing acceptable and system-defined rates of over- and under-triage of major trauma patients to trauma centers (sensitivity and specificity).

The above-mentioned examples emphasize the need for ongoing evaluation of key assurance indicators defined within the trauma information management system. To adequately assess a trauma system, standardized data elements, definitions, and value labels should be used by all acute care facilities, regardless of trauma center designation, for data submission.

Training and Educating a Competent Workforce

The lead agency assists in assuring a competent workforce through evaluation, training, and education and monitors the availability and effectiveness of trauma systems. Recruitment and retention of qualified trauma care professionals in all components of the trauma system require a substantial investment in resources. Trauma systems must clearly delineate, through administrative rules or policy, the specific education and training needs of all trauma system personnel. Trauma system providers must be fully cognizant of the trauma system education and training requirements. These requirements should be readily available to all providers.

Statewide, regional, and local learning needs must be identified. Although specific competencies and educational programs will apply statewide, each region will have individual learning needs that should be data driven, and therefore personalized, for each specific region.

A variety of learning methods should be used. Web-based learning opportunities that can be later archived are one cost-effective way to educate a large number of persons.

Ensuring a competent workforce also means that the education and training requirements will be evaluated, along with the rest of the system, and updated as needs are identified or as change becomes necessary. Periodic review of both the required and the supplemental educational opportunities is an activity for the State Trauma System Advisory/Stakeholder Committee.

Linkages between trauma care providers and academic institutions can be facilitated to ensure that trauma continuing-education programs are varied and current. In addition to educating providers in caring for the injured, these institutions are a valuable mechanism to assure that the public understands the role of trauma systems. All provider (dispatcher, emergency medical technician, paramedic, nursing, physician, and other), public health, and emergency management training programs should include information about the trauma care system.

Some examples of courses that have been established by professional organizations as important and successful for trauma care providers are:

- Basic Trauma Life Support (BTLS), BTLS International
- Advanced Trauma Life Support (ATLS), American College of Surgeons
- Pre-Hospital Trauma Life Support (PHTLS), National Association of Emergency Medical Technicians (NAEMT) in cooperation with the American College of Surgeons
- Trauma Nursing Core Course (TNCC), Emergency Nurses Association
- Course in Advanced Trauma Nursing (CATN), Emergency Nurses Association
- Pediatric Advanced Life Support (PALS), American Heart Association
- Trauma Registrar Course-Basic (TRC-B), American Trauma Society
- Trauma Registrar Course-Advanced (TRC-A), American Trauma Society

- Trauma Coordinator Core Course (TCCC), American Trauma Society
- Advanced Burn Life Support (ABLS) Pre-Hospital Course, American Burn Association
- Advanced Burn Life Support (ABLS) Provider Course, American Burn Association
- Trauma Outcome and Performance Improvement Course (TOPIC), Society of Trauma Nurses

Trauma System Evaluation and Performance Improvement

Trauma system evaluation and performance improvement are a function of the lead agency. Evaluation of statewide system effectiveness, accessibility, cost, and quality of trauma services is essential. This evaluation should include reviewing programs designed to ensure the provision of trauma care services, including their availability and appropriateness, through the use of such national guidelines as, for example, the ACS *Resources for Optimal Care of the Injured Patient* document,[36] ABA *Burn Unit Referral Criteria,* and the HRSA benchmarks and indicators presented in this document.

Assisting local trauma care systems and other local partners in assessing trauma care in their jurisdictions by providing uniform assessment tools and other guidance is an important step. Additionally, the lead agency and trauma centers should use trauma system performance appraisal programs that include customer satisfaction to stimulate supplementary clinician and institutional quality improvement in trauma care. That is, the lead agency should provide assistance in conducting an assessment of customer (patient, provider, and facility) satisfaction with trauma systems, in sharing results of performance evaluations, and in using those outcomes in improvement and strategic planning processes.

Offering consultation services and guidance to regional and local trauma care systems and to other State partners, in collaboration with additional State agencies and programs (e.g., emergency management and injury prevention), is a constructive task. Also in cooperation with other agencies and organizations, analytical tools can be used to monitor the performance of population-based prevention and trauma care services.

Each trauma care facility should be required to demonstrate prevention outreach activities within the facility's service area. Interventions should be matched to the community needs and based on reliable data. Integration is important in this phase of system development. When prevention intervention strategies are designed, it is important to ensure that each facility:

- Uses the assessment studies completed previously
- Has communicated with the injury community including other nearby trauma facilities
- Develops non-duplicative programs and integrated systems within the community

The lead agency should also monitor the adequacy of rehabilitation facilities and assure that these resources are made available to populations as medically necessary.

Through partnerships with public, private, and voluntary sectors, it is also important that all populations, including the underserved and uninsured/underinsured, receive the benefits of a coordinated system of trauma care and have access to the trauma care system. The lead agency should strive for inclusiveness (all-facility participation) by developing the process improvement program

statewide. This program should be inclusive of facilities in the most remote areas of the State, for example, rural clinics and primary care centers in locations such as parks.

The trauma system must continually work to improve the trauma care delivered as measured by patient outcomes. In addition to having an adequate number of trained personnel and required equipment, the system must demonstrate activities related to multidisciplinary, trauma system performance improvement. The lead agency looks not only at the trauma center, but at all system components statewide, for example, designation process, ground versus air transport decisions, prehospital care, interfacility transfers, educational programs offered statewide, appropriateness and effectiveness of injury prevention initiatives, rehabilitation services, and others. The trauma center, as a community resource, must provide clinical outreach to the medical community, and education and training of medical providers; multi-agency and multidisciplinary quality review; and routine reporting on the status of injury and trauma care within the jurisdiction. The role of the State Trauma Office is to assure consistency in the strategies used for process improvement statewide and to receive data to assure and report back the improvements in the system along with deficiencies needing to be addressed.

The lead agency must:

- Design, implement, and draw conclusions from current data, information, and available research to drive system changes and improvements. The trauma system should explore new and innovative solutions to trauma system problems, including the review, evaluation, and revision of laws and regulations to ensure that they reflect current scientific knowledge and best practices for achieving compliance with trauma system standards.
- Institute trauma system changes designed to ensure the provision of those services based on review findings. There should be an evaluation and critical review of trauma programs based on analysis of trauma care and service utilization data. Such an evaluation and review will determine program effectiveness and will provide information necessary for allocating resources and for reshaping programs to improve efficiency, effectiveness, and quality.
- Continuously explore and then use, as appropriate, new technologies to improve the delivery of services, particularly those technologies that may facilitate care statewide inclusive of rural or other underserved areas and populations.

Benchmarks for the Assurance Phase

1. The trauma management information system (MIS) is used to facilitate ongoing assessment and assurance of system performance and outcomes and provides a basis for continuously improving the trauma system including a cost-benefit analysis.
2. The trauma system is supported by an EMS system that includes communication, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated.
3. Acute care facilities are integrated into a resource-efficient, inclusive network that meets required standards and that provides optimal care for all injured patients.
4. The jurisdictional lead agency, in cooperation with other agencies and organizations, uses analytical tools to monitor the performance of population-based prevention and trauma care services.

5. The lead agency ensures its trauma system plan is integrated with, and complementary to, the comprehensive mass casualty plan for natural disasters and manmade disasters, including an all-hazards approach to disaster planning and operations.
6. The lead agency ensures that the trauma system demonstrates prevention and medical outreach activities within its defined service area.
7. To maintain its State, regional, or local designation, each hospital must continually work to improve the trauma care as measured by patient outcomes.
8. The lead agency assures that adequate rehabilitation facilities have been integrated into the trauma system and that these resources are made available to all populations requiring them.
9. The financial aspects of the trauma systems are integrated into the overall quality improvement system to assure ongoing "fine-tuning" and cost-effectiveness.
10. The lead trauma authority assures a competent workforce.
11. The lead trauma authority acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to trauma system components and the system overall.

MASS CASUALTY CARE

Disasters differ in the *degree* to which consequences occur and disrupt the normal medical and public health services of the disaster scene. The severity and diversity of injuries, in addition to the number of casualties, are major factors in determining whether a mass casualty incident (MCI) overwhelms the local medical and public health infrastructure.

Mass casualty incidents are events incurring casualties large enough to overwhelm the public health and medical services of the affected communities. Such incidents in the United States have traditionally been limited in scope, but effective in meeting population needs and providing appropriate resources. However, today's complex disasters, especially those involving terrorism and weapons of mass destruction (i.e., blast, chemical, biological, or nuclear) may result in an "austere environment." An austere environment is a setting where resources, transport, access, or other aspects of the physical, social, political, or economic environments impose severe constraints on providing adequate immediate care for the population in need. This concept is dynamic, depending on the number, severity, and diversity of injuries. Weapons of mass destruction that contaminate environments have the greatest potential to produce the ultimate austere environment and casualties in such numbers that would overwhelm emergency medical and public health systems.

Like the ABCs of trauma care, disaster response includes basic public health and medical elements that are similar in all disasters. The difference is the degree to which these responses are used in a specific disaster and the degree to which outside assistance is needed.

Public health concerns related to mass casualty incidents include:

- Water
- Food
- Shelter
- Sanitation
- Safety and security
- Transportation
- Communication
- Disease surveillance
- Increased risk of infections
- Individual and community mental health services

Trauma care concerns related to mass casualty incidents include:

- Search and rescue
- Trauma triage
- Graceful degradation of care
- Initial stabilization
- Medical direction
- Right patient to right facility (trauma or burn)
- Definitive care
- Evacuation

During the acute phase of a disaster response, the primary objective is to reduce mortality and morbidity. To accomplish this objective, experienced personnel make rapid assessments that allow initial responders to select the appropriate key elements for use in this phase. A consistent medical and public health approach to disasters, based on an understanding of their common features and the level of response they require, is the accepted practice throughout the world. This strategy, called the *Mass Casualty Incident (MCI)* Response, has the primary objective to both reduce the mortality and morbidity caused by the disaster and to achieve the key principle of disaster care, *the greatest good for the greatest number of individuals.*

Many different public health and medical organizations participate in the response to a disaster. The National *Incident Management System (NIMS)* was created to allow different kinds of agencies and institutions (public health, fire, police, emergency medical services, hospitals, and others) to work together effectively in response to a disaster. The NIMS uses a common organizational structure and language to achieve this goal. The organizational structure of the NIMS is built around the following five major management activities, but not all activities are used for every disaster:

- Incident command
- Operations
- Planning
- Logistics
- Financial and administrative

Important NIMS principles are:

1. A *single emergency operations plan* for many different situations (an all-hazards approach) is more effective than multiple separate plans.
2. *Functional requirements,* not titles, determine the organizational hierarchy of the NIMS structure. The organization may raise or lower its requirements based on needs at the time of the disaster.
3. The NIMS *structure is the same* regardless of the nature of the disaster. The difference is in the particular expertise of key personnel.

For example:

- In the case of a biological incident, the safety officer is an infection control expert.
- In a chemical incident, the safety officer is a hazardous materials expert.
- In a radiation incident, the safety officer is an expert in radiation detection.

4. The Incident Commander and *key leaders are identified before* an incident occurs.
5. The NIMS *must be implemented early,* before an incident gets out of control.
6. Public and private emergency response agencies that use the NIMS will be able to coordinate more effectively with other local, regional, and national disaster response organizations.

The trauma system is a model of integrated care with the following capabilities:

- Includes prehospital services, acute care in trauma centers, and non-trauma acute care hospitals and rehabilitation services
- Maintains human resources that are prepared to provide a range of emergency care
- Uses the skills of a diverse professional and paraprofessional workforce that has a well-established communications system
- Interfaces with primary, specialty, and continuing care systems as well as with public health and public safety infrastructures
- Represents *dual-use* capacity; the system routinely functions in accordance with well-established national guidelines of trauma care and is able to expand at the time of a disaster to provide the critical elements of disaster medical care: triage and initial stabilization, definitive care (including critical care), and rehabilitation

The trauma system is a currently existing, organized, and coordinated system with the capacity to deliver a full continuum of care to disaster casualties within a defined geographical area. Unlike the facilities for cardiac and medical care, there are fewer specialized trauma care facilities that can provide appropriate care for the most severely injured patients. Therefore, systematically routing trauma patients to appropriate hospitals (trauma centers) is important. An effective trauma system should be able to:

- Identify hospitals with specialized capability to provide trauma care
- Identify major trauma victims at the scene
- Require that all major trauma victims be taken to a trauma center

The American College of Surgeons (ACS), in the early 1980s, took the position that transporting the severely injured victim to the nearest hospital without regard to the level of care available was generally no longer acceptable. However, it can be acceptable when transport distances are too great. When the victim cannot be delivered to the trauma center within one hour of the incident, the ACS recommends transporting the victim to a closer facility for stabilization, then transferring the victim to a trauma center.[37] Although mass casualty incidents change the volume of patients treated, this underlying principle must be incorporated into State preparedness plans.

Another important consideration is mass casualty burn injuries. The American Burn Association (ABA) currently maintains national guidelines to optimize burn care and, working with the ACS, created a program to provide an operational assessment of individual burn centers and to verify that they comply with the national standards.[38] These specialized burn centers, like trauma centers, are the appropriate facility to administer care to the burned patient. Similar to the trauma patient, they can be stabilized at a closer facility if the distance is too great. The ABA maintains a national network and can assist in locating available burn beds when contacted.

The HRSA *2002 National Assessment of State Trauma System Development, Emergency Medical Services Resources, and Disaster Readiness for Mass Casualty Events* revealed that the States with the most developed trauma systems were more medically ready to handle any type of disaster.[39] The presence of a legislated statewide trauma system signifies the presence of an underlying "grassroots" integration of the public health and medical communities. Success of a statewide disaster preparedness plan is contingent upon the establishment and exploitation of adequate logistical arrangements for materials, equipment, and personnel.[40] Ensuring the timely transfer of injured patients to facilities certified to maintain the appropriate services, expertise, and resources is a mantra of trauma systems development.

The trauma system also is experienced in managing special populations, including children, inner-city residents, low-income groups, minority groups, women, elder persons, and individuals with special health care needs. Such groups are particularly vulnerable to disruptions in public health and medical services that often occur during disasters. These disruptions and special populations represent unique challenges in care for the public health and medical communities.

Key to the success of the trauma care system is its well-established multidisciplinary workforce, which must be able to meet the need for surge capacity in the event of any type of mass casualty incident. The educational systems that train the workforce to support the trauma care system are critical to the development of surge capacity for disaster response. Thus, the trauma system can provide the critical linkages between public health and medical systems necessary for an integrated approach to disaster preparedness, response, and recovery.

The lead agency should assure that the comprehensive mass casualty plan is integrated with the trauma system plan to respond to both natural and manmade disasters, including terrorist events. The trauma system is a natural foundation on which to build all homeland security medical response models. This system can be effective even with biological threats that typically are slower to evolve and be recognized, yet still require a coordinated response of multiple agencies.

Note: This section on Mass Casualty is currently under further development. Future information will incorporate integration of the National Response Plan (NRP), the National Incident Management System (NIMS), and the American Society for Testing and Materials (ASTM) Hospital Preparedness and Response Guidelines.

SYSTEM FINANCE

Trauma systems should be sufficiently financed to be able to implement an integrated public health–trauma system plan. Although this goal seems straightforward, achieving it has been elusive for several reasons, including the following:

- A lack of understanding of the basic business model of health care
- A poor understanding of what costs should be included in a trauma system
- An inability to determine who should pay for these costs and how they should be paid

Basic Business Model of Health Care Delivery

Clinically, health care delivery consists of complex and interdependent processes that must function in a coordinated manner to provide effective patient care. Understanding the basic business model of a health care system requires understanding the three basic costs associated with the delivery of care: fixed, indirect, and variable. These costs are not unique to health care delivery; rather, they are common in all forms of business:

- **Fixed Costs.** These costs are associated with the physical plant, real property, and equipment required to deliver patient care. Specifically, the fixed costs in a health care facility can be those associated with a given care unit (e.g., intensive care unit [ICU], operating room [OR], or emergency department [ED]). Fixed costs can also be human resources, such as the unit clerk or charge nurse. These costs are easy to allocate to a single unit, but not simple enough to allocate to the care of a specific patient. Stated another way, how much would it cost to keep the ICU open regardless of the number of patients served?

  Cost accountants typically allocate these costs based on a fixed rate, or they are amortized over each patient admission. Therefore, each patient can be charged a unit cost, for example, to be admitted to the ICU. This charge does not reflect the severity of the patient's illness.

- **Indirect Costs.** These costs cannot be directly allocated to a specific patient because the cost cannot be readily attributable to a given patient or geographically distinct area within the care facility. These costs include, for example, the chief executive officer's (CEO's) salary, as well as the cost of maintaining a parking garage, cafeteria, and admissions office. All these functions are important to the operational success of the organization, but identifying and allocating a certain portion of these costs to a specific patient is difficult. For example, how much of the CEO's salary should be allocated to an ICU patient or to an ambulatory care patient? Does it really matter? Although indirect cost allocation does matter, this problem is difficult to resolve.

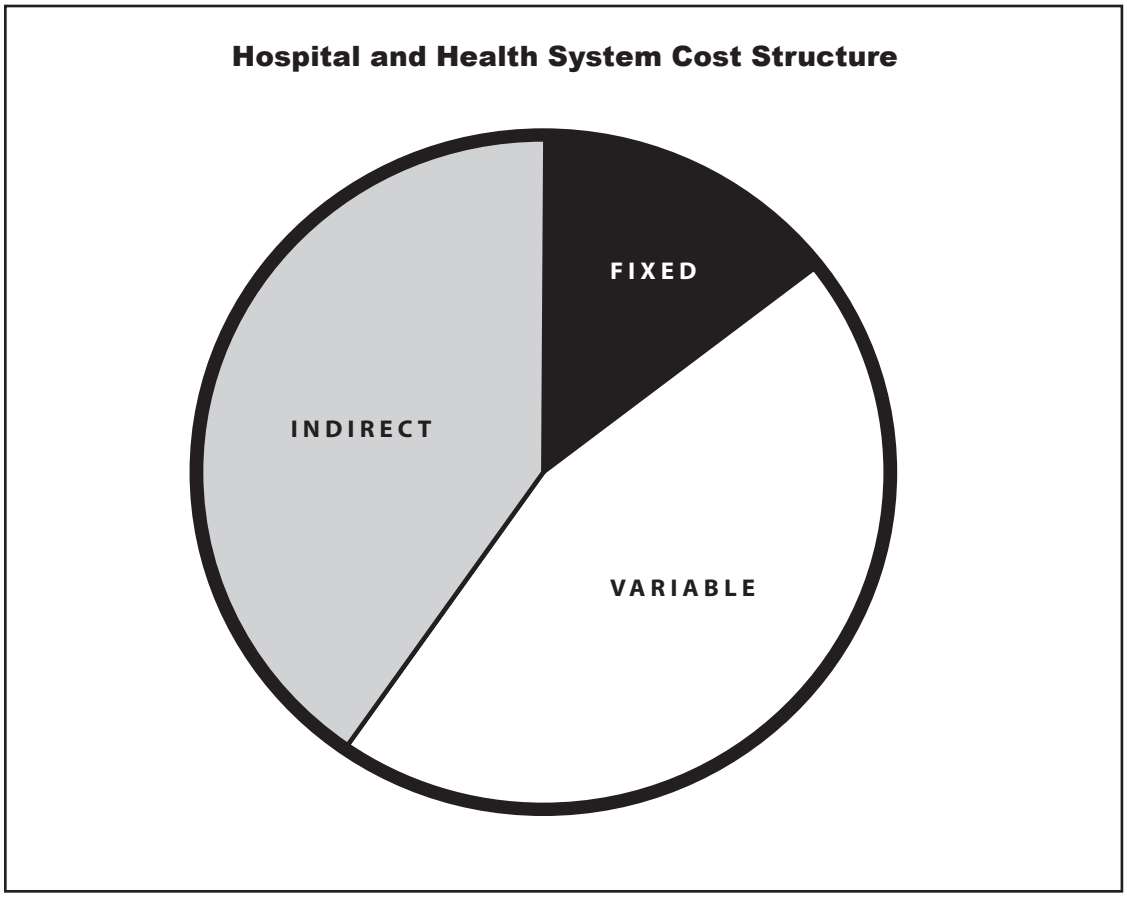
- **Variable Costs.** These costs are directly attributable to an individual patient and vary with each care episode. Clinical examples include the costs of the delivery of an antibiotic, durable medical equipment, a chest x-ray, and laboratory tests. Typically, clinicians can control variable costs. The more patients use or consume clinical resources, the higher the medical bill. Thus, the sicker the patient, the higher the variable costs that will be incurred by the institution.

