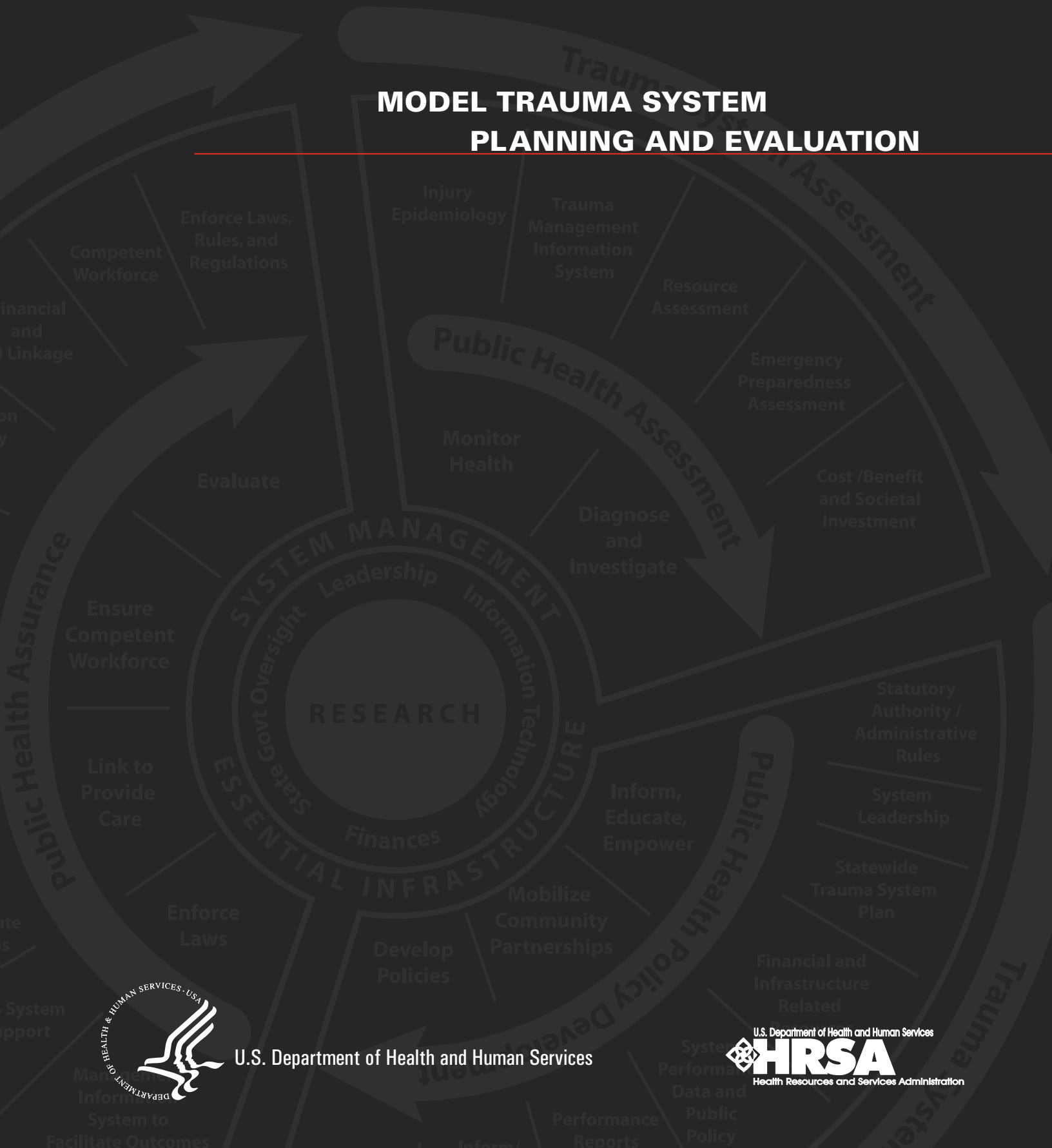
# MODEL TRAUMA SYSTEM PLANNING AND EVALUATION




U.S. Department of Health and Human Services

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Released February 2006

The Health Resources and Services Administration document *Model Trauma System Planning and Evaluation* was edited, designed, and coordinated by the U.S. Department of Health and Human Services Program Support Center, Visual Communications Branch.


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## EXECUTIVE SUMMARY

Injury is a leading cause of death in the United States and continues to occur every day and in every State of our Nation. The rates are not declining. The threat is magnified with the consideration of unexpected natural and man-made incidents. The following are facts on daily injury in the United States:

- Traumatic injuries are estimated to be responsible for over 161,000 deaths each year and for an estimated death rate of 55.9 for every 100,000 persons.
- Children account for 25 percent of all traumatic injuries. Injury has been the leading cause of death for children and youth for decades.
- Trauma is the leading cause of death for Americans 35 years of age and younger.
- For all U.S. residents, unintentional injury ranks as the 5th most common cause of death.

The problem of injury has a profound effect on individuals, families, hospitals, and society at large because it causes tremendous medical, psychosocial, and financial burdens. The need for a comprehensive injury response strategy is clear. That strategy is consistent with trauma system development.

More than 15 years ago, Congress addressed the important role of trauma systems in responding to injury as a public health threat through passage of the Trauma Care Systems Planning and Development Act of 1990 [P.L. No. 101-590, 104 Stat. 2915], which created a new section, Title XII of the Public Health Service Act, on the subject of trauma care. The importance of continuing to address injury remains an important public health issue that was also emphasized in the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 [P.L. No. 107-188, 116 Stat. 594]. In recognition of the significance that the trauma system plays in response to both multiple casualty as well as mass casualty incidents, this Act called for trauma and burn care to be a component of State preparedness plans [P.L. No. 107-188, § 131(a), 116 Stat. 618, 625; 2002].

A trauma system is a pre-planned, comprehensive, and coordinated statewide and local injury response network that includes all facilities with the capability to care for the injured. It is the system's inclusiveness, or range of pre-planned trauma center and non-trauma center resource allocation, that offers the public a cost-effective plan for injury treatment. In such an effective system, trauma care delivery is organized through the entire spectrum of care delivery, from injury prevention to prehospital, hospital, and rehabilitative care delivery for injured persons. The system begins with a State's authority to designate various levels of trauma and burn centers and, through data collection and analysis processes, demonstrates its own effectiveness time and time again.

In 2002, HRSA released the *National Assessment of State Trauma System Development, Emergency Medical Services Resources, and Disaster Readiness for Mass Casualty Events*. This national assessment revealed that those States with the most developed or comprehensive trauma systems were indeed the States that were most ready to respond to and medically manage day-to-day as well as mass casualty incidents. It is the sum of all the trauma system's components that contributes to a State's all-hazards medical response readiness.

This living document, ***Model Trauma System Planning and Evaluation***, is a guide to modern statewide trauma system development. It modernizes the HRSA 1992 *Model Trauma Care System Plan*. The document is designed to provide trauma care professionals, public health officials, and health care policy experts with the direction to use the public health approach, a scientifically proven method, when developing and evaluating trauma systems.

A primary strategy of the public health approach is to identify a problem based on data, devise and implement an intervention, and evaluate the outcome. These fundamental three core functions of public health are used with 10 essential elements, all of which are applied to public health assessment, policy development, and evaluation mechanisms to ensure quality patient outcomes.

*This document introduces:*

- *Trauma care professionals* to the use of the public health system framework as a guide for State and regional trauma system development
- *Public health officials* to an understanding of an inclusive trauma system organized within the commonly accepted parameters of the public health approach
- *Health care policy experts* to collaborative opportunities in which public health, trauma care, and emergency preparedness systems can partner to reduce the total burden of day-to-day and potential mass casualty injury in each community

*The application of the public health approach to trauma system development will result in:*

- Further recognition that injury continues to be a public health concern of monumental importance despite significant efforts at prevention and trauma system development
- Identification and management of injury- and trauma system-related issues, using data-driven problem identification and evaluation methods such as those 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 systems that have increased focus on the health of all residents, are integrated with other community health programs, and are oriented toward improving health status outcomes

*The presence of a State Trauma System Plan will:*

- Provide guidance on comprehensive system development
- Address system operational requirements
- Allow for local trauma system variations based on assessment results (e.g., rural versus urban needs and resources)
- Reflect inclusiveness of the operational components as they fall under assessment, policy development, and assurance
- Demonstrate an all-encompassing methodology, ranging from injury prevention activities to prehospital trauma care, acute care facilities (designated trauma centers and receiving facilities), and post-acute care rehabilitation
- Reflect integration and coordination with the State Health Plan and with the State's Emergency Response Plan
- Allow for a dynamic process that will evolve with changing injury epidemiology and resource availability—both human and financial

The ultimate evaluation outcome of trauma system implementation is a reduction in morbidity and mortality. This goal can be accomplished through trauma system planning and implementation of process of care improvement, enhancement of system performance, use of evidence-based research, development and implementation of targeted injury prevention programs, and revisions to trauma system plans based on system assessments and data-based needs.