Understanding these basic costs is relevant to understanding how health care facilities and health systems make investment decisions. In general, the distribution of these costs is as follows:

1. Fixed costs account for approximately 15%–20%.
2. Indirect costs account for approximately 40%–45%.
3. Variable costs account for approximately 35%–40%.

The fixed and indirect costs together are often referred to as *overhead.* In total, these costs account for approximately 60%–65% of those associated with the delivery of patient care (Figure 5). Another way of thinking of these "fixed costs" is how much would it cost to have the hospital up and running if no patients were admitted? From an economic point of view, a hospital and health system is a high fixed-cost and relatively low variable-cost business. Understanding this fundamental economic tenet regarding the business of health care delivery is critical to understanding trauma system financing. Once it is clear that the majority of costs are fixed, the business model is optimized when more patients go through the system. This model is common in many other forms of industry including education, automobile manufacturing, and oil and gas exploration and pipelines.

Figure 5. Fixed, Variable, and Indirect Costs of Health Care Delivery



Understanding these costs allows for better insights into the management perspective of optimizing health systems. From a management perspective, health systems must invest large amounts of capital in both operating the physical plant and training and maintaining their specialized human resources. The system investments, such as prehospital or emergency department equipment, are easy to see and quantify. In addition, some human resources, such as nurses and various therapists, can be assigned or allocated to a specific section within the facility (OR, ED, or radiology). The fixed costs of the physical plant and some human resources can be allocated and quantified to a geographic region within a health system. However, it is more difficult to allocate with accuracy the intensity of their efforts to deliver care to each patient.

Several observations are important to understand how these costs impact delivery of care. First, the majority of the costs are in overhead (fixed and indirect costs)—not variable. For more than a decade, clinicians and administrators have focused their cost reduction efforts on the variable costs (e.g., laboratory, x-rays, or supplies), yet the greater costs are in overhead. Second, health care facilities and health systems are, by fiscal necessity, required to treat increasing volumes of patients to remain viable. Moreover, how these costs are specifically allocated at the patient level can then create some unfortunate consequences related to the financial interpretation of a given patient care episode.

Because the overhead allocation is approximately 60% of the cost of an episode of care, the majority of the costs of patient care are predetermined even before a patient enters a health care facility. Alternatively, the majority of the costs of patient caring are borne before the patient's arrival. This observation is essential to understanding how institutions allocate future investments and cost considerations.

The trauma center is a system in which substantial investments are required well in advance of the patient's episode of care. Trauma centers must invest in both the physical plant and, most importantly, the human resources to be prepared to accept the critically ill. These investments include ensuring capacity, that health care personnel are immediately available when an injured patient arrives. Other forms of capacity must also be available, for example, ORs, medical equipment, medical devices, pharmaceuticals, and ICU beds. These resources, like all other investments, are expensive, and the investment in capacity must be made well in advance of the first patient arrival. Scheduling and setting priorities for trauma care are difficult to achieve and are often not a clinically viable option.

A recent analysis of the cost associated with trauma center readiness within the State of Florida demonstrated that the median cost of readiness approached $2.7 million annually.[41] This figure included physician on-call costs, verification costs, and the overhead associated with maintaining a verified trauma center. However, this analysis did not capture the costs of the long-term institutional investments in physical plant and other preexisting investments. Nonetheless, this analysis does quantify some costs of maintaining a verified trauma center.

To date, little has been written regarding trauma system financing because of many questions related to understanding trauma systems, such as the following:

- How are the actual boundaries of the trauma system defined; that is, does the system include all prehospital investments related to emergent care (myocardial infarction, stroke, or isolated fractures) or just major trauma?

- How does one quantify prevention (expenditures, cost avoidance, and other factors)?
- Does a system include the administrative overhead within each trauma and non-trauma center? If so, how much of the time and expense for each trauma and non-trauma center are associated with trauma care and systems management?

The Ideal Trauma System Financing Model

For any public critical system to remain viable, it must be well understood and have a long-term investment horizon. Funding for critical systems like trauma care must have unwavering commitment and must remain stable.

Application of the public health framework to the trauma system presents an opportunity to enhance the understanding of the role and the importance of the trauma system and its trauma centers within the larger organized public health system. Trauma systems are often defined by their geographic or demographic domain within a region or State. Yet the precise boundary defining where the public health system elements are integrated into trauma care or when these elements function separately within other health care processes is not well defined. Despite the daunting task of separating and isolating various elements of any system into its components, there are examples of systematic investments in emergent care that are well financed.

For example, high fixed-cost businesses within a public health perspective would be the fire and police departments or the military. These systems all require substantial investments in the physical plant, property, equipment, and specially trained workforce. These investments are financially large and occur over a long-term period. There is general agreement that these systems are essential to our well-being and livelihood. Because society understands the importance of these services, various financing mechanisms reliably fund these activities. The basic issue related to incremental system investments focuses on *how* these services will be financed, not *whether* these services should be financed.

Trauma systems are just as important to society as the systems described above. Although there is agreement that the trauma system is an integral component of the broader public health system, trauma system financing remains difficult to achieve and often does not exist. This lack of funding has negative consequences for trauma system development and maintenance. Most States have not achieved a mature trauma system and, as a result, are essentially without reliable systems to finance them.

What Should the Trauma System Include?

Trauma systems should include all activities that are related to the prevention, education, delivery, and rehabilitation of the injured (refer to Figure 1). From a financing perspective, it is essential that there be agreement and understanding of the goals and objectives for the entire trauma system. Once this general understanding is achieved, the investments and financial commitments can be matched to the desired strategies.

How Should a Trauma System Be Financed?

Financing for a trauma system should be from the public health perspective. Trauma systems, centers, and services have a requirement to be available 24 hours a day year round. This constant readiness has a substantial cost that cannot be recouped in

the traditional health care reimbursement models. Such traditional models reflect reimbursement based on the services rendered (transaction by transaction). Currently, there is no way to reimburse providers for the fixed cost of readiness. Although some reimbursement is eventual, such as Diagnostic Related Groups (DRGs), payment is determined based on transactions that occur once a patient is admitted. Thus, reimbursement does not cover the fixed and indirect costs associated with maintaining a viable trauma system.

Examination of simple financial models used by other industries can provide some ideas about how to achieve a reliable trauma system. For example, telephone service providers have large fixed costs and low variable costs. This industry uses a two-part pricing model, which reflects the costs associated with delivery of services. Telephone service providers typically charge a monthly line or access fee regardless of the amount of service consumed. This “monthly access” fee is essentially a charge to have the “phone line” or capacity available to the consumer. This fixed cost cannot be recouped based on the volume of calls. The telephone service provider then charges a per call fee or a consumption fee.

Trauma systems and trauma centers should be financed in a similar manner. A reasonable proposition could relate to the general tax base of the community—typically defined as a State that has an interest in having the capacity available to deliver health care. As a result, these consumers (taxpayers) would cover the costs associated with trauma system readiness. Then patients would pay as they consumed the health care resources. This second component is precisely the payment mechanism used today in health care. This “solution” is desirable because it recognizes the importance of trauma systems within the community and provides a stable source of funding. It is also easy to administer, because the current transactional-based patient care reimbursement practices are already in place.

The goal of trauma system financing is to provide the public with a consistent, reliable, and readily available health care safety net for injured patients while creating the long-term financial commitment that will provide the foundation for educational (prevention) programs. The lead agency, in cooperation with system policy makers (administrative and elected), should lead efforts to acquire sufficient startup and ongoing funding for system sustainability. In the long term, an integrated prevention and educational approach to the trauma system will yield large measurable clinical and financial payoffs.

Note: Information will be added to this section on System Finance.

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Benchmarks, Indicators, and Scoring
for
STATE TRAUMA SYSTEM SELF-ASSESSMENT

STATE SELF-ASSESSMENT FOR TRAUMA SYSTEM PLANNING, DEVELOPMENT, AND EVALUATION

In the absence of validated national benchmarks/norms, this document stresses the need for each trauma system to define its system-specific health status benchmarks and performance indicators and to use a variety of community health and public health interventions to improve the community's health status. The document also addresses reducing the burden of injury as a community-wide public health problem, not strictly as a trauma patient care issue.

This document focuses on an objective State or sub-State (local or regional system) trauma system self-assessment. It also provides the State lead agency with guidance on trauma system next steps or improvements to be made along a continuum of a maturing and developing trauma system. Many of the benchmarks and indicators are qualitative, and will require judgment and discretion by those completing the assessment—a recognized limitation of this methodology. Other evaluation tools exist for assessing system performance such as the American College of Surgeons, Committee on Trauma, *Consultation for Trauma Systems* document. The trauma system industry has many consultant groups who conduct external reviews of trauma system status with recommendations for improvements. These review opportunities help assess the status of trauma care and moves systems forward in developing inclusive and comprehensive systems of trauma care. For years, systems have conducted their own internal or external reviews, and it is hoped that this document will serve as another tool used by systems to assess the current status of trauma care and to provide guidance on future system enhancements.

Benchmarks, Indicators, and Scoring

Benchmarks are global overarching goals, expectations, or outcomes. In the context of the trauma system, a benchmark identifies a broad system attribute.

Indicators are those tasks or outputs that characterize the benchmark. Indicators identify actions or capacities within the benchmark. Indicators are the measurable components of a benchmark.

Scoring breaks down the indicator into completion steps. Scoring provides an assessment of the current status and marks progress over time to reach a certain milestone.

Within each core function (Assessment, Policy Development, and Assurance) are a variety of potential benchmarks. These potential benchmarks are based, to the extent possible, on current literature on trauma system development and public health systems. For each benchmark, a number of INDICATORS further define the benchmark and scoring for each indicator to help identify progress, efforts, and/or compliance. Each indicator contains a scoring-mechanism ordering of statements to assess progress to date. The following criteria are used to assess progress in complying with each indicator.

Score	Progress Scoring
1	No
2	Minimal
3	Limited
4	Substantial
5	Full

The following table provides an example of how the above criteria are used to assess trauma system progress for a specific indicator.

Example of Progress Scoring

Indicator 101.1: A thorough description of the epidemiology of injury in the system jurisdiction using both population-based data and clinical databases exists.

Score	Criteria
1	There is no detailed analysis of injury mortality.
2	Death certificate data have been used to describe the statewide incidence of trauma deaths aggregating all etiologies, but no e-code reporting is available.
3	Death certificate data, by e-code, are reported on a statewide basis, but are not reported by sub-State jurisdiction.
4	Death certificate data, by e-code, are reported on a statewide and on a sub-State jurisdiction. These data are compared to national benchmarks, if available.
5	Death certificate data, by e-code, are used as part of the overall assessment of trauma care in a State or sub-State, including statewide rural/urban preventable mortality studies.

The rater would review the criteria listed and select the one that best describes the jurisdiction's current ability to describe injury mortality ranging from none in neophyte systems to preventable deaths occurring within the trauma care system in the most mature systems.

Benchmark 101

A thorough description of the epidemiology of injury in the system jurisdiction using both population-based data and clinical databases exists.

Indicator	Score
Indicator 101.1	5
Indicator 101.2	3
Indicator 101.3	2
Median Score Expectation 101	**3**

In this benchmark, the median score of "3" would indicate that, overall, there is evidence of limited, but demonstrable progress in meeting the expectation. Although this scoring mechanism provides a quantitative descriptor of each indicator and, ultimately, of the entire trauma system, the scoring process has a number of methodological limitations:

- The benchmarks focus primarily on process measures, not on outcomes. It is assumed that meeting these process measurements will result in improved outcomes. Each trauma system, however, will determine its specific outcome goals. As better-defined and measured national benchmarks are established, it will be possible to assess progress with national outcomes and with nationally established performance guidelines.
- Despite the "apparent" objectivity of the evaluation methodology, it still relies on the qualitative judgments by those completing the assessment.
- Despite efforts to make the document fully objective, it is difficult to provide complete operational definitions for some terms. One assessment to another will vary considerably, depending on the experience and expertise of the assessor.
- The data presented are "rank ordered." Therefore, it is not possible to do parametric statistical analysis such as a mean. Individuals are cautioned not to perform statistical analyses that exceed the underlying data assumptions. Likewise, persons are cautioned about drawing conclusions from the median score. Because the "points" are not discrete points on an ordered scale, it is not possible to say, for instance, that a score of 4 is twice as good as a score of 2. The median simply denotes the relative progress in achieving the benchmark.
- Although focus groups have reviewed the rank-ordered expectations, some may disagree with both the order and the content. This section and its scoring are not absolute.
- The benchmarks and indicators are not exhaustive. As the document continues to evolve, these will be modified. Additional indicators will be added and some existing indicators will be deleted.
- The self-assessment is but ***one*** tool to use in assessing the progress a system has made in meeting the above-referenced benchmarks and indicators. Any system review should include outcome measures as a full measure of system performance.

The reader is, once again, cautioned that the benchmarks, indicators, and scoring mechanisms are in draft form. The BIS is clearly intended to be a "living tool" that will evolve and be refined as the BIS are used across a variety of settings. Eventually, weighting criteria will be added so that the more important aspects of a comprehensive and inclusive trauma system are more clearly identified. The intent of the tool is to allow an individual trauma system to identify its own strengths and weaknesses, prioritize activities, and measure progress against itself over time. It is not intended to compare one system to another.

100. ASSESSMENT

Regular systematic collection, assembly, analysis,
and dissemination of information on the health of the community.

Benchmark

101. There is a thorough description of the epidemiology of injury in the system jurisdiction using both population-based data and clinical databases.

Essential Service: Monitor Health

Indicator	Scoring
101.1 There is a thorough description of the epidemiology of injury mortality in the system jurisdiction using population-based data.	1. There is no detailed analysis of injury mortality. 2. Death certificate data have been used to describe the statewide incidence of trauma deaths aggregating all etiologies, but no E-code reporting is available. 3. Death certificate data, by E-code, are reported on a statewide basis, but are not reported by sub-State jurisdiction. 4. Death certificate data, by E-code, are reported on a statewide and on a sub-State jurisdiction. These data are compared to national benchmarks, if available. 5. Death certificate data, by E-code, are used as part of the overall assessment of trauma care in a State or sub-State, including statewide rural/urban preventable mortality studies.

Essential Service: Monitor Health

Indicator	Scoring
101.2 There is a description of injuries within the trauma system jurisdiction including the distribution by geographic area, high-risk populations (pediatric, elderly, distinct cultural/ethnic populations, rural, and others) incidence, prevalence, mechanism, manner, intent, mortality, contributing factors, determinants, morbidity, injury severity (including death), and patient distribution using any or all of the following: vital statistics, emergency department (ED) data, emergency medical services data, hospital discharge data, State police data (those from law enforcement agencies), medical examiner data, trauma registry, and other data sources. The description is updated at regular intervals. **Note:** Injury severity should be determined through the consistent and system-wide application of one of the existing injury scoring mechanisms, e.g., Injury Severity Score. See trauma systems dictionary for a list of example of clinical databases.	1. There is no written description of injuries within the trauma system jurisdiction. 2. One or more population-based data sources (e.g., vital statistics and medical examiner data) describe injury within the jurisdiction, but clinical data sources are not used. 3. One or more population-based data sources and one or more clinical data sources are used to describe injury within the jurisdiction. 4. One or more population-based data sources and one or more clinical data sources are used to describe injury within the jurisdiction, and the description is systematically updated at regular intervals. 5. One or more clinical data sources (e.g., trauma registry, ED data, and others) are electronically linked and used to describe injury within the jurisdiction.

Essential Service: Monitor Health	
Indicator	**Scoring**
101.3 There is a comparison of injury mortality against national, regional, and other data.	1. There is no written comparison of injury mortality between and among local, regional, and statewide data. 2. There is a written descriptive comparison of at least the leading cause of injury death between and among local, regional, and statewide data. 3. There is written descriptive, graphic, and tabular comparison of the leading cause of injury death between and among local, regional, and statewide data. 4. There is written descriptive, graphic, and tabular comparison of the top three leading causes of injury death between and among local, regional, and statewide data. 5. There is written descriptive, graphic, and tabular comparison of the top ten leading causes of injury death between and among local, regional, and statewide data.

Essential Service: Monitor Health	
Indicator	**Scoring**
101.4 Collaboration exists between Emergency Medical Services (EMS), other public health officials, and trauma system personnel to complete injury risk assessments.	1. No injury risk assessments are conducted. 2. Trauma system officials conduct injury assessments; however, there is no involvement of EMS or public health officials in those assessments. 3. Public health officials, along with EMS and trauma system participants, assist with the design of injury risk assessments. 4. Public health officials assist with the design and analysis of injury risk assessments, along with EMS and the trauma system leadership. 5. The health department's epidemiologist is involved in the development of injury reports. There is clear evidence of data sharing, data linkage, and well-defined reporting roles and responsibilities.

Essential Service: Monitor Health	
Indicator	**Scoring**
101.5 Integration of injury into other public health risk assessments that occurs at State, regional, and community levels, resulting in the integration into key reports and planning documents such as *Healthy People 2010.*	1. No injury risk assessments are completed. 2. Injury risk assessments are conducted in a segregated manner by the trauma program, separate from other public health risk assessments. 3. Injury risk assessments are combined with other assessment data, after separate collection and analysis efforts. 4. Injury risk assessments are conducted by public health officials as an integrated component with other health risk assessments. 5. Injury risk assessments are conducted by public health officials as an integrated component with other health risk assessments, and comparisons and contrasts between injury death and disability rates are made, fully integrated, and published along with other leading health risk indicators, e.g., HIV/AIDS, cardiac, cancer, and others, in "Health of the State" and other formal public health documents.

Essential Service: Diagnose and Investigate	
Indicator	**Scoring**
101.6 The trauma system works with the EMS and public health system to complete a jurisdiction-wide study of the determinants of injury using existing data sources and public health tools.	1. There is no jurisdiction-wide study of the determinants of injury. 2. The trauma system, EMS, and public health officials (including EMS) use existing data sources such as the Behavioral Risk Factor Surveillance System (BRFSS) to describe determinants of injury among the general population. 3. The trauma system, EMS, and public health officials (including EMS) use existing data sources such as the Youth Behavior Risk Survey (YBRS) to describe determinants of injury among high-risk subpopulations. 4. Statewide data from all potential sources (BRFSS, YBRS, Fatality Analysis Reporting System [FARS], vital records, and others) pertaining to the risk of injury are summarized, electronically linked, and are analyzed to determine the potential target areas for injury prevention activities. 5. A State injury prevention plan identifies injury prevention targets based, in part, on the determinants of injury and injury risk, and identifies strategies to document and demonstrate the cost-benefit of various behaviors.

Essential Service: Diagnose and Investigate	
Indicator	**Scoring**
101.7 The trauma system works with EMS and public health to identify special "at-risk" populations.	1. There is no effort to describe risks to high-risk populations such as age categories, cultural/ethnic populations, geographic variances, pediatrics, and high-risk co-morbidities, e.g., substance abuse, and/or children with special health care needs. 2. Risk assessments have been conducted for various age groupings, e.g., adolescents and elderly. 3. In addition to risk assessments for age cohorts, cultural/ethnic variations have been analyzed. 4. In addition to risk assessments for age and cultural/ethnic cohorts, geographic distribution of injury within the jurisdiction has been analyzed, e.g., inner city vs. suburban. 5. There is demonstrable evidence that "at-risk" populations have been identified during the assessment processes.

Benchmark

102. There is an established trauma management information system for ongoing injury surveillance and system performance assessment.

Essential Service: Monitor Health	
Indicator	**Scoring**
102.1 There will be an established injury surveillance process that can, in part, be used as a system performance measure.	1. There is no established system-wide injury surveillance system. 2. There is a system-wide trauma registry, but not all hospitals in the service area contribute to the trauma management information system. 3. There is a system-wide trauma registry with all hospitals in the service area contributing data. 4. The system-wide trauma registry data are bolstered by one or more of the following databases: EMS data system, ED data system, or hospital discharge data. 5. The statewide trauma registry, EMS data system, ED data system, hospital discharge data, rehabilitation, and burn data system are accessible, electronically linked, and have consistent data definitions and elements. The data are used for both surveillance and system performance measures.

Essential Service: Monitor Health	
Indicator	**Scoring**
102.2 Injury surveillance is coordinated with statewide and local community health surveillance.	1. Injury surveillance, as described in 102.1, does not occur within the system. 2. Injury surveillance occurs in isolation from other health risk surveillance and is reported separately. 3. Injury surveillance occurs in isolation but is combined and reported with other health risk surveillance processes. 4. Injury surveillance occurs as part of broader health risk assessments. 5. Processes of sharing and linkage of data exist between EMS systems, public health systems, and trauma systems, and the data are used to monitor, investigate, and diagnose community health risks.

Essential Service: Monitor Health	
Indicator	**Scoring**
102.3 There is the capacity to link data from a variety of sources. **Note:** Deterministically means with such patient identifiers as name and date of birth. Probabilistically means computer software is used to match likely records through such less certain identifiers as date of incident, patient age, gender, and others.	1. Trauma registry data exist but are not deterministically or probabilistically linked to other databases. 2. Trauma registry data exist and can be deterministically linked through hand-sorting processes. 3. Trauma registry data exist and can be deterministically linked through computer-matching processes. 4. Trauma registry data exist and can be probabilistically and deterministically linked to at least one other injury database including: EMS data systems (i.e., patient care records, dispatch data, and others), ED data systems, hospital discharge data, and others. 5. All data stakeholders (insurance carriers, FARS, and rehabilitation, in addition to typical trauma system resources) have been identified, data access agreements executed, hardware/software resources secured, and the “manpower” to deterministically and probabilistically link a variety of data sources designated.

Essential Service: Monitor Health	
Indicator	**Scoring**
102.4 There is a process to evaluate the quality, timeliness, completeness, and confidentiality of the data.	1. There is no process or written policy to evaluate data collected in the system. 2. There is a process of evaluation and written policy but no compliance with governance. Confidentiality of information is not assured. 3. The process of reviewing the quality and timeliness of data is just beginning. There is some compliance with a draft written policy. 4. There are draft policies in place for evaluating the quality (including both reliability and validity) of data and ensuring confidentiality. 5. There is a comprehensive written policy and demonstrated compliance concerning data management and governance including an evaluation of the quality, timeliness, and completeness of data, with confidential protection of records ensured while allowing appropriate access for research purposes.

Essential Service: Monitor Health	
Indicator	**Scoring**
102.5 There is an established method of collecting trauma financial information from all health care facilities and trauma agencies including patient charges as well as administrative and system costs.	1. Financial data are not collected as part of the trauma system registry. 2. Financial data are collected as part of the trauma system registry at individual facilities but are not reported to the lead trauma authority. 3. Financial data are collected as part of the trauma system registry and are analyzed and reported by the lead trauma authority. 4. Financial data from the trauma registry are linked with at least one other source of cost data such as hospital discharge data. 5. Financial data are linked and analyzed from trauma registry, insurers, ED, EMS, hospital discharge, and rehabilitation and are compared with general trauma system infrastructure costs to establish the general financial health of the system and its value to the community.

Benchmark

103. A resource assessment for the trauma system has been completed and is regularly updated.

Essential Service: Monitor Health

Indicator	Scoring
103.1 The trauma system has completed a comprehensive system status inventory that identifies the availability and distribution of current capabilities and resources.	1. There is no statewide resource assessment. 2. A State resource assessment has been completed that documents the frequency and distribution of resources for at least two of the following categories: prehospital and hospital personnel, education programs, facilities, and prehospital equipment. 3. A State resource assessment has been completed that documents the frequency and distribution of resources for more than two of the following categories: leadership, system development, legislation, finances, injury prevention, work force resources, education, EMS, transport, communications, trauma care facilities, interfacility transfer, medical rehabilitation, information systems, medical oversight, system evaluation, performance improvement, and research. 4. A trauma jurisdiction-specific resource assessment has been completed for at least half of the trauma jurisdictions. 5. A trauma jurisdiction-specific resource assessment has been completed for the State, regional, or local area.

Essential Service: System Management

Indicator	Scoring
103.2 The trauma system has completed a gap analysis based on the internal and external system status inventories and system resource standards.	1. There are no resource standards on which to base a gap analysis. 2. The State trauma committee has begun to develop statewide trauma system resource standards. 3. State trauma system resource standards have been approved by the appropriate approving authority. 4. A statewide trauma system resource gap analysis has been completed for the entire State based on the system resource standards adopted. 5. A statewide trauma system gap analysis has been completed for the entire State and is updated at regular intervals based on the trauma resource standards in place.

Essential Service: System Management	
Indicator	**Scoring**
103.3 There has been an initial assessment (and periodic reassessment) of overall system effectiveness.	1. No system-wide assessment of effectiveness has been conducted. 2. A system-wide preventable mortality study has been completed. 3. A system-wide preventable mortality study that includes rates, frequencies, and types of inappropriate care rendered within the hospitals participating in the trauma system has been conducted. 4. A system-wide preventable mortality study that includes rates, frequencies, and types of inappropriate care rendered in all phases of care within the trauma system, e.g., prehospital, rehabilitation, and others, has been conducted. 5. The system has completed preventable death studies that include the determination of rates of inappropriate care, as well as an examination of the number of severely injured (ISS > 15) patients arriving at the highest levels of available care within appropriate times. The assessment is repeated at regular intervals (could be an annual summary of deaths and complications).

Essential Service: System Management	
Indicator	**Scoring**
103.4 The trauma system has undergone a jurisdiction-wide external independent analysis.	1. No external examination of the trauma system or individual components has occurred. 2. Individual trauma centers have undergone outside consultation and verification. 3. In addition to trauma center verification, at least one other component of the system has been analyzed by external reviewers, e.g., prehospital, rehabilitation, burns, and others. 4. Preparations are underway for a formal trauma system review (to occur within the next six months). 5. An outside group of trauma system “experts” has conducted a formal trauma system external assessment and has made specific recommendations to the system.

Benchmark

104. An assessment of the trauma system's disaster/emergency preparedness has been completed including coordination with the public health and EMS systems and the emergency management agency.

Essential Service: System Management

Indicator	Scoring
104.1 There is a resource assessment that identifies the trauma system's expanded capability to respond to mass casualty incidents in an all-hazards approach.	1. There is no system-wide assessment of the trauma system's ability to expand capacity to meet mass casualty incidents for trauma patients. 2. An assessment of the ability of some components of the trauma care system to respond to a mass casualty incident has been included in all-hazards planning. 3. An assessment of the ability for all components of the trauma system to respond to a mass casualty incident has been conducted on a jurisdiction-wide basis. 4. A written system-wide Mass Casualty Incident (MCI) capacity inventory has been completed and includes: medical reserve personnel, facility surge capacity, additional equipment resources and caches, communications interoperability, overall management structure such as NIMS (National Incident Management System), and SEMS (Standardized Emergency Management System). 5. The written trauma system-wide MCI capacity inventory has been shared with and incorporated into broader community-wide and statewide planning efforts for all-hazards responses.

Essential Service: System Management	
Indicator	**Scoring**
104.2 There has been a consultation by external experts to help identify current status and needs of the trauma system to be able to respond to mass casualty situations.	1. No external examination of the trauma system's performance or capabilities to respond within the all-hazards response system has occurred. 2. Individual trauma centers have undergone outside consultation during tabletop and simulated disaster drills. 3. In addition to the involvement of at least some individual trauma centers, at least one other component of the trauma system has been analyzed by external reviewers, e.g., prehospital, communications, information systems, and others. 4. Preparations are underway for a formal system-wide review of the trauma system response to MCI (to occur within the next six months). 5. An outside group of all-hazards response "experts" has conducted a formal external assessment and has made specific recommendations to the system.

Essential Service: System Management	
Indicator	**Scoring**
104.3 The trauma system has completed a gap analysis based on the resource assessment for trauma disaster preparedness.	1. There are no resource standards on which to base a gap analysis. 2. The statewide trauma committee, in conjunction with appropriate disaster management personnel, has begun to develop statewide MCI response resource standards. 3. State resource standards for trauma system response during an MCI have been developed and approved. 4. Some components (e.g., prehospital) of, or facilities within, the trauma system have completed a gap analysis based on the adopted standards. 5. A system-wide trauma system MCI resource gap analysis has been completed for the jurisdiction based on the system resource standards adopted.

Benchmark

105. The system assesses and monitors its value to its constituents in terms of cost/benefit analysis and societal investment.

Essential Service: System Management

Indicator	Scoring
105.1 The benefits of saving lives, in terms of years of productive life lost (YPLL), quality—adjusted life years (QALY), disability—adjusted life years (DALY), and so on, are described.	1. There are no cost data available to the system. 2. Trauma system costs are included in the trauma information management system that can serve as the basis for these calculations. 3. Additional sources of data, in terms of other economic and quality of life measures, are available. 4. Cost and quality of life measures can be analyzed and presented in descriptive and graphic form. 5. A series of reports and fact sheets are available and regularly updated to descriptively and graphically illustrate costs and benefits of the trauma system as well as the cost and benefits of specific personal behaviors.

Essential Service: System Management

Indicator	Scoring
105.2 Cases that document the societal benefit are reported on so that the community sees and hears the benefit of the trauma system to society.	1. No effort is made to formally gather or catalogue descriptive information on dramatic “saves” within the trauma system. 2. Dramatic saves and functional outcome returns are documented at each facility or within various components of the system. 3. Cases concerning dramatic saves and return to a quality life are on file (at a system level) but not reported unless asked for by the press. 4. Dramatic saves and functional outcome returns are provided to, and reported by, the press. 5. Cases are used as part of information fact sheets documenting cost-benefit of the trauma system to the community that are distributed to the press and other segments of the community.

Essential Service: System Management	
Indicator	**Scoring**
105.3 An assessment of the needs of the media concerning trauma system information has been conducted.	1. There is no routine or planned contact with the media. 2. Plans are in place to feed information to the media in response to a particular traumatic event. 3. The media are involved in various oversight activities such as local, regional, and State trauma advisory councils. 4. The media have been formally asked about what types of information would be helpful in reporting on trauma cases and issues. 5. Media information resources have been developed, based on the stated needs of the media themselves, and media representatives are included in trauma system informational events.

Essential Service: System Management	
Indicator	**Scoring**
105.4 An assessment of the needs of the public officials concerning trauma system information has been conducted.	1. There is no routine or planned contact with the general public. 2. Plans are in place to provide information to the general public in response to a particular traumatic event. 3. General public representatives are involved in various oversight activities such as local, regional, and State trauma advisory councils. 4. Public officials and policy makers have been formally asked what types of information would be helpful in planning, monitoring, and reporting on trauma system issues. 5. Public official information resources have been developed, based on the stated needs of the public officials themselves, and public officials are included in trauma system informational events.

Essential Service: System Management	
Indicator	**Scoring**
105.5 An assessment of the needs of the general public concerning trauma system information has been conducted.	1. There is no routine or planned contact with the general public. 2. Plans are in place to provide information to the general public in response to a particular traumatic event. 3. General public representatives are involved in various oversight activities such as local, regional, and State trauma advisory councils. 4. The general public has been formally asked about what types of information would be helpful in understanding and supporting trauma system issues. 5. General public information resources have been developed, based on the stated needs of the general public themselves, and general public representatives are included in trauma system informational events.

Essential Service: System Management	
Indicator	**Scoring**
105.6 An assessment of the needs of the health insurers concerning trauma system information has been conducted.	1. There is no routine or planned contact with the health insurers. 2. Plans are in place to provide information to the health insurers during a response to a particular payment, reimbursement, and cost issues. 3. Health insurers are involved in various oversight activities such as local, regional, and State trauma advisory councils. 4. Health insurers have been formally asked about what types of information would be helpful in reporting on trauma cases and issues. 5. Health insurer information resources have been developed, based on the stated needs of the insurers themselves, and insurance representatives are included in trauma system informational events.

Essential Service: System Management	
Indicator	**Scoring**
105.7 An assessment of the needs of the general medical community, including physicians, nurses, prehospital care providers, and others, concerning trauma system information, has been conducted.	1. There is no routine or planned contact with the broad medical community. 2. Plans are in place to provide information to the broad medical community in response to a particular trauma system event or issue. 3. Broad health care representatives are involved in various oversight activities such as local, regional, and State trauma advisory councils. 4. The broad medical community has been formally asked about what types of information would be helpful in reporting on trauma cases and issues. 5. General medical community information resources have been developed, based on the stated needs of the general medical community themselves, and general medical community representatives are included in trauma system informational events.

200. POLICY DEVELOPMENT

Promoting the use of scientific knowledge in decision making that includes building constituencies; identifying needs and setting priorities; legislative authority and funding to develop plans and policies to address needs; and assuring the public's health and safety.

Benchmark

201. Comprehensive State statutory authority and administrative rules support trauma system leadership and maintain trauma system infrastructure, planning, oversight, and future development.

Essential Service: Develop Policies

Indicator	Scoring
201.1 Legislative authority (statute and regulations) plans, develops, implements, manages, and evaluates the trauma system and its component parts, including the identification of the lead agency and the designation of trauma facilities.	1. There is no specific legal authority or mandate to plan, develop, manage, and evaluate, or fund, the trauma system and its component parts. 2. There is legislation and legal authority for establishing a trauma system, and specific timelines for adoption are being drafted and reviewed by trauma and injury constituencies. 3. The lead agency is identified in State statute and is required to plan and develop a statewide trauma system. 4. The lead agency is authorized (has a legal basis) to take actions to implement the trauma system and to report on the progress and effectiveness of system implementation. 5. The State lead agency is required (exercises the legal authority) to plan, develop, manage, monitor, and improve the trauma system while reporting regularly on the status of the trauma system within the State.

Essential Service: Develop Policies

Indicator	Scoring
201.2 The legislative authority states that all the trauma system components, EMS, injury control, emergency management, and planning documents, work together for the effective implementation of the trauma system (infrastructure is in place).	1. There is no legislative authority or integrated management, and system participants do not routinely work together. 2. There is no legislative authority; planning documents reflect a silo management structure in that participating agencies are not linked. For key issues, stakeholders sometimes come together to resolve problems. 3. There is no legislative authority, but people are working together to improve system effectiveness and management within their individual jurisdictions. 4. There is legislative authority, although it is not clearly evident that system components are integrated and working together. 5. There is legislative authority; it clearly provides for the integration of trauma system components for an effective management and infrastructure to plan and implement the trauma system, as evidenced by agency involvement and interaction.

Essential Service: Develop Policies	
Indicator	**Scoring**
201.3 Administrative rules direct the development of operational policies and procedures at the State, regional, and local levels.	1. There is no legal authority to adopt administrative regulations regarding the development of a trauma system at the State, regional, or local level. 2. There is legal authority, but there are no administrative regulations governing trauma system development including components of the trauma system such as designation of trauma facilities, adoption of triage guidelines, integration of prehospital providers and rehabilitation centers, communication protocols, and integration with public health and disaster preparedness plans. 3. There are draft State, regional, or local requirements and procedures for the different components of trauma system development including integration with public health and disaster preparedness. 4. There are existing statewide administrative regulations for planning, developing, and implementing the trauma system and its components at the State, regional, and local levels. 5. The lead agency regularly reviews, through established committees and stakeholders, the regulations governing system performance including policies and procedures for system operations at the State, regional, and local levels that include integration with disaster services and public health preparedness plans.

Essential Service: Develop Policies	
Indicator	**Scoring**
201.4 The lead agency has adopted clearly defined trauma system standards (e.g., facility standards, transfer protocols, triage protocols, and data collection standards) and has sufficient legal authority to ensure and enforce compliance.	1. The lead agency does not have sufficient legal authority and has not adopted or defined trauma system performance/operating standards nor is there sufficient legal authority to do so. 2. Sufficient authority exists to define and adopt standards for system performance and operations, but the lead agency has not yet completed this process. 3. There is sufficient legal authority to adopt and implement operation and performance standards including enforcement. Draft process procedures have been developed. 4. The authority exists to fully develop all operational guidelines and standards; the stakeholders are reviewing draft policies and procedures; and adoption by the lead agency, including implementation and enforcement, is pending. 5. The authority exists; operational policies and procedures and system performance standards are in place; and active monitoring of compliance is taking place.

Benchmark

202. Trauma system leadership (lead agency, trauma center personnel, and other stakeholders) is used to establish, maintain, and constantly evaluate and improve a comprehensive trauma system in cooperation with medical, professional, governmental, and citizen organizations. (Stress process nature of this activity.)

Essential Service: Mobilize Community Partnership

Indicator	Scoring
202.1 The lead agency demonstrates that it can bring organizations together to implement and maintain a comprehensive trauma system.	1. There is no evidence of partnerships, alliances, or working together to implement the trauma system. 2. There have been limited attempts to organize groups, but to date no ongoing system committees meeting regularly to design or implement the trauma system. 3. The lead agency has multiple committees meeting regularly to develop and implement a comprehensive trauma system plan. 4. The lead agency demonstrates, through its various committees, an ability to bring together multidisciplinary groups interested in developing, implementing, and maintaining a comprehensive trauma system plan. Multiple stakeholders for various disciplines are routinely recruited to participate in system operational issues and refinement depending on expertise needed (e.g., data vs. Public Information & Education). 5. The lead agency has brought together multiple stakeholder groups to assist with and make recommendations on the development and implementation of the trauma system, preferably through a multidisciplinary advisory committee.