*The document* Model Trauma System Planning and Evaluation *provides the trauma care field with:*

- A process for collaboration between the public health system and the trauma care system
- Benchmarks, indicators, and a scoring mechanism for regional and State trauma system self-assessment
- The necessary structured tool to identify system gaps
- A planning mechanism to promote and guide future development of State trauma care systems
- An opportunity for improved injury care outcomes

## 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 as authorized by the Trauma Care Systems Planning and Development Act of 1990 [P.L. No. 101-590, 104 Stat. 2915]. The Program proposed that the legislatively required 1992 *Model Trauma Care System Plan* be updated. A decision was made to revise the HRSA *Model Plan* to coordinate with the 3 Core Functions and 10 Essential Services of Public Health developed by the U.S. Department of Health and Human Services (HHS) with the public health community in the mid-1990s. The Federal Program's National Trauma-EMS Stakeholder Group, composed of affiliated professional organization representatives, endorsed the concept. *Model Trauma System Planning and Evaluation*, a guide to modern statewide trauma system development, is the resulting document.

## INTRODUCTION

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

The trauma 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 to reduce the incidence and severity of injury, as well as to improve health outcomes for those who are injured. (For the purposes of this document, injury and injury prevention are both intentional and unintentional.) *Model Trauma System Planning and Evaluation* outlines a structure for trauma system development using the public health system framework:

- *Trauma care professionals* are introduced to the use of the public health system framework as a guide for State and regional trauma system development.

- *Public health officials* are introduced to an understanding of an inclusive trauma system organized within the commonly accepted parameters of the public health approach.
- *Health care policy experts* are 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 developers, the document will also be useful to local trauma center managers and includes:

- Injury as a public health concern
- Historical developments of trauma care and systems
- The three phases of injury prevention
- A description of the 3 Core Functions and 10 Essential Services of Public Health[1]
- The application of the core functions of assessment, policy development, and assurance to trauma systems
- Trauma system benchmarks and indicators established for the first time
- A description of how the benchmarks and indicators fit into the public health framework
- A trauma system self-assessment tool, structured around the three core functions of public health, with the benchmarks, indicators, and scoring system to rank the stage of trauma system development and to guide the next appropriate steps

## STATEMENT OF THE PROBLEM

Injuries, intentional and unintentional, continue to be a significant public health concern in the United States. Traumatic injury refers to acute physical injuries, including burns and head injuries, which pose discernible risk for death or long-term disability. Trauma is estimated to be responsible for over 161,000 deaths annually and for an estimated mortality rate of 55.9 per 100,000 persons.[2] Children are said to account for 25 percent of all traumatic injuries. Injury has been the leading cause of death for children 1 to 14 years of age for decades.[3] These figures are not decreasing; rather, they are on the rise (see Appendix A). Trauma is also the leading cause of death for Americans 35 years of age and younger. For all U.S. residents, unintentional injury ranked as the 5th most common cause of death. Suicide and homicide ranked as the 11th and 14th causes of death.[4] The number of intentional and unintentional injuries combined each year reflects the true ranking of injury as a leading cause of death in the United States. Additionally, the years of potential life lost before the age of 65 from injury continues to be significant. Unintentional injury accounts for more than 2.2 million years of potential life lost, and suicides and homicides account for an additional 1.3 million years.[5]

Injuries are responsible for millions of medical visits. For every person who dies from injury, an estimated 10 persons are hospitalized or transferred for specialized medical care, and 178 persons are treated and released from a hospital emergency department.[6] These estimates equate to 83 episodes of injury-related medical care per 1,000 population annually.[7] The number of emergency department visits for injury treatment is estimated to be over 33 million annually.[8] Of the injuries that resulted in hospitalization, 58 percent were unintentional injuries. Thirty percent of all injuries requiring hospitalization were related to falls.[9]

More than 16 percent of all hospitalizations for unintentional injuries among children 14 years and younger result in permanent disability.[10] When one adds on the impact of intentional injuries that result in permanent disability, the concern escalates. Such disabling injury either results in varying degrees of permanent impairment or renders injured persons unable to maintain their previous lifestyles and societal roles.