Essential Service: Mobilize Community Partnership	
Indicator	**Scoring**
202.2 The lead agency has developed and implemented a statewide multidisciplinary trauma system committee to provide overall guidance to trauma system planning and implementation strategies. The committee meets regularly and is instrumental in providing guidance to the lead agency.	1. There is no statewide multidisciplinary group of stakeholders providing guidance to the State lead agency in planning and developing a statewide trauma system. 2. There is no committee, and attempts to organize a statewide trauma system committee have not been successful but are continuing. 3. There is a statewide committee, but its meetings are infrequent and guidance is not always sought or available. Collaborative working arrangements have not been realized. 4. There is a statewide trauma system committee. Committee members and stakeholders regularly attend meetings. Collaboration and consensus are beginning. 5. There is a multidisciplinary trauma system committee with well-defined goals and responsibilities. It meets regularly with the lead agency providing staff support. The committee routinely provides guidance and assistance to the lead agency concerning system issues. Multiple subcommittees meet as often as necessary to resolve specific system issues and to report back to the statewide trauma system advisory committee. There is strong evidence of consensus building among system participants.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
202.3 A clearly defined and easily understood structure is in place for the trauma system decision-making process.	1. There is no defined process (written policy and procedure) for decision making regarding the trauma program within the trauma system lead agency or its committees. 2. There is an unwritten process that stakeholders use when convenient, although not regularly or consistently. 3. The process for decision making is articulated within the State trauma plan, although it has not been fully implemented. Policies are not written. 4. The process for decision making is contained within the trauma plan, and there are current policies and procedures in place to guide decision-making. Use of the decision-making process is infrequent. 5. There is a clearly defined process for making decisions impacting the trauma program. The process is articulated in the trauma plan and is further identified within system policies. Stakeholders know and understand the process and use the process to resolve issues and to improve the program.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
202.4 Trauma system leadership has adopted and uses goals and time-specific quantifiable and measurable objectives for the trauma system.	1. There are no system goals or measurable objectives. 2. Trauma system leadership has met to discuss the specific quantifiable goals. 3. Trauma system leadership is beginning the process of identifying programmatic and outcome-based goals and objectives. 4. Trauma system leadership has adopted goals and time-specific objectives that guide system performance. 5. Trauma system leadership, in consultation with its multidisciplinary committee, has established measurable programmatic goals and outcome-based quantifiable and time-specific objectives to guide system effectiveness and system performance.

Benchmark

203. The State lead agency has a comprehensive written trauma system plan based on national guidelines. The plan integrates the trauma system with EMS, public health, emergency preparedness, and emergency management. The written trauma system plan is developed in collaboration with community partners and stakeholders.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
203.1 The lead agency, in concert with the multidisciplinary, multi-agency trauma system committee, has adopted a trauma plan.	1. There is no trauma plan, and one is not in progress. 2. There is no trauma plan, although some groups have begun meeting to discuss the development of a trauma plan. 3. A trauma plan was developed and adopted by the lead agency. However, the plan has not been endorsed by multiple stakeholder organizations. 4. A trauma plan has been adopted, developed with multiple agency groups, and endorsed by those agencies. 5. A comprehensive trauma plan has been developed, and adopted in conjunction with trauma stakeholder groups, and includes the integration of all the components of a trauma system (such as EMS, public health, and disaster/emergency preparedness).

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
203.2 A trauma system plan is based on the analysis of the trauma demographics assessment and the resource identification/assessment.	1. There is no effort underway to develop a trauma system plan. 2. The lead agency is developing a trauma system plan without reference to the trauma demographics and resource assessments and analyses. 3. The lead agency is actively developing a trauma system plan based on the trauma demographics and resource assessments and analyses. 4. A trauma system plan has been developed identifying system priorities and timelines and integrating trauma demographics and resource assessments and analyses along with EMS, public health, and emergency/disaster preparedness plans. 5. The trauma system plan is regularly updated based on changes in trauma demographics and resource assessments. It is reviewed for integration of other relevant plans such as EMS, emergency/disaster preparedness, and public health.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
203.3 There should be within the trauma system plan congruence of the trauma demographics with system development and resource allocation priorities. **Note:** The comprehensive plan encompasses various components of the system. Needs of specific populations (pediatrics, burns, Native Americans, special health care needs, and other cultural groups) are integrated into the plan. Considerations with regard to age, population characteristics, and urban and rural environments are all part of the planning process.	1. There is no evidence that system demographics drive resource allocation or that this information is used to establish system priorities in developing or implementing the trauma system plan. 2. System demographics and system resources have been identified. It is not clear that this information is used for system allocation, priority setting, or system planning. 3. There is evidence that planning processes take into consideration the needs of special populations and other cultural or geographic parameters. 4. There is evidence within the trauma system plan that consideration of the needs of differing groups, cultural, geographic, and others, has been included. Translation of the information regarding the needs of special groups is occurring at the provider level. 5. The plan addresses the needs of all residents and visitors including special population groups applicable to the geographic area.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
203.4 The trauma system plan clearly describes the system design (including the components necessary to have an integrated and inclusive trauma system) and is used to guide system implementation and management. **Example:** The plan includes references to regulatory standards and documents, and includes methods of data collection and analysis.	1. There is no trauma system plan. 2. The trauma system plan does not address or incorporate the trauma system components (prehospital, communication, transportation, acute care, rehabilitation, and others) nor is it inclusive of disaster preparedness, EMS, or public health integration. 3. The trauma system plan provides general information about all the components including disaster preparedness, EMS, and public health integration; however, it is difficult to determine who is responsible and accountable for system performance and implementation. 4. The trauma system plan addresses every component of a well-organized and functioning trauma system including disaster preparedness and public health integration. Specific information on each component is provided, and trauma system design is inclusive of providing for specific goals and objectives for system performance. 5. The trauma plan is used to guide system implementation and management. Stakeholders and policy leaders are familiar with the plan and its components and use the plan to monitor system progress and to measure results.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
203.5 A written injury prevention and control plan is developed and coordinated with other agencies and community health programs. The injury program is data driven, and targeted programs are developed based on high injury risk areas. Specific goals with measurable objectives are incorporated into the injury plan.	1. There is no written plan for a coordinated injury prevention and control program. 2. There are multiple injury prevention and control programs that may conflict with each other and/or with the goals of the trauma system. 3. There is a written plan for a coordinated injury prevention and control program that is linked to the trauma system plan and that has goals and time-specific, measurable objectives. 4. The injury prevention and control plan is being implemented in accordance with established timelines. 5. An injury prevention and control plan is being implemented in accordance with the timelines; data concerning the effectiveness of the plan are being collected and are used to validate, evaluate, and modify the plan.

Essential Service: Mobilize Community Partnerships	
Indicator	**Scoring**
203.6 The trauma system plan has established clearly defined methods of integrating with disaster preparedness plans (all hazards).	1. There is no trauma plan and no integration between trauma and emergency/disaster preparedness. 2. There is an established trauma plan but it is silent on emergency/disaster integration, and no evidence is present to demonstrate an integrated disaster and trauma system. 3. The trauma system plan addresses the interaction of the lead agency of the trauma system and emergency/disaster preparedness service system. Close coordination and clearly defined goals and objectives are in process. 4. The trauma system plan addresses coordination between the lead agencies for the trauma system and emergency/disaster preparedness. Plans are integrated, and working collaboration exists and is demonstrated. Routine working drills and training exercises are incorporated into operational plans. 5. The trauma system plan addresses the lead agency coordination between EMS and emergency preparedness. Plans are well integrated, and routine drills that are conducted use an all-hazards approach. Results from drills and live responses are used to further improve the plans and processes.

Essential Service: Mobilize Community Partnerships	
Indicator	**Scoring**
203.7 The trauma system plan has established clearly defined methods of integrating the trauma system plan with the EMS, emergency/disaster, and public health preparedness plans.	1. There is no mention of integration between the trauma system plan and other relevant plans. 2. There is some cross-reference between plans, but defined methods of working collaboratively together are not developed. 3. The written plans are integrated and there are defined methods for working collaboratively; however, implementation or practice within the geographic area has not occurred. 4. The trauma system has been wholly integrated with other relevant plans. There is evidence that working together on system issues is occurring. 5. The trauma system planning and operations have been fully integrated with public health, EMS, and emergency/disaster preparedness. Training and exercises are conducted regularly, and the integration of the system and its plans is evident.

Benchmark

204. Sufficient resources, including those both financial and infrastructure related, support system planning, implementation, and maintenance.

Essential Service: Develop Policies

Indicator	Scoring
204.1 The trauma system plan clearly identifies the human resources and equipment necessary to develop, implement, and manage the trauma program, both clinically and administratively. (The trauma system plan integrates with the Assessment of Resources done previously.)	1. There is no method of assessing available resources or of identifying resource deficiencies in either the clinical or administrative areas of the trauma system. 2. The trauma plan addresses resource needs and identifies gaps in resources within the trauma system, but no mechanism for correcting resource deficiencies has been identified. 3. Resource needs are identified, and a draft plan, inclusive of goals and timelines, has been prepared to address the resource needs. The plan has not been implemented. 4. Resource needs are clearly identified, and action plans are being implemented to correct deficiencies in both clinical areas and administrative support functions. 5. A resource assessment survey has been completed and is incorporated into the trauma system plan. Goals and measurable objectives to reduce or eliminate resource deficiencies have been implemented. Evaluation of progress on meeting resource needs is evident and, when necessary, the plan has been adapted.

Essential Service: System Management	
Indicator	**Scoring**
204.2 Financial resources exist that support the planning, implementation, and ongoing management of the administrative and clinical care components of the trauma system.	1. There is no funding to support the trauma system planning, implementation, or ongoing operations for either trauma system administration or trauma clinical care. 2. Some funding for trauma care within the third-party reimbursement structure has been identified, but ongoing support for administration and clinical care outside the third-party reimbursement structure is not available. 3. There is current funding for the development of the trauma system within the lead agency organization consistent with the trauma system plan, but costs to support clinical care support services have not been identified (transportation, communication, uncompensated care, standby fees, and others). No ongoing commitment of funding has been secured. 4. There is funding available for both administrative and clinical components of the trauma system plan. A mechanism to assess needs among various providers has begun. Implementation costs and ongoing support costs of the lead agency have been addressed within the plan. 5. A stable (consistent) source of reliable funding for the development, operations, and management of the trauma program (clinical care and lead agency administration) has been identified and is being used to support trauma implementation, maintenance, and ongoing program enhancements.

Essential Service: System Management	
Indicator	**Scoring**
204.3 Designated funding for the trauma system support infrastructure (lead agency) is legislatively appropriated. **Note:** Although nomenclature concerning designated, appropriated, and general funds varies between jurisdictions, the intent of this indicator is to demonstrate long-term, stable funding for trauma system development, management, evaluation, and improvement.	1. There is no designated funding to support the trauma system infrastructure. 2. Limited funds for trauma system development have been identified, but the funds have not been appropriated for trauma system infrastructure support. 3. One-time funding has been designated for trauma system infrastructure, and appropriations have been made to the lead agency budget. 4. Consistent, albeit limited, infrastructure funding has been designated and appropriated to the lead agency budget. 5. The legislature has identified and designated and appropriated sufficient infrastructure funding for the lead agency consistent with the trauma system plan and priorities for funding administration and operations.

Essential Service: System Management	
Indicator	**Scoring**
204.4 Operational budgets (system administration and operations, facilities administration and operations, and EMS administration and operations) are aligned with the trauma system plan and priorities. **Examples:** Full-Time Equivalents (FTEs) per population to support the infrastructure. Costs to improve communications system.	1. There is no operational budget. 2. There is a limited operations budget, not sufficient to cover related programmatic costs for the lead agency, the EMS system, or trauma center program costs. 3. There is an operational budget without regard to the trauma system plan or priorities. 4. There is an operational budget that has some ties to the trauma system plan and that includes consideration for the extraordinary costs to various components of the trauma system, including providers. 5. An operational budget for each component in the plan exists that matches system needs and priorities with programmatic and operational expenditures.

Essential Service: Mobilize Community Partnerships	
Indicator	**Scoring**
204.5 The trauma system plan includes identification of additional resources, both manpower and equipment, necessary to respond to mass casualty situations.	1. The plan does not include the identification of resources necessary to respond to mass casualty situations. 2. The plan addresses mass casualty situations but has not identified additional resources. 3. The plan identifies resources, but it is unclear how the needs are going to be met. 4. The plan identifies both equipment and manpower resources available currently and additional resources needed; it also defines a process for securing/assuring that equipment and human resources are available. 5. There is a well-drafted and rehearsed response plan, along with sufficient caches of equipment and backup personnel, that ensures the rapid deployment of additional resources during mass casualty incidents.

Benchmark

205. Collected data are used to evaluate system performance and to develop public policy.

Essential Service: System Management	
Indicator	**Scoring**
205.1 Collected data are used for strategic and budgetary planning.	1. There is no central data repository that can be accessed for budgetary or strategic planning purposes. 2. There are varying databases that can be accessed but no single reporting structure to produce reports and to analyze findings. 3. Data are collected and stored in a central repository; however, reports are not routinely generated that could be used for budgetary or strategic planning. 4. There is a central warehouse for trauma system data that are used for annual reporting of system performance. 5. There is a central repository and data warehouse for all trauma system data. System participants including trauma centers and the lead agency can access the data. Regular (written, on-line, or electronic) reports are generated to identify financial information and budget utilization. Regular reports are used for strategic planning and performance efficiency.

Essential Service: Develop Policies

Indicator	Scoring
205.2 Collected data from a variety of sources are used to review the appropriateness of trauma system policies and procedures. **Note:** The format of the reports in this and other sections may be written, web-based, or other electronic media.	1. There are no written, quantifiable trauma system performance standards or quality improvement mechanisms. 2. There are draft written, quantifiable system performance standards for each component of the trauma system. 3. There are written, quantifiable system performance standards that have been adopted by the lead agency in consultation with the multidisciplinary, multi-agency trauma system committee. 4. Data from trauma, emergency medical services, public safety, and other sources are routinely used by the lead agency to assess the extent of compliance of the trauma system with adopted standards. 5. The lead agency, in cooperation with the multidisciplinary, multi-agency trauma system committee, uses the compliance data to improve the system design changes or to make other system refinements. There is routine and consistent feedback to all system providers to ensure that data-identified deficiencies are corrected.

Essential Service: System Management

Indicator	Scoring
205.3 The trauma information management system is used to assess system performance, to measure system compliance with applicable standards, and to allocate trauma system resources to areas of need or to acquire new resources.	1. There is no trauma information system. 2. There is a limited trauma information system consisting of a trauma patient registry, but no data extraction is used to identify resource needs, to establish performance standards, or to routinely assess and evaluate system effectiveness. 3. There is a trauma information system that routinely reports (written, on-line, or electronic) on system-wide management performance and compliance. Linkage between management reports, resource utilization, and performance measures has begun. 4. Routine trauma management reports are issued at the State, regional, and local levels as well as at the provider level. Reports focus on management strengths, compliance with standards, and resource utilization. Trends are used to improve system efficiency and performance. 5. Trauma management reports are used extensively to improve and report on system performance. The lead agency issues regular and routine reports to providers. Trauma leadership assesses reports to determine system deficiencies and to allocate resources to areas of greatest need. System performance and standard compliance are regularly assessed and reported.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
205.4 Injury prevention programs use trauma information to develop intervention strategies.	1. There is no evidence to suggest that trauma management information is used to determine injury prevention strategies. 2. There is some evidence that trauma management information is available for injury prevention program strategies, but its use is limited and sporadic. 3. Trauma management information reports are routinely provided to the injury prevention programs. The usefulness of the reports has not been measured, and injury prevention providers are just beginning to use trauma injury reports for programmatic strategies and decision making. 4. Trauma management reports on the status of injury and injury mechanisms are routinely available to injury prevention providers and are used routinely to realign injury programs to target the greatest need. 5. A well-integrated trauma and injury reporting system exists. Evidence is available to demonstrate how system providers routinely use the information to identify program needs, to develop strategies on program priorities, and to set annual goals for injury prevention.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
205.5 Education for trauma system participants is developed based on a review and evaluation of trauma system data.	1. There is no correlation between training programs for providers and the trauma management information system. 2. There is limited use of trauma management information reports to target educational opportunities. 3. There is evidence that some providers are using trauma management information reports to identify educational needs and to incorporate them into training programs. 4. Many educational forums have been conducted based on an analysis of the performance data in the trauma management information system. Clear ties link education of providers with identified areas of need from the trauma system reports. 5. Routine analysis of trauma information and educational opportunities is being conducted. Integrated program objectives tying system performance and education are implemented and routinely evaluated. Regular updates to trauma information and education are available. Trauma system management information is used to measure outcomes and effectiveness.

Benchmark

206. Trauma system leadership, including its multidisciplinary advisory committees, regularly reviews system performance reports.

Essential Service: Inform, Educate, Empower

Indicator	Scoring
206.1 Trauma data reports are generated by the trauma system not less than once per year and are disseminated to trauma system leadership and stakeholders to evaluate and improve the effectiveness of the system.	1. No trauma data reports are generated to assess system effectiveness or performance. 2. Some general trauma system information is available for the stakeholders, but it is not consistent or regular. 3. Trauma data reports are done on an annual basis, but decision-making and assessing system effectiveness are absent. 4. Routine reports are generated using trauma system data and other databases so that the system can be analyzed, standards assessed, and performance measured. 5. Regularly scheduled reports are generated from trauma system data and are used by the stakeholder groups to assess system effectiveness.

Essential Service: Inform, Educate, Empower

Indicator	Scoring
206.2 The multidisciplinary, multi-agency trauma system committee regularly reviews annotated trauma system data reports and system compliance information to monitor trauma system performance and to determine the need for system modifications.	1. There is no multidisciplinary, multi-agency trauma committee and no regular reports of system performance. 2. There is a trauma committee, but it does not routinely review trauma data reports. 3. The multidisciplinary, multi-agency committee meets regularly and reviews process-type reports; no critical assessment of system performance is completed. 4. The multidisciplinary, multi-agency committee meets regularly and routinely assesses reports from trauma data to determine system compliance and operational issues needing attention. 5. The lead agency, multidisciplinary, multi-agency committee and related stakeholder groups meet regularly and review trauma data reports to assess system performance overtime, looking for ways to improve system effectiveness and patient outcomes.

Benchmark

207. The lead agency informs and educates State, regional, and local constituencies and policy makers to foster collaboration and cooperation for system enhancement and injury control.

Essential Service: Mobilize Community Partnerships

Indicator	Scoring
207.1 The lead agency ensures communications, collaboration, and cooperation between State and regional/local systems.	1. There is no evidence of active dialogue, either written or verbal, to suggest a strong working relationship between the trauma system lead agency and other governmental agencies (State, regional, or local). 2. There is little evidence that the lead agency and other governmental agencies working to implement a trauma system actively engage in system planning and operational dialogue. 3. The lead agency issues a quarterly update on trauma system activities. The update is largely one-way communication to other governmental agencies. Routine communication usually revolves around an event (reactionary); proactive open communication is not the norm. 4. The lead agency, through its multidisciplinary committee, engages in open and frequent communication with its constituencies. Newsletters, activity reports, and proactive planning are occurring through the lead agency. Communication and collaboration among governmental organizations is occurring, although they are largely event based. 5. State, regional, and local systems engage in mutual and cooperative plan development and implementation. The lead agency seeks input and dialogue with a multitude of stakeholders. The communication is open, frequent, and proactive. Frequent dialogue occurs among the lead agency and local, regional, or State trauma system participants and leaders. There is evidence of mutual respect and sharing of information among the multidisciplinary groups.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
207.2 The trauma system leadership (lead agency, advisory committees, and others) informs and educates constituencies and policy makers through community development activities, targeted media messaging, and active collaborations aimed at injury prevention, and trauma system development.	1. No targeted messaging or media campaigns have begun to educate and inform community and State leadership or policy makers either about injury prevention needs or trauma system development activities. 2. Limited interfaces with policy makers and the media, aimed at both injury prevention and trauma system development, have occurred. Community activities have been limited to incident-specific response opportunities. 3. Community activities have begun with the development of an injury prevention campaign, and there have been initial discussions with policy makers regarding trauma system development. 4. Trauma system leadership is engaging policy makers in discussions about injury prevention and the trauma system. Media awareness and media messaging have been targeted at injury prevention activities with limited trauma system integration. 5. A well-orchestrated and continuing trauma media campaign is underway. Key policy makers at the State, regional, and local levels are keenly aware of the benefits of a trauma system and of the importance of injury prevention programs.