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.[11] This estimate includes direct medical care, rehabilitation, lost wages, and lost productivity. Annual direct medical cost of injury is estimated to be $117 billion, approximately 10 percent of the total U.S. medical expenses.[12] 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.[13]

When the national effort to be prepared for all types of incidents (both natural and man-made) is considered, the need for effective injury response (trauma) systems is clear. Even with recent Federal, State, and local efforts to prevent and/or minimize injury, the problem continues to be "the neglected disease of modern society," as it was described more than 40 years ago in the 1966 white paper on injury: *Accidental Death and Disability: The Neglected Disease of Modern Society*.[14] According to the Harris Poll spearheaded by the Coalition for American Trauma Care in 2005, 75 percent of American adults believe trauma systems exist in their States, and 69 percent of American adults stated they would be extremely or very concerned if they learned that the trauma system in their State did not meet recognized standards.[15] 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 and burn patients through system development. Additionally, 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. Over 45 million U.S. residents are unable to access high-level trauma care within the traditional golden hour after injury.[16]

Why does such a gap between trauma care expectations and outcomes continue to persist? There is a need for a comprehensive response strategy on the role of the trauma and EMS systems, the levels of care provided by trauma centers, the specific care provided by burn and pediatric centers, and the varied resources available and unavailable in communities. Such a strategy would link the expertise of the public health system traditionally focused on disease prevention with the expertise of the trauma care system in its processes of triage, diagnosis, and treatment.[17]

## 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 U.S. Department of Health and Human Services (HHS) entitled *Healthy People 2010*.[18] Before the 2010 document, national trauma and emergency medical services were not recognized in prior Healthy People documents (2000). The 2010 document's two overarching goals are to:

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

A number of the 467 objectives in the 28 chapters are issues of importance to trauma care professionals. One chapter, for example, is devoted to injury and violence prevention.

## HISTORICAL DEVELOPMENTS

### THE TRAUMA CARE APPROACH

The Highway Safety Act of 1966[19] and the Emergency Medical Services Systems Act of 1973[20] 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. Federal Agencies 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 experienced better outcomes compared to those cared for at hospitals without such expertise.[21, 22] The model 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[23] represented the next major step in the modern evolution of health policy related to trauma care. This Act directed HRSA to develop the 1992 *Model Trauma Care System Plan (MTCSP)*.[24] 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 level of trauma system participation.[25] 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 network), States 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 met all the historical criteria used by trauma system researchers and outlined in the HRSA 1992 *MTCSP*. These historical criteria were considered necessary for a truly comprehensive and fully functional system.[26] 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 prepared the State was to provide medical care in the face of all types of incidents.

The concept of the fully inclusive trauma care system advanced the idea that trauma care should be community based rather than trauma center based and planned for all populations, incorporating the unique needs of children, elder persons, and those with special health care needs and cultural considerations. However, the fully inclusive trauma systems envisioned in the 1992 *MTCSP* did not include the potential roles of injury prevention, public health, and disaster planning 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 B 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.[27] 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 all-hazards response systems increase, but recognition of the importance of the public health infrastructure in responding to all hazards, including terrorist activities, 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, and cooperative, environment. This renewed spirit of cooperation created a synergy between the two groups working jointly to reduce the burden of injury in communities. Previous efforts at building a strong interface between public health and EMS became more important post-September 11, 2001, and a new goal of strengthened collaboration emerged.

## THE TRAUMA SYSTEM APPROACH

### Trauma Care

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 provides injured persons with the greatest likelihood of returning to their prior level of function and interaction within society. This continuum of care includes intentional and unintentional injury prevention, EMS 9-1-1/dispatch and medical oversight of prehospital care, appropriate triage and transport, emergency department trauma care, trauma center team activation, surgical intervention, intensive and general in-hospital care, rehabilitative services, mental and behavioral health, social services, community reintegration plans, and medical care followup.

There are many phases in the process of care for those who are traumatically injured. Although injury prevention initiatives can do a very good job to maintain injury rates at a minimum, they cannot prevent all injury. When injury occurs, each phase of care, as demonstrated in Figure 1 on page 8, should occur seamlessly. Injury data should be collected throughout each phase of care and analyzed so that data usage will yield continuous performance improvement in trauma care delivery.

### Statewide Trauma Care System

Many components make up a statewide trauma care system. Detailed planning is required for all components to interface successfully and for 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