Essential Service: Mobilize Community Partnerships	
Indicator	**Scoring**
207.3 The trauma system leadership (lead agency, advisory committees, and others) mobilizes community partners in identifying the injury problem throughout the State and in building coalitions of personnel to design systems that can reduce the burden of injury.	1. No State lead agency exists to establish, maintain, or mobilize community partners in identifying the injury problem or in building community coalitions. 2. A State lead agency to review and report on the injury problem statewide exists, but there is limited involvement with community coalitions or trauma system partners. 3. A State lead agency for injury prevention has been established, and a statewide injury coalition has been meeting regularly and reporting on the status of injury in the State. Interface between the injury coalition and the trauma system multidisciplinary committee or trauma system leadership (government, acute care, or rehabilitation) has been limited. 4. The trauma system leadership (lead agency, advisory committees, and others) for injury prevention has a proven track record for identifying the injury problem and for targeting messages and programs to reduce the impact of injury in the State. The injury prevention lead agency (if not the trauma system lead agency) interfaces with the multidisciplinary trauma system committee. Trauma leadership and injury prevention leadership have begun to identify strategies and are working collaboratively. Key policy makers are well informed about the burden of injury in the State. 5. The trauma system and injury prevention leadership regularly informs and educates policy makers on trauma system development and injury prevention. Injury coalitions and trauma committees are integrated and work collaboratively to inform the community and to educate community leaders.

Essential Service: Inform, Educate, Empower	
Indicator	**Scoring**
207.4 A public information and education program exists that heightens public awareness of trauma as a disease, the need for a trauma care system, and the preventability of injury.	1. There is no written public information and education plan on trauma system or injury prevention and control. 2. There is a trauma system and injury prevention program public information and education plan, but linkages between programs and implementation of specific objectives have waned. 3. There is a trauma system, and injury prevention plans have a linked public information and education component that has specific timetables and measurable goals and objectives. 4. The trauma system, and injury prevention program public information and education plan is being implemented in accordance with the timelines established and agreed on by the stakeholders and coalitions. 5. The trauma system and injury prevention program public information and education plan is being implemented in accordance with the timelines. Data concerning the effectiveness of the strategies are used to modify the plan and programs.

Benchmark

208. The trauma, public health, and emergency preparedness systems are closely linked.

Essential Service: Mobilize Community Partnerships

Indicator	Scoring
208.1 The trauma system and the public health system have established linkages including programs with an emphasis on population-based public health surveillance, and evaluation, for acute and chronic traumatic injury and injury prevention.	1. There is no evidence that demonstrates program linkages, a working relationship, or the sharing of data between public health and the trauma system. Population-based public health surveillance for acute or chronic traumatic injury has not been integrated with the trauma system. 2. There is little population-based public health surveillance shared with the trauma system, and program linkages are rare. Routine public health status reports are available for review by the trauma system lead agency and constituents. 3. The trauma system and the public health system have begun sharing public health surveillance data for acute and chronic traumatic injury. Program linkages are in the discussion stage. 4. The trauma system has begun to link with the public health system, and the process of sharing public health surveillance data is evolving. Routine dialogue is occurring between programs. 5. The trauma system and the public health system are integrated. Routine reporting, programmatic participation, and system plans are fully vested. Operational integration is routine, and measurable progress can be demonstrated. (Demonstrated integration and linkage could include such activities as rapid response and notification in disasters, integrated data systems, communication cross-operability, and regular epidemiology report generation.)

Essential Service: Mobilize Community Partnerships	
Indicator	**Scoring**
208.2 The trauma system and the disaster management system have formal established linkages for system integration and operational management.	1. There is no linkage, integration, or operational management between the trauma system plan and the disaster preparedness plan. 2. There is limited linkage or interface between the trauma system plan and the disaster plan specific to mass casualties. 3. Plans are in place for both disaster and trauma system linkage. Integration is beginning, and cooperation within the multidisciplinary groups is occurring. Draft policies are being reviewed, and operational management strategies are being aligned. 4. There is evidence of programmatic linkages between the trauma system plan and the disaster preparedness plans. Operational management guidelines exist and are routinely evaluated and tested. 5. Strong program linkages and interfaces are present. The trauma system plan and the disaster preparedness plan are well integrated, and operational procedures have been implemented, tested, and evaluated. System participants meet regularly and are familiar with the operational plans of both areas. Data from the trauma system and from the disaster preparedness program are shared.

300. ASSURANCE

Assurance to constituents that services necessary to achieve agreed-on goals are provided by encouraging actions of others (public or private), requiring action through regulation, or providing services directly.

Benchmark

301. The trauma management information system (MIS) is used to facilitate ongoing assessment and assurance of system performance and outcomes and provides a basis for continuously improving the trauma system including a cost-benefit analysis.

Essential Service: Evaluation

Indicator	Scoring
301.1 The lead trauma authority ensures that each member hospital of the trauma system collects and uses patient data as well as provider data to assess system performance and to improve quality of care. Assessment data are routinely submitted to the lead trauma authority.	1. There is no system-wide management information data collection system that the trauma centers and other community hospitals regularly contribute to or use to evaluate the system. 2. There is a trauma registry system in place in the trauma centers, but it is not used by all facilities within the system nor is it used by the lead trauma authority to assess system performance. 3. The system management information system contains information from all facilities within a geographic area. 4. The MIS is used by the trauma centers to assess provider and system performance issues. 5. Hospital trauma registry data are routinely submitted to the lead trauma authority, are aggregated with other trauma registry data, and are used to evaluate overall system performance.

Essential Service: Evaluation

Indicator	Scoring
301.2 Prehospital care providers collect patient care and administrative data for each episode of care and provide these data not only to the hospital, but have a mechanism to evaluate the data within their own agency including monitoring trends and identifying outliers.	1. There is no prehospital data collection to ensure appropriate care provided by prehospital providers. 2. Prehospital providers have a patient care record for each episode of care, but it is not yet automated or integrated with the trauma MIS. 3. The prehospital patient care record electronically captures patient care provided by field personnel and can be linked to the trauma registry system within individual trauma centers. 4. The prehospital patient data system is integrated into the trauma system MIS and is used by prehospital and hospital personnel to review and evaluate prehospital and system performance. 5. Individual prehospital agency data are electronically submitted to the lead trauma authority, are aggregated with other prehospital agency data, and are used to evaluate overall trauma system performance.

Essential Service: Evaluation	
Indicator	**Scoring**
301.3 Trauma registry, emergency department, prehospital, rehabilitation, and other databases are linked or combined to create a trauma system registry.	1. There are databases for trauma, emergency departments, prehospital, and rehabilitation as well as statewide injury databases. None of the databases are in an integrated or linkable system for review. 2. Some trauma registry and prehospital patient records are manually entered into a database when needed to answer system questions. There is no rehabilitation registry. 3. There are electronic trauma registry and prehospital patient record databases. Both databases are linked, but the system does not use these data for routine review of system performance. Some rehabilitation data are collected separately from the trauma registry. 4. There is an integrated MIS system that includes, at a minimum, hospital and prehospital databases. The information is linked, and providers use the databases for system evaluation. Rehabilitation centers routinely provide electronic data to the trauma registry system. 5. There is an integrated MIS that includes, at a minimum, trauma, emergency department, prehospital, 9-1-1 dispatch, and rehabilitation databases that are regularly used by the lead trauma authority and system provider agencies to monitor the performance of the trauma system.

Essential Service: Evaluation	
Indicator	**Scoring**
301.4 The lead trauma agency has available for use the latest in computer/technology advances and analytical tools for monitoring injury prevention and control components of the trauma system. There is reporting on the outcome of implemented strategies for injury prevention and control within the trauma system.	1. No computer/technology systems or analytical tools are available to the lead agency or other stakeholders to facilitate the monitoring of, or reporting on, the outcome of the implemented strategies for injury prevention and control within the trauma system. 2. There are integrated computer/technology systems, but the development and use of those systems for analytical monitoring and reporting has not yet begun. 3. The lead agency is using the computer/technology systems and analytical tools available to assist in monitoring the injury prevention and control programs of the trauma system. The evaluation of injury prevention and control programs is in its formative stages. 4. The lead agency has integrated the use of new computer/technology systems and analytical tools in the monitoring of injury prevention and control programs within the trauma system. 5. The trauma system participants, under the leadership of the trauma lead agency, have been trained in the use of the computer/technology systems and analytical tools. These tools are used routinely to monitor and report on the outcome of implemented strategies and on the effectiveness of injury prevention and control programs within the trauma system. A process is in place to facilitate the access to data for evaluation and research.

Benchmark

302. The trauma system is supported by an EMS system that includes communication, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated.

Essential Service: Link To Provide Care

Indicator	Scoring
302.1 There is well-defined trauma system medical oversight integrating the specialty needs of the trauma system with the medical oversight for the overall EMS system. **Note:** The EMS system medical director and the trauma medical director may, in fact, be the same person.	1. There is no medical oversight for EMS providers within the trauma system. 2. EMS medical oversight for all levels of prehospital providers caring for the trauma patient is provided, but such oversight is provided outside of the purview of the trauma system. 3. The EMS and trauma medical directors have integrated prehospital medical oversight for prehospital personnel caring for trauma patients. 4. Medical oversight is routinely given to EMS providers caring for trauma patients. The trauma system has integrated medical oversight for prehospital providers and routinely evaluates the effectiveness of both online and offline medical oversight. 5. The EMS and trauma system fully integrate the most up-to-date medical oversight and regularly evaluate the effectiveness of the program. System providers are included in the development of medical oversight policies.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.2 There is a clearly defined, cooperative, and ongoing relationship between the trauma specialty care physician leadership (e.g., trauma medical director within each facility) and the EMS system medical director.	1. The trauma specialty care physicians and the EMS system medical director provide conflicting medical oversight to emergency care providers. 2. There is no formally established, ongoing relationship between the trauma medical director (within each trauma center) and the EMS system medical director; there is no evidence of informal efforts to cooperate and communicate. 3. There is no formally established, ongoing relationship between the trauma medical director (within each trauma center) and the EMS system medical director; however, the trauma medical director and the EMS medical director meet or visit informally to resolve problems, “to plan strategies,” and to coordinate efforts. 4. There is a formal, written procedure delineating the responsibilities of the trauma medical director (within each trauma center) and the EMS system medical director and specifying the formal method by which they work together. However, there is no evidence that the system is regularly used. 5. There is a formal, written procedure delineating the responsibilities of the trauma medical director (within each trauma center) and the EMS system medical director and specifying the formal method by which they work together. There is written documentation including, for instance, meeting minutes indicating this relationship is regularly used to coordinate efforts.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.3 There is clear-cut legal authority and responsibility for the EMS system medical director including the authority to adopt protocols, to implement a quality improvement system, to restrict the practice of prehospital care providers, and to generally assure medical appropriateness of the EMS system.	1. There is no EMS system medical director. 2. There is an EMS system medical director with a written job description; however, the individual has no specific legal authority or time allocated for these tasks. 3. There is an EMS system medical director with a written job description, but with no specific legal authority. The system medical director has adopted protocols, has implemented a quality improvement program, and is generally taking steps to improve the medical appropriateness of the EMS system. 4. There is an EMS system medical director with a written job description and whose specific legal authorities and responsibilities are formally granted by law or by administrative rule. 5. There is an EMS system medical director with a written job description and whose specific legal authorities and responsibilities are formally granted by law or by administrative rule. There is written evidence that the system medical director has, consistent with the formal authority, adopted protocols, implemented a quality improvement program, and is making significant efforts to improve the medical appropriateness of the EMS system and to fully integrate EMS into the trauma care system.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
302.4 The trauma system medical director is actively involved with the development, implementation, and ongoing evaluation of system dispatch protocols to assure they are congruent with the trauma system design. These protocols include, but are not limited to, which resources to dispatch (ALS vs. BLS), air-ground coordination, early notification of the trauma care facility, pre-arrival instructions, and other procedures necessary to assure resources dispatched are consistent with the needs of injured patients. **Note:** The trauma system medical director and the EMS system medical director may be the same individual. However, specific responsibility for, and oversight of, the trauma system must be assured.	1. There are no trauma dispatch protocols. 2. Trauma dispatch protocols have been adopted, but they are in conflict with the design of the trauma system. 3. Trauma dispatch protocols have been adopted and are not in conflict with the trauma system design, but there has been no effort to coordinate the use of protocols with the lead agency or trauma center. 4. Trauma dispatch protocols have been developed in close coordination with the trauma system medical director and are congruent with the trauma system design. 5. Trauma dispatch protocols have been developed in close coordination with the trauma system medical director and are congruent with the trauma system design. There are established procedures to involve the dispatchers and their supervisors in trauma system quality improvement and a “feedback link” to change protocols or to update dispatcher education when appropriate.

Essential Service: Evaluation	
Indicator	**Scoring**
302.5 The retrospective medical oversight of the EMS system for trauma triage, communication, treatment, and transport is closely coordinated with the established quality improvement processes of the trauma system.	1. There is a retrospective medical oversight procedure for trauma triage, communication, treatment, and transport by both the trauma system and the EMS system, but the two processes are in conflict with each other or use different review criteria. 2. There is no retrospective medical oversight procedure for trauma triage, communication, treatment, and transport. 3. There is a retrospective medical oversight procedure for trauma triage, communication, treatment, and transport by the quality improvement processes of the trauma system or by the EMS system; however, this is not coordinated. 4. By the quality improvement (QI) processes of the trauma system, there is retrospective medical oversight for trauma triage, communication, treatment, and transport that is coordinated with the EMS system retrospective medical direction, or by QI processes of the EMS system that are coordinated by the trauma system. 5. There is retrospective medical oversight of the trauma triage, communication, treatment, and transport that is coordinated with the EMS system retrospective medical direction, or vice versa. There is evidence this procedure is being regularly used to monitor system performance and to make system improvements.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.6 There are mandatory system-wide prehospital triage criteria to ensure that trauma patients are transported to an appropriate facility based on their injuries. These triage criteria are regularly evaluated and updated to ensure acceptable and system-defined rates of sensitivity and specificity for appropriately identifying the major trauma patient.	1. There are no mandatory universal triage criteria to ensure trauma patients are transported to the most appropriate hospital. 2. There are differing triage criteria guidelines used by different providers. Appropriateness of triage criteria and subsequent transportation are not evaluated for sensitivity or specificity. 3. There are universal triage criteria that are in the process of being linked to the MIS for future evaluation. 4. The triage criteria are used by all prehospital providers. There is system-wide evaluation of the effectiveness of the triage tools in identifying trauma patients and ensuring that they are transported to the appropriate facility. 5. System participants routinely evaluate the triage criteria for effectiveness. There is linkage with the trauma system, and sensitivity and specificity (over/under triage rates) of the tools used is regularly reported through the trauma lead authority. Updates to the triage criteria are made as necessary to improve system performance.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.7 There is a universal access number for citizens to access the EMS/trauma system, with dispatch of appropriate medical resources. There is a central communications system for the EMS/trauma system to ensure field-to-facility bidirectional communication, interfacility dialogue, and disaster service communications among all system participants. **Note:** In some systems with limited resources, e.g., rural, the available resources are, at least initially, the "appropriate resources."	1. There is no 9-1-1 system for easy citizen access to the trauma system and no central communications system for triage, treatment, and transport of trauma patients for either single or multiple patient encounters. 2. There is a 9-1-1 system for quick citizen access to care. However, there is no central communications system within a jurisdiction to allow for communications to occur among system participants either routinely or during disaster incidents. 3. There is a universal access number and central communications system (9-1-1). A communications plan for the trauma system has been completed. 4. The 9-1-1 and central communications system are integrated and communication regularly occurs among dispatch, field providers, hospitals, and other system providers. The communications plan is implemented. Evaluation of the effectiveness of the communications system is done routinely, and corrective action is implemented as needed. 5. A state-of-the-art electronic communications system is available within the jurisdiction. The trauma system communications plan is integrated with other system plans. The system is also available in disasters and can be used as a quick call system and as a paging network and is linked to public health and other nontraditional partners. Evaluation of the communications system interface with the trauma system occurs routinely.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.8 There are sufficient and well-coordinated transportation resources to ensure EMS providers arrive at the scene promptly and expeditiously transport the patient to the correct hospital by the correct transportation mode.	1. There is no coordination of transport resources within a jurisdiction. Multiple ambulances and/or aeromedical providers can all arrive on scene unannounced. 2. There is a priority dispatch system in place that sends resources to the scene. 3. There is a priority dispatch system that ensures appropriate resources arrive on scene promptly and transport victims to the hospital. A plan for transporting trauma patients from the field to the hospital has been completed. 4. There is a priority dispatch and transportation system that ensures appropriate system resources for prompt transport of trauma victims to trauma centers. A trauma transportation plan has been implemented. System issues are evaluated, and corrective plans are implemented as needed. 5. The transportation system has a priority dispatch system; it regularly assesses its ability to get the right resources to the scene and to transport by using the correct mode of transportation. The transportation system is part of the overall EMS, trauma, and disaster system.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.9 There is a procedure for communications among medical facilities when arranging for interfacility transfers including contingencies for radio or telephone system failure.	1. There are no specific communications plans or procedures to ensure communications among facilities when arranging for interfacility patient transfers. 2. Interfacility communications procedures are generally included in the patient transfer protocols for each facility, but there is not a system-wide procedure. 3. There are uniform, system-wide procedures to facilitate communications among facilities when arranging for interfacility patient transfers, but there are no redundant procedures in the event of power or other communications system failures. 4. There are uniform, system-wide procedures for communications among facilities when arranging for interfacility patient transfers, and there are redundant procedures in the event of power or other communications system failures. 5. There are uniform, system-wide procedures for communications among facilities when arranging for interfacility patient transfers. There are redundant procedures in the event of power or other communications system failures. The effectiveness of these procedures is regularly reviewed and changes made if necessary during the quality improvement process.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
302.10 There are established procedures for EMS and trauma system communications in a disaster that are effectively coordinated with the overall disaster plan for the jurisdiction.	1. There are no written procedures for EMS and trauma system communications in the event of a disaster or major EMS incident. 2. Local EMS systems have written procedures for EMS communications in the event of a disaster or major EMS incident. However, there is no coordination among the local jurisdictions. 3. There are statewide or regional EMS communications procedures in the event of a disaster or major EMS incident. These plans do not involve other jurisdictions and are not coordinated with the overall disaster plan and incident management system. 4. There are statewide or regional EMS communications procedures in the event of a disaster or major EMS incident that are coordinated with other jurisdictions, with the overall disaster plan, and with the incident management system. 5. There are statewide or regional EMS communications procedures in the event of a disaster or major EMS incident that are coordinated with other jurisdictions, with the overall disaster plan, and with the incident management system. There are one or more communications system redundancies. These procedures are regularly tested in disaster drills and changes made in the procedures, when necessary, based on the results of these drills.

Benchmark

303. Acute care facilities are integrated into a resource-efficient, inclusive network that meets required standards and that provides optimal care for all injured patients.