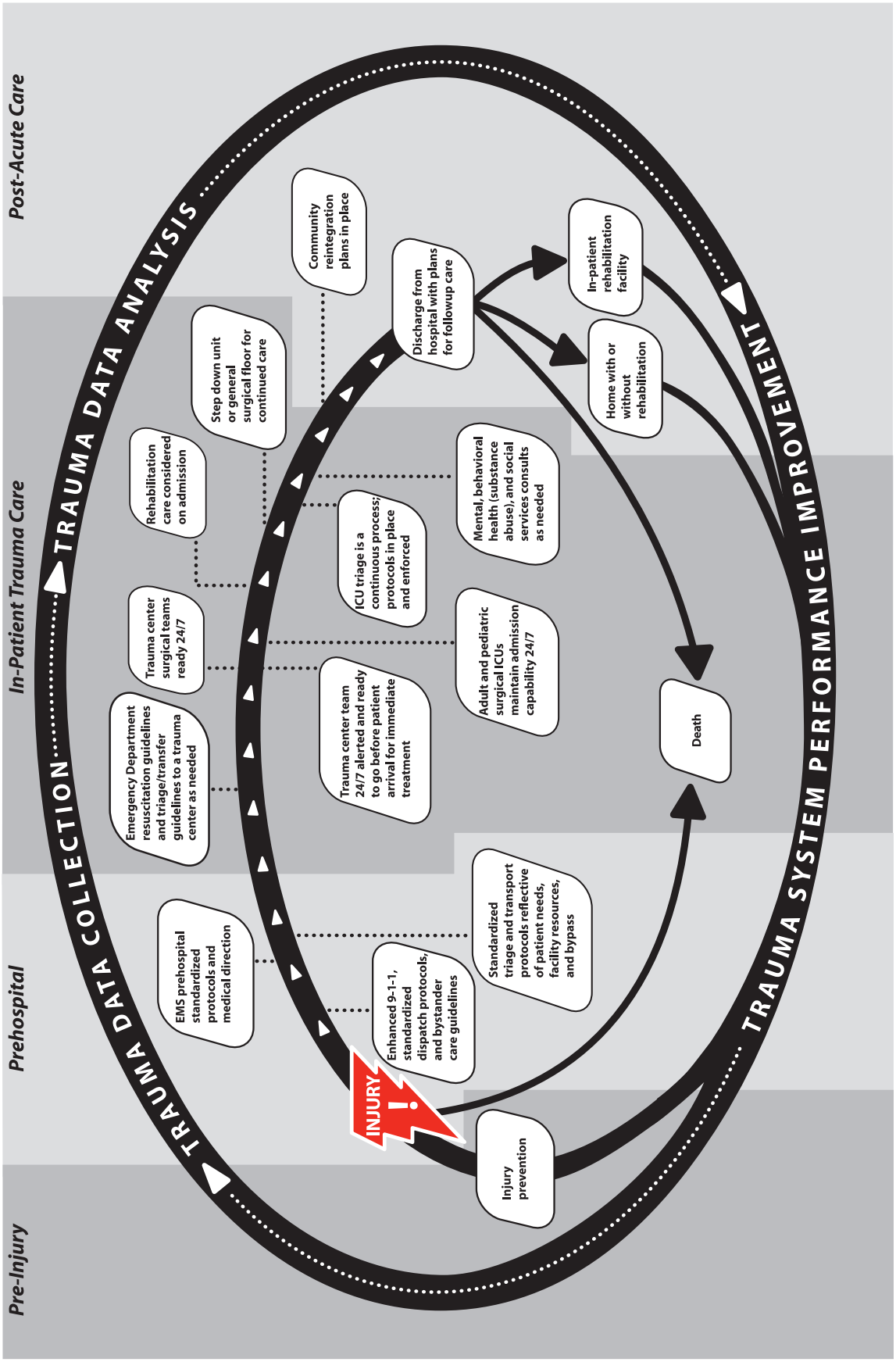



**FIGURE 1.** Phases of a Pre-Planned Trauma Care Continuum

health care providers function in pre-planned concert with one another. Emergency care providers match patients with the aid of triage protocols and medical supervision to 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. This process should reflect the general population and the populations requiring special considerations (i.e., children and elder persons).

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—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. Trauma-specific statewide multidisciplinary, multi-agency advisory committee meetings are important for planning, implementing, and evaluating the State trauma care system.

*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
- Collaborating and coordinating with related health care and non-health care systems
- Establishing, consistently using, and maintaining common standards of trauma care that address the needs of all populations
- Assessing, planning, coordinating, monitoring, and ensuring consistent and optimal care
- Applying scientifically evaluated injury prevention strategies that target specific populations at risk, 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 post-acute 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 that shape each trauma system.