Essential Service: Link To Provide Care

Indicator	Scoring
303.1 The trauma system plan has clearly defined the role and responsibilities of all acute care facilities treating trauma and of facilities that provide care to specialty populations (e.g., burns and spinal cord injury).	1. There is no trauma system plan that outlines roles and responsibilities of all acute care facilities. 2. There is a trauma system plan, but it does not address the role and responsibilities of licensed acute care and specialty facilities. 3. There is a trauma system plan that addresses the role and responsibilities of licensed acute care facilities or specialty care facilities, but not both. 4. There is a trauma system plan that addresses the role and responsibilities of licensed acute care facilities and specialty care facilities. 5. The trauma system plan clearly defines the roles of all acute care hospitals within the system jurisdiction. Specialty services are addressed within the plan, and appropriate policies and procedures are implemented and tracked.

Essential Service: Link To Provide Care

Indicator	Scoring
303.2 The trauma system lead agency should ensure the number, levels, and distribution of trauma centers required to meet system demand are available.	1. There is no trauma system plan to identify the numbers, levels, and distribution of trauma centers. 2. There is a trauma system plan, but it does not identify the number, location, or levels of trauma facilities needed for the jurisdiction served. 3. There is a trauma system plan that identifies the number, location, and levels of trauma facilities needed for the jurisdiction. However, the plan is not based on available data. 4. There is a trauma system plan that identifies the number and levels of trauma facilities needed based on the actual available data. However, this plan is not used to make decisions about trauma facility designations. 5. There is a trauma system plan that identifies the number and levels of trauma facilities based on needs identified through the needs assessment process. The plan is used to make decisions about trauma facility designations and should account for facility resources and their geographic distribution, population densities, injured patient volumes, transport resource capabilities, and transport times. The plan is reviewed and revised periodically.

Essential Service: Evaluation	
Indicator	**Scoring**
303.3 The trauma lead authority ensures that trauma facility patient outcomes and quality of care are monitored. Deficiencies are recognized and corrective action is implemented. Variations in standards of care are minimized, and improvements are made routinely.	1. There is no requirement for trauma facilities to monitor patient outcome and quality of care. 2. Designated trauma facilities are required to maintain a trauma registry including patient outcomes, but they are not required to regularly monitor these outcomes, or quality of care, and are required to report those findings to the lead trauma authority. 3. Designated trauma facilities are required to maintain a trauma registry and to use data from the registry in an ongoing quality improvement program to monitor and to improve the quality of care and patient outcomes. 4. Designated trauma facilities are required to maintain a trauma registry including patient outcomes, to use these data in an ongoing quality improvement program, to provide regular comparisons to local trauma system standards, and to report those findings to the lead trauma authority. 5. Designated trauma facilities are required to maintain a trauma registry including patient outcomes, to use these data in an ongoing quality improvement/performance improvement program. Deficiencies in meeting the local trauma system standards are recorded, and corrective action plans are instituted. Results of comparisons with State or national norms are regularly provided to the trauma agency, along with an explanation for significant variations from these norms, and a written plan to reduce this variation is determined to be unacceptable.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
303.4 When injured patients arrive at a medical facility that cannot provide the appropriate level of definitive care, there is an organized and regularly monitored system to ensure the patients are expeditiously transferred to the appropriate, system-defined trauma facility.	1. There is no system to regularly review the conformity of interfacility transfers within the trauma system according to pre-established procedures. 2. There is a fragmented system, usually event based, to monitor the interfacility transfer of trauma patients. 3. The system for monitoring interfacility transfers is new, the procedures are in place, but training has yet to occur. 4. There is an organized system of monitoring interfacility transfers within the trauma system. 5. The monitoring of interfacility transfers of trauma patients has been integrated into the overall program of quality and system improvement. As the system identifies issues for correction, a plan of action is implemented.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
303.5 The specific needs of unique populations (e.g., Language [EASL], socially disadvantaged, migrant/transient, remote, rural, and others) are accommodated within the existing trauma system.	1. There has been no consideration of the needs of unique populations in making an impact on the patient's access to care within the trauma system. 2. The trauma system lead agency and stakeholders are beginning to consider the needs of unique populations in implementing the trauma system. 3. The trauma system lead agency has, within the trauma plan, identified the unique populations that may require special accommodations with the trauma system to effectively meet their needs. 4. The trauma system lead agency has, within the trauma plan, accommodations for unique populations that allow them to effectively access trauma care. Monitoring processes are in development. 5. The trauma system has accommodated the needs of unique populations that allow them to effectively access trauma care. Routine monitoring, review, and reporting of these populations are incorporated into the evaluation of trauma system effectiveness.

Benchmark

304. The jurisdictional lead agency, in cooperation with other agencies and organizations, uses analytical tools to monitor the performance of population-based prevention and trauma care services.

Essential Service: Evaluation	
Indicator	**Scoring**
304.1 The lead agency, along with partner organizations, prepares annual reports on the status of injury and trauma care in the State, regional, or local areas. **Note:** Annual reports may be distributed electronically rather than, or in addition to, printed copies.	1. No annual reports are available on the status of injury or the trauma system. 2. Annual reports are prepared but are not based on input from providers and other key stakeholders. 3. Annual reports are written by the trauma centers along with the lead trauma agency. 4. Annual reports are written by the lead trauma agency in conjunction with the trauma centers and other stakeholders. Multiple sub reports reporting on the status of trauma care and injury prevention are distributed throughout the year. 5. There is an integrated annual reporting system that is electronically available to stakeholders. Regular annual reports are prepared and disseminated on the status of the trauma system within the State, regional, or local areas.

Essential Service: Evaluation	
Indicator	**Scoring**
304.2 The trauma system MIS database is available for routine public health surveillance. There is concurrent access to the databases (emergency department, trauma, medical examiner, and public health epidemiology) for the purpose of routine surveillance and monitoring of health status that occurs regularly and is a shared responsibility. **Note:** All legal requirements for confidentiality and safeguarding of patient information must be met when sharing data between or among agencies.	1. There is no sharing of databases between emergency department, trauma, prehospital, medical examiner, or public health epidemiology. 2. The databases can be accessed by only the owner of the data, and sharing of information goes through a formal request process. 3. The databases are shared among emergency department, trauma, and public health epidemiology, although regular review for the purpose of surveillance is not occurring. 4. The databases are shared among prehospital, emergency department, trauma, medical examiner, and public health epidemiology. Access issues have been resolved, and epidemiology is beginning to routinely monitor the data for unusual events. 5. The databases of prehospital, emergency departments, trauma, medical examiner, and public health epidemiology are shared files. The epidemiology staff can review all the databases and registries for routine surveillance and unusual occurrences. Concurrent review by the respective groups is used to ensure the effectiveness of the injury prevention and trauma system.

Benchmark

305. The lead agency assures its trauma system plan is integrated with, and complementary to, the comprehensive mass casualty plan for natural disasters and manmade disasters, including an all-hazards approach to disaster planning and operations.

Essential Service: Link To Provide Care

Indicator	Scoring
305.1 The EMS trauma system and the disaster medical system have operational trauma and disaster response plans and have established an ongoing cooperative working relationship to assure trauma system readiness to "all hazard" multiple patient events.	1. There is no system for integration between the EMS, the trauma system, and the disaster services system. 2. There have been some discussions between the EMS, the trauma system, and the disaster system, but no formal plans have been developed. 3. Formal plans for EMS trauma system/disaster services systems integration are in development and have started the approval process. Working relationships have formed and cooperation is evident. 4. There are plans in place to ensure that the EMS, the trauma system, and the disaster system are integrated and operational. Disaster exercises and drills have the cooperation and participation of the trauma system. 5. The EMS trauma system and the disaster system plans are integrated and operational. Routine working relationships are present with cooperation and sharing of information to improve trauma system readiness for "all hazard" multiple patient events.

Essential Service: Evaluation

Indicator	Scoring
305.2 Disaster exercises routinely include situations involving natural (e.g., earthquake), unintentional (e.g., school bus crash), and intentional (e.g., terrorist explosion) trauma-producing events that test expanded response capabilities and surge capacity of the trauma systems.	1. Disaster training is not a routine part of the trauma system. 2. Training in response to disasters is solely the responsibility of the EMS and of emergency management agencies. Trauma response has not been integrated into the system. 3. Disaster exercises are conducted routinely and include both trauma and EMS response capabilities to all hazards. 4. The trauma, EMS, and public health stakeholders have begun exercises in an all-hazards approach to disaster situations. 5. Exercises and training in all-hazards disaster situations including testing of facility/clinic surge capacity are regularly conducted with trauma, EMS, and public health stakeholders. Post-disaster debriefing sessions occur after each drill or event.

Essential Service: Link To Provide Care	
Indicator	**Scoring**
305.3 The trauma system through the lead trauma agency has access to additional equipment, materials, and personnel for large-scale traumatic events. **Note:** The lead trauma agency will work with other appropriate national, State, regional, and local agencies to secure these additional resources.	1. There is no surge capacity (prehospital, hospital, clinic, or coroner) built into the system for either smaller multi-victim events or mass casualty situations. 2. The trauma system has begun to identify additional equipment, material, and personnel needed to respond to disasters and mass casualties in light of new threats and emergencies. 3. The lead trauma agency, working with the trauma stakeholders, has in place additional equipment and materials for mass casualty events. A process to utilize additional personnel resources is in development. Testing of newly acquired equipment, material, and personnel resources has not yet been completed. 4. The lead trauma agency, in conjunction with the trauma stakeholders, has begun to test a method of deploying additional equipment, materials, and personnel during disasters and mass casualty events. 5. The lead trauma agency has acquired additional equipment and material for both the prehospital and hospital response to disasters and mass casualty events. Deployment issues have been resolved. A mechanism to share personnel resources has been developed and tested in both the prehospital and hospital setting (e.g., mutual aid, precredentialing of practitioners, and rapid assignment of privileges). The system routinely tests its capabilities in this area.

Benchmark

306. The lead agency ensures that the trauma system demonstrates prevention and medical outreach activities within its defined service area.

Essential Service: Link To Provide Care

Indicator	Scoring
306.1 The trauma system has developed mechanisms to engage the medical community and other system participants in their research findings and quality improvement efforts.	1. There is no evidence that the trauma system reaches out to the medical community at large to integrate them into trauma system improvements. 2. There is some evidence of medical community interface with the trauma centers, but it is sporadic and not well coordinated. 3. The trauma system can demonstrate routine interface with the general medical community regarding trauma care updates and quality improvements. 4. The trauma system has a formal mechanism to discuss trauma care, system improvements, and research results with the greater medical community within its jurisdiction. 5. There is strong evidence of active participation between the trauma system and the general medical community. Routine discussions are held; quality updates are shared; and research results are integrated within the medical care system.

Essential Service: Link To Provide Care

Indicator	Scoring
306.2 The trauma system is active within its jurisdiction with the evaluation of prevention programs and injury-related community-based activities, e.g., CERT (community emergency response teams) training and response.	1. There is no active participation by the trauma system in the evaluation of injury prevention programs or other community-based activities. 2. There is some activity by the trauma system in the evaluation of prevention programs and other community-based efforts. 3. Prevention programs and other community-based efforts are evaluated by the trauma system. 4. The trauma system is an active participant in community outreach and injury prevention efforts, including the evaluation of program effectiveness. 5. The trauma system has integrated its programs of injury prevention and community-based injury response activities with similar effort within the community. Outreach efforts are well coordinated and duplication of effort is avoided. Ongoing evaluation is routine, and data are used to make program improvements.

Essential Service: Evaluation	
Indicator	**Scoring**
306.3 The effect or impact of outreach programs (both medical community and prevention intervention) are evaluated as part of a system performance improvement process. **Note:** "Evaluation" implies both informal evaluation processes and more structured research.	1. There is no effort by the lead agency to review the activities of the trauma centers in either medical community outreach or prevention. 2. There is no routine evaluation of the outreach or prevention activities accruing within the jurisdiction. 3. Trauma centers do internal monitoring and evaluations of their efforts in outreach and prevention activities. The results are shared with the lead trauma agency. 4. The lead trauma agency participates with trauma centers in evaluating outreach opportunities to the medical community and in prevention intervention activities. The programs are regularly assessed for effectiveness. 5. The lead trauma agency and trauma centers routinely use the data both to implement prevention programs and to communicate trauma system outcomes and performance to the medical community through its annual report. Evaluation processes are institutionalized and used to enhance future outreach and prevention activities.

Benchmark

307. To maintain its State or regional or local designation, each hospital must continually work to improve the trauma care as measured by patient outcomes.

Essential Service: Evaluation	
Indicator	**Scoring**
307.1 The trauma system engages in regular evaluation of licensed acute care facilities that provide trauma care to trauma patients and designated trauma hospitals. Such evaluation involves independent external reviews.	1. There is no ongoing mechanism for the trauma system to assess or evaluate the quality of trauma care delivered by all facilities. 2. There is a mechanism for the trauma system to evaluate trauma care services through internal quality improvement processes. 3. There is a mechanism to evaluate trauma care services across the entire trauma care system through internal quality improvement processes. 4. Review of trauma care quality is both internal through routine monitoring and evaluation and external through independent review during re-designation or re-verification of trauma centers. 5. Quality of trauma care is assured through both internal and external methods. Internal review is regular, and participation is routine for trauma stakeholders. External independent review teams provide further assurance of quality trauma care within all licensed acute care and trauma facilities treating trauma patients.

Essential Service: Evaluation	
Indicator	**Scoring**
307.2 The trauma system implements and regularly reviews a standardized report on patient care outcomes as measured against national norms. **Note:** This process may include clinical and bench research conducted by trauma center or other research entities.	1. There is no evidence that the trauma system engages in any review of patient outcome data to evaluate its performance against national norms. 2. There is some standardized measurement of outcomes for trauma patients within the trauma system and applied to the trauma centers. 3. Through the trauma lead agency, trauma centers use a national standardized measurement tool to assess the quality of trauma patient care outcomes and to regularly report trends in quality improvement committee reports. 4. The trauma system has established standardized measurements of trauma patient outcomes based on national norms and routinely uses the report to highlight improvements in trauma patient care or to identify patient care issues needing remedial action. 5. The trauma system has completed an assessment of trauma care outcomes based on national norms and implements any corrective action noted. Routine measurements of quality are carried out, and routine reporting is accomplished with improvements instituted, trends reported, and highlights acknowledged as necessary.

Benchmark

308. The lead agency ensures that adequate rehabilitation facilities have been integrated into the trauma system and that these resources are made available to all populations requiring them.

Essential Service: Link To Provide Care

Indicator	Scoring
308.1 The lead agency has incorporated, within the trauma system plan and the trauma center standards, requirements for rehabilitation facilities including interfacility transfer of trauma patients to rehabilitation centers.	1. There are no standards written for the integration of rehabilitation services with the trauma system or with trauma centers. 2. The trauma system plan has incorporated the use of rehabilitation services, but the use of those facilities for trauma patients has not been fully realized. 3. The trauma system plan has incorporated requirements for rehabilitation services. The trauma centers routinely use the rehabilitation expertise although written agreements do not exist. 4. The trauma system plan incorporates rehabilitation services throughout the continuum of care. Trauma centers have actively included the rehabilitation services and their programs into trauma patient care plans. 5. There is evidence to show a well-integrated program of rehabilitation is available for all trauma patients. Rehabilitation programs are included in the trauma system plan, and the trauma centers work closely with rehabilitation centers and services to assure quality outcomes for trauma patients.

Essential Service: Evaluation	
Indicator	**Scoring**
308.2 Rehabilitation centers and out-patient rehabilitation services providing care for trauma patients provide data to the trauma system registry that include final disposition, functional outcome, and rehabilitation costs and also participate in quality improvement processes.	1. There is no requirement for the rehabilitation centers or out-patient rehabilitation services to contribute data on trauma patient outcomes. 2. Rehabilitation centers and out-patient rehabilitation services are integrated into the trauma plan, but there is no requirement for them to submit data on trauma patients to a central trauma registry. 3. Rehabilitation centers and out-patient rehabilitation services are integrated into the plan, and rehabilitation care is begun early in the patient's treatment plan within the acute care hospital. Data submission to the central trauma registry is yet to be realized. 4. Some trauma centers and rehabilitation facilities/out-patient rehabilitation services have close links, and integration of services is routine. Data sharing between individual trauma centers and rehabilitation centers/services is accomplished, and some integration with the central registry is ongoing. Rehabilitation personnel participate in trauma system quality improvement activities. 5. The trauma plan integrates rehabilitation centers and out-patient rehabilitation services. Trauma centers integrate rehabilitation early in the patient's treatment plan. Rehabilitation data are collected and are routinely submitted to trauma centers and to the central registry for inclusion in system evaluation reports. Rehabilitation personnel are fully integrated into the trauma system quality improvement processes.

Benchmark

309. The financial aspects of the trauma systems are integrated into the overall quality improvement system to assure ongoing "fine-tuning" and cost-effectiveness.

Essential Service: Evaluation

Indicator	Scoring
309.1 Cost data are collected and provided to the system trauma registry for each major component including: prevention, prehospital, acute care, disaster planning, and rehabilitation.	1. No cost data are collected. 2. Administrative and program cost data are collected and included as part of the annual trauma system report. 3. In addition to administrative and program costs, clinical costs are included in one or more component areas and are included as part of the annual trauma system report. 4. The costs associated with individual system components can be determined and are included as part of the annual trauma system report. 5. The cost of an aggregate system can be determined and is included as part of the annual trauma system report.

Essential Service: Evaluation

Indicator	Scoring
309.2 Collection and reimbursement data are submitted by each agency or institution on at least an annual basis.	1. No cost recovery data are collected nor do common definitions exist. 2. Common definitions exist, and cost recovery data are available and reported to the lead agency for one or more clinical components. 3. Common definitions exist, and cost recovery data are available and reported to the lead agency for one or more clinical components, and are compared to cost data for those components. 4. Common definitions exist, and cost recovery data are available and reported to the lead agency for <u>all</u> clinical components, and are compared to cost data for those components. 5. Common definitions exist, and cost recovery data are available and reported to the lead agency for <u>all</u> clinical components, are compared to cost data for those components, and are reported in an aggregate form in the annual trauma system report.

Essential Service: Evaluation	
Indicator	**Scoring**
309.3 Cost, charge, collection, and reimbursement data are aggregated with other data sources including insurers and data system costs and are included in annual trauma system reports. **Note:** "Outside" financial data means costs that may not routinely be captured in trauma center or registry data, e.g., transportation, communication, training, infrastructure, and the overall cost of readiness.	1. No outside financial data are captured. 2. Outside financial data are collected from one or more sources (e.g., Medicaid or private insurers). 3. Extensive financial data are collected from one or more sources. Sufficient expertise is available to the trauma system to analyze and report complex fiscal data. 4. Outside financial data are combined with internal trauma system data and are used to estimate total system costs. 5. Outside financial data are combined with internal trauma system data and are used to estimate total system costs. These financial data are detailed in the annual trauma system report.

Essential Service: Evaluation	
Indicator	**Scoring**
309.4 Financial data are combined with other cost, outcome, or surrogate measures (e.g., YPLL, QALY, and DALY), length of stay, length of Intensive Care Unit (ICU) stay, number of ventilator days, and others, to estimate and track true system costs and cost-benefits.	1. No nonfinancial burden of disease costs and outcome measures are collected or modeled. 2. Estimated savings using various burdens of disease costs or outcome measure models are calculated for all injury prevention programs. 3. Estimated savings using various burdens of disease costs or outcome measure models are calculated for clinical trauma programs. 4. Estimated savings using various burdens of disease costs or outcome measure models are calculated for all injury prevention programs and are combined with actual system cost data to determine costs and savings of the total system. 5. Estimated savings using various burdens of disease costs or outcome measure models are calculated for all injury prevention programs and are combined with actual system cost data to determine costs and savings of the total system and are detailed in the annual trauma system report.