## THE PUBLIC HEALTH SYSTEM

Public health is "what we as a society do collectively to assure the conditions in which people can be healthy."[28, 29] The public health system exists to ensure a safe and healthy environment for all citizens in homes, schools, workplaces, public spaces such 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."[30]

The public health system is a complex network of individuals and organizations that have the potential to play important roles in creating conditions for health. The collaborative effort between individuals and organizations is the framework needed to influence social policy that supports health.[31] The primary strategy of the public health approach is to:

- Identify a problem based on data (Assessment)
- Devise and implement an intervention (Policy Development)
- Evaluate the outcome (Assurance)

The parenthetical terms following the preceding phrases are those used since 1988 to describe the core functions of public health: assessment, policy development, and assurance (that the developed policy is delivered). 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."[32]

## 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 or its negative impacts decreased, or both, 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. Therefore, injury prevention is an essential component of the trauma system continuum of care. This concept provides support for public health system collaboration on targeted reduction programs focused on injury. 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 effective 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:

- Recognition that injury continues to be a public health problem of monumental importance despite significant efforts at prevention and trauma system development

- Identification and management of injury- and trauma system-related problems, using data-driven problem identification and evaluation methods as those 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.** 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<br>• Potential communication infrastructure (notification systems)<br>• Population-based data<br>• Resources and information for all-hazards preparedness<br>• Opportunity to integrate the trauma system into other community health efforts to promote overall health<br>• More precise identification of populations at risk and a targeting of specific issues, based on these data, to reduce injuries<br>• Framework for injury prevention strategies | • Access to a well-established health system infrastructure<br>• Health system response that differentiates facilities by level of resource availability<br>• Existing protocols and guidelines for the care process<br>• Access to patient outcome data<br>• Existing performance improvement process<br>• Additional resources for injury prevention efforts<br>• Resources to provide all-hazards care<br>• Recognition that injury continues to be a public health problem despite significant efforts to develop trauma systems |

## THE THREE PHASES OF INJURY PREVENTION

Injury prevention efforts are categorized by three phases: primary, secondary, and tertiary. The phases focus on efforts to prevent, reduce, or substantially diminish the impact of injury before, during, and after the injury. Leaders of the public health departments usually coordinate and target these efforts.

### PRIMARY PREVENTION—PRE-INJURY

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

- 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

- Encouraging evacuation prior to an anticipated mass casualty incident
- Educating the public to communicate potentially harmful activities (e.g., reckless driving and possible terrorist actions)
- Promoting use of trigger locks on handguns
- Promoting the proper storage of guns
- Sponsoring bicycle rodeos to teach children how to ride bicycles safely
- Educating senior citizens on fall prevention

### SECONDARY PREVENTION—AT THE TIME OF INJURY

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

- Establishing shelters and emergency care center protocols
- 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
- Implementing 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-INJURY

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:

- 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 that include the needs of special populations, treatment protocols, and medical direction
- Delivering the injured patient to a trauma facility with the appropriate resources to best meet the patient's needs
- Providing emergency department, surgical, and in-hospital care to the patient
- Providing appropriate rehabilitation, mental and behavioral 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.[33, 34] This model analyzes each event in terms of a host, an agent, and the environment:

- Host is generally the person at risk.
- Agent is energy (e.g., mechanical, thermal, and electrical) that is transmitted to the Host through a vehicle or vector (animal or human).

- 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 in each particular phase of prevention. The matrix provides a way for a community to look at a type of injury-producing incident 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<br>• Driving experience<br>• Alcohol or drug use<br>• Speed | • Defects<br>• Brakes<br>• Tires<br>• Collision Avoidance Warning System | • Visibility<br>• Congestion<br>• Surface/pavement<br>• Road design | • Driving while intoxicated laws<br>• Speed limits<br>• Driver training and licensure |
| Event | • Seat belt use<br>• Helmet use<br>• Tolerance | • Airbags<br>• Contact surfaces<br>• Crash-worthiness of the vehicle | • Guardrails<br>• Medians<br>• Breakaway posts | • Road and environmental design policies |
| Post-Event | • Age<br>• Pre-existing physical condition | • Fuel Integrity System<br>• Fire | • EMS system<br>• First responder<br>• Bystander care<br>• Proximity to medical care<br>• 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 its selection of policy options and interventions that are more likely to be supported. Potential values that can be considered include:[35]

- ***Effectiveness.*** Does the intervention work when applied?
- ***Cost.*** Are there 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 specially targeted intervention for some persons lead to equal protection for all?
- ***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:[36]

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, State, and regional 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 better 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 regional variation in 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, in concert with 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. After recognition of the core functions of public health as assessment, policy development, and assurance, the public health community moved to make these concepts clearer by describing the services that are essential to delivering public health at a local level. These essential services are not tied to any one program area. They can be used to understand the process of decision making on either a community or specific program level, and they can be seen as cyclic, with the services overlapping, and being repeated over time as new assessments lead to new policies.

### THREE CORE FUNCTIONS

The three core functions of public health are assessment, policy development, and assurance:[37]

- *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).