Benchmark

310. The lead trauma authority assures a competent workforce.

Essential Service: Assure Competent Workforce

Indicator	Scoring
310.1 In cooperation with the prehospital certification/licensure authority, sets guidelines for prehospital personnel for initial and ongoing trauma training including trauma-specific courses and those courses that are readily available throughout the State.	1. There are no trauma training guidelines for prehospital personnel as part of initial or ongoing certification or licensure. 2. Trauma training is incorporated into initial prehospital training programs following the National Highway Traffic Safety Administration (NHTSA) curricula. 3. Prehospital personnel are offered trauma training during their initial education, and specialty trauma courses are available periodically. 4. There are trauma courses offered to prehospital personnel during initial training, and courses are regularly scheduled throughout the State. 5. Prehospital personnel receive trauma training as part of their initial certification and licensure. Routine continuing education in prehospital trauma care is provided. Such additional certifications as Basic Trauma Life Support (BTLS) and Pre-Hospital Trauma Life Support (PHTLS) are offered regularly throughout the State.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.2 In cooperation with the prehospital certification/licensure authority, assure that prehospital care providers who routinely respond to trauma have a current trauma training certificate, e.g., PHTLS, BTLS, and others, or that after initial certification, training needs are driven by quality assurance or performance improvement (QA/PI) mechanisms, or both.	1. There is no mechanism to assure that prehospital personnel (Emergency Medical Technicians [EMTs]) providing care to trauma patients are certified in PHTLS and BTLS or have completed other trauma training. 2. There is a requirement for EMTs to complete a certification course in trauma; however, no mechanism to assure compliance has been instituted. 3. There is a requirement for prehospital trauma course completion for EMTs providing trauma care. Compliance with training requirements is the responsibility of the employing agency as part of the quality assurance process. 4. Requirements for EMT trauma training are provided by the trauma centers, the lead agency, or other educational training institutions. Monitoring compliance with meeting the requirement is beginning. 5. Regular and routine EMT trauma training is conducted through a variety of venues. Other trauma training as identified through the performance improvement process is completed in cooperation with the appropriate authorities (trauma center, lead agency, and licensing body) to assure a collectively competent prehospital workforce in issues of trauma care.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.3 As part of the trauma center standards and regulations, set appropriate levels of trauma training for all nursing personnel who routinely care for trauma patients in acute care facilities.	1. There are no specialized trauma training requirements for nursing personnel caring for trauma patients in acute care hospitals (e.g., Advanced Trauma Care for Nurses [ATCN], Trauma Nursing Core Course [TNCC], Advanced Trauma Life Support [ATLS], or any national or State-recognized trauma nurse verification course). 2. There are courses for nurses in trauma training but no requirement for nurses to attend or to achieve certification of completion. 3. There are nursing trauma-training standards written into the trauma plan. 4. There are nursing trauma training standards written into the trauma plan (and associated rules and regulations), and nurses who care for trauma patients participate in trauma nurse training. 5. Nurses working in all acute care facilities that see trauma patients receive initial and ongoing trauma training, including updates in trauma care, continuing education, and trauma nurse certifications, as appropriate. Outcome data are monitored for quality improvement and subsequent training opportunities.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.4 Assure that appropriate/approved trauma training opportunities are provided for nursing personnel on a regular basis.	1. There is no mechanism to approve or provide trauma nurse training throughout the jurisdiction. 2. There is a process to provide trauma nurse training, but courses are sporadic and uncoordinated with needs. 3. There are regularly approved trauma nurse course offerings throughout the jurisdiction. 4. Trauma nurse courses have been approved and are provided regularly and routinely. There are initial trauma courses and opportunities for special courses as needed. 5. Trauma nurse courses are provided regularly and routinely throughout the jurisdiction and within the trauma centers. Courses are open to nurses from any facility that treats trauma patients and are matched to needs identified in the performance improvement process.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.5 In cooperation with the nursing licensure authority, assure that all nursing care providers who routinely respond to trauma have a current trauma training certificate (e.g., ATCN, TNCC, or any national or State trauma nursing verification course). As an alternative after initial trauma course completion, training can be driven by QA/PI processes.	1. There is no mechanism to assure that nurses providing care to trauma patients are certified in an ATCN, TNCC, or any national or State trauma nursing verification course. 2. There is a requirement for nurse verification in trauma; however, no mechanism to assure compliance has been instituted. 3. There is a requirement for trauma nursing course completion for nurses providing trauma care. Compliance with training requirements is the responsibility of the trauma center as part of the quality assurance process. 4. Requirements for nurse trauma training are provided by the trauma centers and the lead agency. Monitoring compliance with meeting the requirement is beginning. 5. Regular and routine trauma nurse training is conducted. Other trauma training as identified through the performance improvement process is completed in cooperation with the appropriate authorities (e.g., trauma center, lead agency, or licensing body). Compliance is documented and forwarded to the appropriate oversight body to assure a collectively competent nursing workforce in issues of trauma care.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.6 As part of the trauma center regulations, set appropriate levels of training for physician personnel who routinely care for trauma patients in all facilities.	1. There are no specialized trauma training requirements for physicians caring for trauma patients in acute care hospitals. 2. There are physician trauma training requirements, but no mechanism to assure attendance or successful completion. 3. There are physician trauma training standards written into the trauma plan. 4. There are physician trauma training standards written into the trauma plan, and physicians who care for trauma patients participate in trauma training. 5. Physicians working in acute care facilities that see trauma patients receive initial and ongoing trauma training, including updates in trauma care, continuing education, and certifications, as appropriate.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.7 Assure that appropriate, approved trauma training opportunities are provided for physicians on a regular basis.	1. There is no mechanism to approve or provide physician training in trauma throughout the jurisdiction. 2. There is a process to provide trauma training for physicians, but courses are sporadic and uncoordinated with needs. 3. There are regularly approved trauma training opportunities provided for physicians. 4. Trauma courses appropriate for physicians have been approved and are provided regularly and routinely. There are initial trauma courses and opportunities for special courses as needed. 5. Trauma courses for physicians are provided regularly and routinely throughout the jurisdiction and within the trauma centers. Courses are open to physicians from any facility that treats trauma patients and are matched to needs identified in the performance improvement process.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.8 In cooperation with the physician licensure authority, assure that all physician providers who routinely respond to trauma have a current trauma training certificate of completion (e.g., Advanced Trauma Life Support [ATLS] and others). Alternatively, physicians may maintain trauma competence through continuing medical education programs following initial ATLS completion.	1. There is no mechanism to assure that physicians providing care to trauma patients are certified in ATLS. 2. There is a requirement for ATLS for physician providers; however, no mechanism to assure compliance has been instituted. 3. There is a requirement for ATLS for physicians providing trauma care. Compliance with trauma course completion is the responsibility of the trauma center as part of the quality assurance process. 4. Requirements for ATLS and other trauma training for physicians are provided by the trauma centers and the lead agency. Monitoring compliance with meeting the requirement is beginning. 5. Regular and routine ATLS, and other trauma training as identified through the performance improvement process, is completed in cooperation with the appropriate authorities (e.g., trauma center, lead agency, or licensing body) to assure a collectively competent physician workforce in issues of trauma care.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.9 Conduct at least one multidisciplinary trauma conference annually that encourages system and team approaches to trauma care.	1. There are no multidisciplinary trauma conferences conducted within geographic boundaries of the trauma system. 2. There are occasional trauma conferences conducted. 3. Multidisciplinary trauma conferences are conducted regularly, and attendance by trauma practitioners is monitored and reviewed. 4. Multidisciplinary trauma conferences are conducted annually within the trauma center system. 5. Multidisciplinary (EMS, physicians, nurses, physiatrists, policy makers, consumers, and others) trauma conferences are conducted regularly; new findings from QA/PI processes are shared; and the conferences are open to all practitioners within the system. Regular attendance is required and system compliance is acceptable.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.10 As new protocols and treatment approaches are instituted within the system, structured mechanisms are in place to inform all personnel in those changes in a timely manner.	1. There is no mechanism to inform or educate personnel in new policies or protocols within the jurisdiction. 2. A process is in place to inform or educate personnel in new policies or protocols, but it has not been tried or tested. 3. A mechanism is in place to inform personnel in new policies or protocols as changes in the system are identified. 4. A mechanism is in place to educate personnel in new policies and protocols. 5. A mechanism exists to educate personnel in new policies and protocols in a timely manner, and there is a method to monitor compliance with new procedures as they are instituted.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.11 There are mechanisms within the system quality improvement processes to identify and correct systemic personnel deficiencies. **Note:** Systemic personnel deficiencies are those that cut across multiple agencies and institutions and impact the system as a whole. As an example, if trauma triage protocols are not being adhered to by most prehospital providers from multiple agencies, then it is a systemic problem that could involve communication, training, medical direction, or quality improvement issues.	1. There is no mechanism to identify, through the quality improvement processes, deviations from the standards of care by personnel within the trauma system. 2. The trauma system has begun to identify systemic personnel deficiencies. 3. The trauma system has a mechanism to identify systemic personnel deficiencies and is working on a process for corrective action. 4. The trauma system has a mechanism to identify systemic personnel deficiencies and is instituting corrective actions across the system. 5. Trauma stakeholders, including trauma centers and the lead agency, monitor and correct personnel deficiencies as identified through QA/PI processes. A method of corrective action has been instituted, and appropriate follow-up is occurring. Monitoring of system deficiencies and corrective actions is ongoing.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.12 There are mechanisms in place within institutional and agency quality improvement processes to identify and correct individual personnel deficiencies.	1. There is no mechanism in place to routinely assess the individual practice patterns of personnel providing trauma care within the trauma system. 2. The trauma system has begun a process to evaluate trauma care practice patterns by individual practitioners (EMTs, paramedics, nurses, and physicians). 3. A mechanism is in place to monitor and report on practice patterns of individual practitioners within the trauma system. The process is evolving as part of the QA/PI processes. 4. There is a well-defined process to assess care provided by practitioners within the trauma system. The QA/PI processes identify deficiencies and corrective action plans are instituted. 5. Practice patterns of individual practitioners (EMTs, paramedics, nurses, physicians, and others) outside the standards of care are routinely assessed by the trauma centers and the local, regional, or State lead agency. Corrective actions (training, additional education, and disciplinary), as appropriate, are instituted, and trends are monitored and reported to the lead agency or other licensing agency.

Essential Service: Assure Competent Workforce	
Indicator	**Scoring**
310.13 There is authority to hire, and a clear job description for the lead agency trauma physician medical director, including requisite education, training, and certification. **Note:** The trauma medical director and the EMS medical director may be one and the same.	1. There is no requirement for a lead agency trauma medical director, and no job description has been developed. 2. There is authority for a trauma medical director, but no job description has been developed. 3. The authority exists for a trauma medical director, and a job description is under development. Approval to hire is pending. 4. The authority exists, and the plan to hire has been developed along with a comprehensive job description. 5. The authority for a trauma medical director exists, and the job description for the trauma medical director is clear. A physician appropriately credentialed has been hired and the job classification is routinely assessed for appropriateness of the duties required.

Benchmark

311. The lead trauma authority acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to trauma system components and the system overall.

Essential Service: Enforce Laws	
Indicator	**Scoring**
311.1 The lead trauma authority works in conjunction with the prehospital regulatory agency to ensure that prehospital care is provided by licensed agencies and that those agencies are in compliance with any rules, regulations, or protocols specific to prehospital trauma delivery (e.g., taking patients to the correct facility in accordance with pre-existing destination protocols). **Note:** In many cases, the trauma lead agency and the prehospital regulatory agency are one and the same.	1. There is no evidence that the trauma system lead agency and the prehospital agency licensing authority work together to ensure appropriate provider agency licensure and compliance. 2. The trauma system lead agency refers complaints concerning issues of prehospital agency performance to the prehospital agency licensure authority. 3. The trauma system lead agency and the prehospital agency licensure authority work together to resolve complaints involving prehospital agencies as it relates to trauma system performance. 4. The trauma system and the prehospital agency licensure authority work together to monitor prehospital provider agency compliance with trauma system policies and procedures. 5. The prehospital agency licensure authority, working cooperatively with the trauma lead agency, is involved in ongoing trauma system performance improvement processes and prehospital compliance with trauma regulations.

Essential Service: Enforce Laws	
Indicator	**Scoring**
311.2 The lead trauma authority refers issues of personnel noncompliance with trauma laws, rules, and regulations to appropriate boards or licensure authorities.	1. Individual provider performance is not monitored. 2. Individual provider complaints, as they relate specifically to trauma care, go directly to licensure boards. 3. Trauma authority personnel collaborate actively with licensure agencies to resolve complaints involving individual performance within the trauma system. 4. Individual provider performance issues are addressed within trauma performance improvement processes unless they involve breaches of State or Federal statute. 5. Appropriate licensure boards are involved in the system performance improvement processes.

Essential Service: Enforce Laws	
Indicator	**Scoring**
311.3 The lead trauma authority enforces laws, rules, and regulations concerning the verification of trauma centers, including the ability to de-designate trauma facilities for matters of noncompliance.	1. The lead trauma system agency does not have the authority to de-designate trauma facilities for matters of noncompliance. 2. The lead trauma system agency has the authority to de-designate trauma facilities for matters of noncompliance but does not monitor facility performance. 3. The lead trauma system agency has the authority to de-designate trauma facilities for matters of noncompliance and monitors facility performance. 4. The lead trauma system agency has the authority to de-designate trauma facilities for matters of noncompliance, monitors facility performance, and has taken one or more administrative actions to bring noncompliant facilities into compliance. 5. Facilities are represented in the system performance improvement process and benchmark their performance against local and national standards. Issues of noncompliance are monitored and addressed as part of the performance improvement process. De-designation is reserved only as a final public health safeguard.

Essential Service: Enforce Laws	
Indicator	**Scoring**
311.4 Laws, rules, and regulations are routinely reviewed and updated to continually strengthen and improve the trauma system.	1. There is no process for examining laws, rules, or regulations. 2. Laws, rules, and regulations are reviewed and revised only in response to a "crisis" (e.g., malpractice insurance costs). 3. Laws, rules, and regulations are reviewed and revised on a period schedule (e.g., every 5 years). 4. Laws, rules, and regulations are reviewed by agency personnel on a continuous basis and are revised as needed. 5. Laws, rules, and regulations are reviewed as part of the performance improvement process involving representatives of all system components and are revised as they negatively impact system performance.

Essential Service: Enforce Laws	
Indicator	**Scoring**
311.5 The lead agency routinely evaluates all components of the system to assure compliance with various laws, rules, and regulations pertaining to their role and performance within the trauma system.	1. The lead agency does not have the authority to evaluate all system components (e.g., prehospital). 2. Complaints concerning individual component performance within the trauma system go directly to the licensure agency responsible for that component. 3. Trauma agency personnel collaborate actively with licensure agencies to resolve complaints involving component performance within the trauma system. 4. Individual system deficiencies are addressed as part of the trauma system performance improvement process. 5. System components are equitably represented in the trauma system improvement process and work to improve individual component compliance and overall trauma system performance. De-designation, or revocation of licenses or certifications are used only as a course of last resort to safeguard public health.

Essential Service: Enforce Laws	
Indicator	**Scoring**
311.6 Incentives are provided to individual component agencies and institutions to seek State or nationally recognized accreditation in areas that will contribute to overall improvement across the trauma system (e.g., Commission on Accreditation of Ambulance Services [CAAS] for prehospital agencies, Council on Allied Health Education Accreditation [CAHEA] for training programs, American College of Surgeons [ACS] verification for trauma facilities, and others).	1. There are no incentives for outside review and accreditation. 2. Accreditation processes are generally encouraged but are not specifically acknowledged; e.g., no special dispensation is offered to programs or agencies completing such accreditation. 3. Accreditation processes are strongly encouraged, and some incentives are provided, e.g., extension of EMS agency review from 2 years to 3 years following CAAS accreditation. 4. Incentives are provided to agencies that successfully complete outside accreditation processes, e.g., acceptance of CAAS accreditation in lieu of local EMS agency review. 5. As part of the system performance improvement process, the impact of outside review and accreditation on various components and subcomponents is monitored, and incentives are provided as appropriate.

Appendix A

10 Leading Causes of Injury Death by Age Group – 2001
Highlighting Unintentional Injury Deaths

	Age Groups										
Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	Total
1	Unintentional Suffocation 614	Unintentional MV Traffic 558	Unintentional MV Traffic 660	Unintentional MV Traffic 884	Unintentional MV Traffic 10,513	Unintentional MV Traffic 6,759	Unintentional MV Traffic 6,891	Unintentional MV Traffic 5,422	Unintentional MV Traffic 3,328	Unintentional Fall 11,623	Unintentional MV Traffic 42,443
2	Unintentional MV Traffic 139	Unintentional Drowning 458	Unintentional Drowning 168	Unintentional Drowning 165	Homicide Firearm 4,200	Homicide Firearm 3,308	Unintentional Poisoning 5,036	Unintentional Poisoning 3,547	Suicide Firearm 2,083	Unintentional MV Traffic 7,256	Suicide Firearm 16,869
3	Homicide Other Spec., Class. 117	Unintentional Fire/burn 230	Unintentional Fire/burn 164	Suicide Suffocation 163	Suicide Firearm 2,130	Suicide Firearm 2,564	Suicide Firearm 3,030	Suicide Firearm 3,023	Unintentional Fall 1,004	Unintentional Unspecified 5,806	Unintentional Fall 15,019
4	Homicide Unspecified 107	Homicide Unspecified 146	Homicide Firearm 59	Homicide Firearm 121	Unintentional Poisoning 1,362	Unintentional Poisoning 2,507	Homicide Firearm 1,978	Suicide Poisoning 1,439	Unintentional Poisoning 798	Suicide Firearm 3,943	Unintentional Poisoning 14,078
5	Unintentional Drowning 68	Unintentional Suffocation 138	Unintentional Other Land Transport 48	Suicide Firearm 90	Suicide Suffocation 1,235	Suicide Suffocation 1,373	Suicide Poisoning 1,541	Unintentional Fall 1,024	Suicide Poisoning 578	Unintentional Suffocation 3,204	Homicide Firearm 11,348
6	Unintentional Fire/burn 50	Unintentional Pedestrian, Other 81	Unintentional Suffocation 44	Unintentional Fire/burn 88	Unintentional Drowning 596	Homicide Transportation-Related 842	Suicide Suffocation 1,534	Suicide Suffocation 952	Unintentional Fire/burn 395	Adverse Effects 1,995	Unintentional Unspecified 7,218
7	Undetermined Suffocation 47	Homicide Other Spec., Class. 80	Unintentional Fall 33	Unintentional Other Land Transport 83	Homicide Cut/pierce 481	Suicide Poisoning 753	Undetermined Poisoning 1,121	Homicide Firearm 934	Suicide Suffocation 392	Unintentional Fire/burn 1,147	Suicide Suffocation 6,198
8	Homicide Suffocation 40	Homicide Firearm 55	Unintentional Pedestrian, Other 26	Unintentional Suffocation 68	Suicide Poisoning 337	Undetermined Poisoning 549	Homicide Transportation-Related 1,061	Undetermined Poisoning 761	Unintentional Unspecified 385	Unintentional Poisoning 722	Unintentional Suffocation 5,555
9	Adverse Effects 26	Homicide Other Spec., NEC 49	Unintentional Struck by or Against 25	Unintentional Firearm 39	Unintentional Fall 256	Homicide Cut/pierce 472	Unintentional Fall 647	Homicide Transportation-Related 644	Adverse Effects 384	Unintentional Natural/Env. 621	Suicide Poisoning 5,191
10	Unintentional Fall 23	Unintentional Natural/Env. 42	Unintentional Other Transport 22	Unintentional Pedestrian, Other 38	Unintentional Other Land Transport 250	Unintentional Drowning 374	Unintentional Drowning 462	Unintentional Suffocation 461	Unintentional Suffocation 381	Unintentional Other Spec., NEC 578	Unintentional Fire/burn 3,423

Note: Homicide and suicide counts include terrorism deaths associated with the events of September 11, 2001, that occurred in New York City, Pennsylvania, and Virginia. A total of 2,926 U.S. residents lost their lives in these acts of terrorism in 2001, of which 2,922 were classified as (transportation-related) homicides and 4 were classified as suicides.