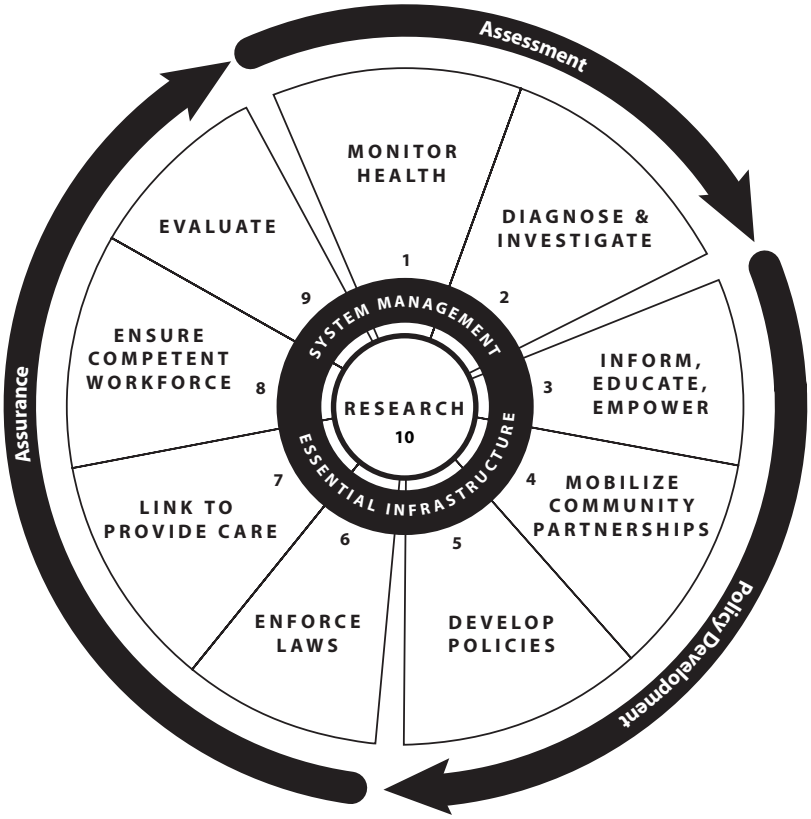
## TEN ESSENTIAL SERVICES

All HHS agencies endorsed 10 Essential Services of Public Health that fall into the 3 Core Functions of Public Health. The 10 essential services are:[38]

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. Ensure 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

See Figure 2 for the model describing these public health functions and services. It describes the 3 public health core functions and the 10 essential services. Note that research, one of the 10 essential services, is key and is placed in the center. It is research that drives the system.

**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 10 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<br>Diagnose and investigate | Evaluation | Needs assessment<br>Data collection<br>Research |
| Policy Development | Inform, educate, and empower<br>Mobilize community partnerships | Public information and education | Injury prevention<br>Trauma advisory committee |
| | Develop policies | Legislation and regulations | Trauma system planning and operations<br>Regulations and rules |
| Assurance | Enforce laws | | Lead agency at State level |
| | Ensure links to or provision of care | Prehospital care | Communications<br>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<br>Research<br>Interdisciplinary review committee |
| | Research | | |

## 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 demonstrating 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), 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:

- Using data to develop policies, and to inform and educate the public
- Developing a trauma system plan
- Having trauma care professionals join forces with community-based prevention coalitions to provide community education to encourage support of 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

### Assurance Examples

In response to the problems identified by the assessment and the policies 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
- Evaluating adherence to triage and transport guidelines and to the quality of clinical care (prehospital and post acute) provided to injured patients
- Designating and verifying trauma centers

Figure 3 demonstrates public health functions (PH) and trauma system functions (TS) in one wheel. It displays 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


## 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 post-acute care rehabilitation); 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 benefit the community in daily responses to injury and trauma care while better preparing both groups to work collaboratively in times of disaster.

Using the broader systems approach, centered on the three public health core functions, 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 system focusing on all three levels of injury prevention.

For future development of trauma systems using the three public health core functions, the following sections on Assessment, Policy Development, and Assurance include trauma system benchmarks. These benchmarks will assist trauma regions and statewide systems of trauma care in better determining priority areas for system development.