Source: National Center for Health Statistics, (NCHS) Vital Statistics Systems.

Produced by: Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC.

Appendix B

Injury Mortality Reports, 1999 - 2002

All Injury Deaths and Rates per 100,000

All Races, Both Sexes, All Ages

ICD-10 Codes: V01-Y36, Y85-Y87, Y89,*U01-*U03

1999

Number of Deaths	Population	Crude Rate	Age-Adjusted Rate**
148,286	279,040,181	53.14	53.27

2000

Number of Deaths	Population	Crude Rate	Age-Adjusted Rate**
148,209	281,421,906	52.66	52.73

2001

Number of Deaths	Population	Crude Rate	Age-Adjusted Rate**
157,078	285,093,870	55.10	54.93

2002

Number of Deaths	Population	Crude Rate	Age-Adjusted Rate**
161,269	287,974,001	56.00	55.66

* Rates based on 2002 fewer deaths may be unstable. Use with caution.

** Standard population is 2,000, all races, both sexes.

These data clearly demonstrate that injury deaths continue to be of major concern in the United States. The numbers are not going down. Therefore, a need for statewide trauma systems is critical to respond effectively and to be able to minimize deaths due to trauma.

Source of Data: CDC, Center for Injury Prevention and Control (NCIPC). Data are from the Web-based Injury Statistics Query and Reporting System (WISQARS). Retrieved from www.cdc.gov/ncipc/wisqars

Appendix C

National Estimates of the 10 Leading Causes of Nonfatal Injuries Treated in Hospital Emergency Departments, United States, 2002

	Age Groups										
Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	Total
1	Unintentional Fall 126,459	Unintentional Fall 870,950	Unintentional Fall 676,444	Unintentional Fall 659,923	Unintentional Struck by/Against 951,581	Unintentional Fall 702,946	Unintentional Fall 765,275	Unintentional Fall 684,042	Unintentional Fall 490,737	Unintentional Fall 1,638,883	Unintentional Fall 7,410,159
2	Unintentional Struck by/Against 33,023	Unintentional Struck by/Against 390,945	Unintentional Struck by/Against 449,222	Unintentional Struck by/Against 622,615	Unintentional MV-Occupant 902,186	Unintentional Overexertion 701,783	Unintentional Overexertion 656,122	Unintentional Overexertion 393,539	Unintentional Struck by/Against 185,922	Unintentional MV-Occupant 193,068	Unintentional Struck by/Against 4,490,051
3	Unintentional Fire/Burn 13,193	Unintentional Other Bite/Sting 126,710	Unintentional Cut/Pierce 135,098	Unintentional Overexertion 288,074	Unintentional Fall 794,288	Unintentional Struck by/Against 671,811	Unintentional Struck by/Against 609,021	Unintentional Struck by/Against 385,139	Unintentional MV-Occupant 179,527	Unintentional Struck by/Against 190,501	Unintentional Overexertion 3,286,856
4	Unintentional Other Bite/Sting 10,926	Unintentional Foreign Body 106,331	Unintentional Pedal Cyclist 118,046	Unintentional Cut/Pierce 170,062	Unintentional Overexertion 758,312	Unintentional MV-Occupant 609,636	Unintentional MV-Occupant 515,768	Unintentional MV-Occupant 332,260	Unintentional Overexertion 175,009	Unintentional Overexertion 156,231	Unintentional MV-Occupant 2,988,064
5	Unintentional MV-Occupant 9,336	Unintentional Cut/Pierce 87,836	Unintentional Other Bite/ Sting 96,330	Unintentional Pedal Cyclist 142,085	Unintentional Cut/Pierce 492,172	Unintentional Cut/Pierce 461,058	Unintentional Cut/Pierce 394,133	Unintentional Cut/Pierce 272,953	Unintentional Cut/Pierce 142,911	Unintentional Cut/Pierce 115,708	Unintentional Cut/Pierce 2,278,105
6	Unintentional Poisoning 8,814	Unintentional Poisoning 78,828	Unintentional MV-Occupant 79,531	Unintentional Unk./Unspecified 129,388	Other Assault[A] Struck by/Against 445,965	Other Assault[A] Struck by/Against 271,774	Other Assault[A] Struck by/Against 228,208	Other Assault[A] Struck by/Against 102,941	Unintentional Other Bite/Sting 57,805	Unintentional Other Bite/Sting 70,093	Other Assault[A] Struck by/Against 1,270,224
7	Unintentional Foreign Body 8,776	Unintentional Overexertion 74,530	Unintentional Overexertion 76,811	Unintentional MV-Occupant 115,920	Unintentional Unk./Unspecified 174,572	Unintentional Other Bite/Sting 121,398	Unintentional Other Specified 129,831	Unintentional Other Bite/Sting 94,895	Unintentional Other Specified 37,399	Unintentional Unk./Unspecified 47,825	Unintentional Other Bite/Sting 880,910
8	Unintentional Unk./Unspecified 6,916	Unintentional Fire/Burn 62,073	Unintentional Foreign Body 54,164	Other Assault[A] Struck by/Against 114,891	Unintentional Other Bite/Sting 126,498	Unintentional Other Specified 110,163	Unintentional Other Bite/Sting 115,409	Unintentional Other Specified 93,356	Unintentional Other Transport 34,315	Unintentional Other Transport 44,759	Unintentional Unk./Unspecified 742,188
9	Unintentional Inhalation/Suff. 6,452	Unintentional MV-Occupant 50,331	Unintentional Dog Bite 51,882	Unintentional Other Transport 65,375	Unintentional Other Transport 125,085	Unintentional Unk./Unspecified 109,749	Unintentional Poisoning 97,480	Unintentional Poisoning 74,802	Unintentional Unk./Unspecified 28,358	Unintentional Poisoning 31,073	Unintentional Other Transport 594,127
10	Unintentional Overexertion 6,336	Unintentional Unk./Unspecified 48,293	Unintentional Unk./Unspecified 48,079	Unintentional Other Bite/Sting 60,780	Unintentional Other Specified 111,000	Unintentional Other Transport 95,680	Unintentional Unk./Unspecified 92,403	Unintentional Foreign Body 57,803	Other Assault[A] Struck by/Against 26,969	Unintentional Foreign Body 28,723	Unintentional Foreign Body 577,622

[A] The 'Other Assault' category includes all assaults that are not classified as sexual assault. It represents the majority of assaults.
Data Source: National Electronic Injury Surveillance System All Injury Program operated by the Consumer Product Safety Commission
Chart developed by the National Center for Injury Prevention and Control, CDC

Appendix D

Trauma System Historical Information

DATE	EVENT
1775	*Plain Concise, Practical Remarks on the Treatment of Wounds and Fracture*, written by Dr. John Jones, becomes the guide for surgeons during the Revolutionary War.[1]
1777	Dr. Benjamin Rush, who signed the Declaration of Independence, becomes Surgeon General for the Continental Army. During this time, trauma care was limited to the treatment of patients with minor and moderate soft tissue injuries, and amputation was the most extensive operation performed.[2]
1792	A French surgeon, Dr. Dominique Larrey, establishes early trauma principles during the Napoleonic Wars. He is credited with the concepts of establishing ambulance services and field hospitals close to the battle lines to reduce the time between injury and definitive surgical care.[3]
1797	Napoleon's chief physician implements a prehospital system designed to triage and transport the injured from the field to aid stations.[4]
1865	Civilian ambulance services begin in Cincinnati and New York.[5]
	One of the most important innovations during the Civil War was the introduction of nursing care modeled after that established by Florence Nightingale in the Crimean War.[6]
1872	The American Public Health Association is established.[7]
1895	William Roetgen advances the diagnosis of traumatic wounds with the invention of the x-ray in 1895. Before this period, it was common to probe wounds.[8]
1898	The American Hospital Association is established.[9]
1903	Dr. George Crile reports the first successful use of external chest compressions in human resuscitation.[10]
1913	The American College of Surgeons (ACS) is established.[11]
1915	First known air medical transport occurs during the retreat of the Serbian Army from Albania.[12]
1918	World War I uses blood transfusions and motorized ambulances to enhance care of the injured.[13]
1922	The ACS establishes the Committee on Treatment of Fractures (later the Committee on Trauma).[14]
1925	Böhler forms the first trauma care system for civilians in Austria.[15]
1938	The American Association for the Surgery of Trauma is established.[16]
1943	During World War II, antibiotics greatly reduce wound infections. Transport time to definitive care facilities is reduced to four hours, with a subsequent reduction in mortality.[17]
1950	During the Korean Conflict, air ambulances and forward surgical hospitals are used to reduce the time from injury to definitive surgical care. Vascular injuries are repaired, reducing the need for amputation.[18]
1960	Cardiopulmonary resuscitation (CPR) is developed. The American Heart Association starts a program to acquaint physicians with closed-chest cardiac resuscitation and becomes the forerunner of CPR training for the general public.[19]

DATE	EVENT
1966	The National Research Council of the National Academy of Sciences publishes *Accidental Death and Disability: The Neglected Disease of Modern Society*.[20] This document reflects the deficiencies in prehospital care and proposes a long-range plan for changes in emergency care. It does not describe the need for "systems" of care.
	Congress enacts the Highway Safety Act of 1966 and directs the Department of Transportation to administer it. Investigation into emergency services for the injured will concentrate on improvement in methods of communication and transportation as well as on the need for improved equipment and trained personnel. Safety research and demonstration activities include emergency medical care.[21]
1967	The American Burn Association is established.[22]
1968	The American College of Emergency Physicians is established.[23]
	The American Trauma Society is established.[24]
1969	The American Association of Critical-Care Nurses is established.[25]
1970	The Emergency Nurses Association is established.[26]
	The American Pediatric Surgical Association is established.[27]
1973	Extensive use of helicopters in the Vietnam Conflict reduces the time from injury to definitive surgical care to less than one hour.[28]
	Congress passes the Emergency Medical Services Systems (EMSS) Act and directs the Department of Health, Education, and Welfare (now the Department of Health and Human Services) to support States' efforts to plan, improve, and expand comprehensive and integrated systems for emergency medical care. Congress also requires State EMSS Plans and establishes the Interagency Committee on Emergency Medical Services to coordinate Federal programs and activities for emergency medical services.[29]
1975	The National Association of Emergency Medical Technicians is established.[30]
1976, 1979	The Public Health Service Act Amendment renews Federal Emergency Medical Services (EMS) funding.[31]
1980	State EMS Directors establish the National Association of State EMS Directors.[32]
	The ACS creates Advanced Trauma Life Support.[33]
1981	Congress passes the Omnibus Budget Reconciliation Act of 1981, which consolidates EMS funding into State preventive block grants: EMSS Act funding is eliminated.[34]
1984	Congress passes Preventive Health Amendments of 1984 (PL 98-555, October 30, 1984), authorizing the Health Resources and Services Administration (HRSA) to support a program of demonstration projects for the expansion and improvement of EMS for children who need treatment for trauma or critical care. Congress establishes the Emergency Medical Services for Children Program.[35]
	EMS physicians establish the National Association of EMS Physicians.[36]
1985	The National Research Council publishes *Injury in America: A Continuing Public Health Problem,* describing deficiencies in the progress of addressing the problem of accidental death and disability.[37]
1986	Reagan and the General Accounting Office release the report *Health Care: States Assume Leadership Role in Providing Emergency Medical Services.*[38]

DATE	EVENT
1987	The American College of Emergency Physicians publishes *Guidelines for Trauma Care Systems*, which identifies essential criteria for trauma care systems, especially prehospital care components.[39]
	The American Burn Association creates the Advanced Burn Life Support (ABLS) course.[40]
	The ACS establishes a trauma center verification program.[41]
1988	The National Highway Traffic Safety Administration (NHTSA) establishes the Statewide EMS Assessment Program and the Development of Trauma Systems course.[42]
	West et al. release the First National Assessment of Trauma Care Systems: *Trauma Systems: Current Status–Future Challenges*.[43]
1989	The Committees on Trauma establish the National Trauma Data Bank within the ACS.[44]
	Trauma nurses establish the Society of Trauma Nurses.[45]
1990	Congress passes the Trauma Systems Planning and Development Act of 1990, which amends the Public Health Service Act to add Title XII—Trauma Care, and directs HRSA to administer it. No appropriation.[46]
1992–1995	HRSA establishes the Division of Trauma and EMS.[47] The legislatively mandated *Model Trauma Care Systems Plan* is released in 1992. [47]
1993	The ACS establishes the Trauma Systems Consultation Committee.[48]
	The National Academy of Sciences publishes *Emergency Medical Services for Children: A Report of the Institute of Medicine* (1993), which points out deficiencies in the ability of our health care system to address the emergency medical needs of pediatric patients. [49]
1995	Bazzoli et al. releases the Second National Assessment of Trauma Care Systems: *Progress in the Development of Trauma Systems in the United States: Results of a National Survey*.[50]
1996	The ACS establishes the Trauma Systems Consultation Committee.[51]
1998	Bass et al. releases the Third National Assessment of Trauma Care Systems: *Update on Trauma System Development in the United States*.[52]
2001	HRSA establishes theTrauma-EMS Systems Program to foster the development of appropriate, modern systems of such care.[53]
2002	HRSA's Trauma-EMS Systems Program establishes the National Trauma-EMS Systems Stakeholder Group.[54]
	HRSA's Trauma-EMS Systems Program creates the Trauma-EMS Technical Assistance Center.[55]
	Title XII—Trauma Care legislation expires in September 2002.[56]
2002	NHTSA releases *Trauma System Agenda for the Future.*[57]
2003	HRSA releases the Fourth National Assessment of Trauma Care Systems: *National Assessment of State Trauma System Development, Emergency Medical Services Resources, and Disaster Readiness for Mass Casualty Events*.[58]
2005	*HRSA releases Model Trauma System Planning and Evaluation.* HRSA also integrates trauma systems with public health and provides benchmarks, indicators, and a scoring mechanism for State self-assessment.[59]
	HRSA and the ACS release nationally standardized Trauma Care and Trauma System Data Elements.[60]

Trauma System Historical Information

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Appendix E

Acknowledgments

The development of a document such as the *Model Trauma System Planning and Evaluation* can occur only through the collaboration of many dedicated individuals and national organizations.

When the Trauma-EMS Systems Program held its first National Stakeholder meeting in 2002, there was clear consensus that it was time to update the *1992 Model Trauma Care Plan.* Individuals who had been authors of the original plan expressed an interest in collaborating on the project. Original authors, Mrs. Gail Cooper, then the Director of Public Health, San Diego, California, and Dr. Christoph Kaufmann, United States Army Trauma Surgeon and previous Director of the HRSA Division of Trauma and EMS, were joined by Mr. Drew Dawson, then Chief of the Health Systems Bureau in the Montana Department of Public Health and Human Services, to assist the new Federal Program in determining a strategy for the revision. They identified the value of revising the Model Trauma Care Plan to be consistent with the public health structure previously laid out by the Department of Health and Human Services. Their concepts were accepted by the Federal Program and then by the National Trauma-EMS Stakeholder Group. This strategy became the framework for the revision of the new model plan.

Additionally, prior unfinished and unpublished work to develop a protocol for evaluation of a trauma system by Mr. Drew Dawson, Dr. Ellen MacKenzie, Dr. Christoph Kaufmann, and others was re-evaluated and utilized within the new model plan. The Trauma-EMS Systems Program contracted the American College of Surgeons Committee on Trauma (Trauma Systems Consultation Committee) to lead the effort to complete the Model Plan's State Self-Assessment Tool. Through the dedicated efforts of Mrs. Gail Cooper, Consultant, Dr. Robert Mackersie, ACS Trauma Systems Consultation Committee Chairperson, and Mr. Nels Sanddal, Consultant, the previous work was integrated into the new Model Plan's Benchmarks, Indicators, and Scoring (BIS) State Self-Assessment Tool.

Many other individuals and professional organizations provided content, consultation, and recommendations. The National Trauma-EMS Stakeholder Group provided recommendations at several stages during the document's development. Other individuals carefully reviewed the document and provided constructive recommendations that improved this draft version. Significant contributors and reviewers to which the Federal Program is truly grateful are listed below.

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American Association for the Surgery of Trauma
American College of Emergency Physicians
American College of Surgeons Committee on Trauma
American Hospital Association
American Pediatric Surgical Association
American Public Health Association
American Trauma Society
Centers for Disease Control and Prevention, National Center for Injury Prevention and Control
Coalition for American Trauma Care
Emergency Nurses Association
Healthcare Financial Management Association
HRSA National Bioterrorism Hospital Preparedness Program
HRSA Office of Rural Health Policy
HRSA Emergency Medical Services for Children Program
International Association of Fire Chiefs
National Association of Emergency Medical Technicians
National Association of EMS Physicians
National Association of State EMS Directors
National Highway Traffic Safety Administration
National Organization of State Offices of Rural Health
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Model Trauma System Planning and Evaluation
Federal Partners for Trauma-EMS Meeting
July 12, 2005

Federal partners are invited to review and comment on the Draft ***Model Trauma System Planning and Evaluation*** document that includes a section with Benchmarks, Indicators and Scoring Criteria. This document, required by the program's authorizing legislation, will be used by States to guide trauma systems development.

In particular, the Trauma-EMS Systems Program would like Federal Agency representatives to review the document and give comment. In return for reviewing the document and submitting feedback, your names and agencies will be included in the list of reviewers when the document is published.

The following questionnaire will help guide you in providing responses back to the Trauma-EMS Systems Program. **Please fill in (this document will be sent to you electronically) and send your responses by August 3, 2005.**

Regarding the document ***Model Trauma Systems Planning and Evaluation***:	
1.	Does the proposed content appear to be up to date, comprehensive, and theoretically sound? What content should be revised due to recent changes or developments? Please elaborate, giving specific suggestions or needed improvements.
2.	Have any topic areas been missed or inadequately covered? If yes, please specify.
3.	Is any unnecessary material included?
4.	Does the document adequately reflect necessary networking/linkages/involvement of appropriate State Agencies/programs that could have potential involvement in trauma systems development? If your Federal Agency/Program's role in trauma system development needs to be better described, please provide appropriate information to include in the document.
5.	Does the document conflict with any guidance provided to States by your Program/Agency?
6.	Please describe 3 strengths and 3 weaknesses of the document.
7.	What additional comments and suggestions do you have to further develop this document to ensure that it serves as a model for States?
8.	Provide any additional suggestions. (Please include page numbers).

Submit your feedback, electronically, to Terry Mullins via email tmullins@trauma-ems.org.
Please copy Cheryl Anderson on these emails caanderson@hrsa.gov.