## CORE FUNCTION: ASSESSMENT

**Assessment**

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

The essential *public health services* typically associated with assessment include:

- The monitoring and surveillance of the public's health
- The diagnosis and investigation of public health issues
- Research in the area of assessment, surveillance, and diagnosis of injury

*Trauma system* assessment includes:

- 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.
- Obtaining information about the trauma system structure and processes, including clinical care, for a given jurisdiction and comparing these data with uniform trauma system standards.
- Obtaining information about risk management and response to major or mass casualty (both man-made and natural) incidents.
- Preparing a "gap analysis" risk assessment, using objective data to describe the significant injury issues to be addressed by the trauma system and by 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…that is, the "gap." The gap analysis assists in determining 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.[39] 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 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, post-acute 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 performance 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. An ideal statewide trauma registry is inclusive of both standardized data elements and inclusion and exclusion criteria, as well as some degree of data from all facilities caring for the injured, along with population-based sampling.

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

- Vital statistics
- Hospital discharge
- Emergency department
- Rehabilitation facility
- Law enforcement
- State fire marshal
- Public health
- Emergency medical service

A myriad of technological solutions for enhanced data collection and presentation are available. Examples include geographical information system (GIS) mapping; probabilistic data linkage (a method of linking data between two or more sources using a series of algorithms that maximize the probability that a record from each data source refers to the same patient event); cube technology; real-time highway safety data; and many 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.[40]

*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, age group, location, and categories of patient risk. 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, 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 on 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 for prehospital, acute, and post-acute care. 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. The 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.[41, 42] 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 injury 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. There is a thorough description of the epidemiology of injury in the system jurisdiction using both population-based data and clinical databases.
2. There is an established trauma management information system (MIS) 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's emergency preparedness has been completed including coordination with the public health, EMS system, 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, constituencies, and policy makers. Policy development includes nurturing leadership to develop policies and plans in support of community and State health development and monitoring implementation of those plans. Policy development is the first step in translating assessment results into system development.

The essential *public health services* typically associated with policy development include:

- Informing, educating, and empowering
- Mobilization of community partnerships
- Development of system policies
- Research in the area of policy

*State trauma system* policy development includes:

- Having sufficient legal authority, including statutes and administrative rules and regulations, to implement, monitor, assess, and ensure trauma system performance.

- Effectively using such key contacts as political leaders, partners, advocates, and constituents to organize groups; engage communities; form trauma-specific statewide multidisciplinary, multi-agency advisory committees; and coordinate with ongoing community health efforts for the purpose of:
  - Developing and implementing trauma system plans
  - Communicating with elected officials and policy leaders regarding development and sustainability of the trauma system
- Integrating State and local trauma system 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
  - All-hazards preparedness
  - Public health system preparedness
- Using the trauma management information system for 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 both the public health system and the health care delivery system
  - To ensure system effectiveness
- 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, EMS, 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. Use of a trauma-specific statewide multidisciplinary, multi-agency advisory committee is an effective way to coordinate such activities. 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 EMS, public health, incident 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 a system of trauma care that spans the prevention continuum. 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 communications 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 also should support the collaboration and integration of EMS, emergency preparedness, and public health systems with trauma so that a statewide comprehensive coordinated system of injury and 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 vision. 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 be those of the State plus address specific regional resources and needs.

**Preparation 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 to 12 is recommended. Lead decision makers must determine 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
- 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 development, and assurance
- All-encompassing, ranging from injury prevention activities to prehospital trauma care, acute care facilities (designated trauma centers and receiving facilities), and post-acute care rehabilitation
- 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 system plans may focus on guidelines for prehospital providers, communications among trauma team members, designation of trauma facilities, or evaluation of trauma system performance, or any combination of these. 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 and data-based needs

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

### Management Information System

Policy development includes the use of assessment results, trauma system data, and management information system 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 management information system provides opportunities to:

- Review, and may link, multiple sources of data (e.g., trauma registry, EMS, incident 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 trauma resource utilization
- 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.

In summary, policy development includes leadership, legislation, comprehensive planning, and evaluation. It defines and promotes trauma systems by informing and educating the public, constituencies, and policy makers; by mobilizing partners to solve 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 for the long term.

### Benchmarks for the Policy Development Phase

1. Comprehensive State statutory authority and administrative rules support trauma system leaders and maintain trauma system infrastructure, planning, oversight, and future development.
2. Trauma system leaders (lead agency, trauma center personnel, and other stakeholders) use a process to establish, maintain, and constantly evaluate and improve a comprehensive trauma system in cooperation with medical, professional, governmental, and citizen organizations.
3. 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 incident management. The written trauma system plan is developed in collaboration with community partners and stakeholders.
4. Sufficient resources, including those both financial and infrastructure related, support system planning, implementation, and maintenance.
5. Collected data are used to evaluate system performance and to develop public policy.
6. Trauma system leaders, including a trauma-specific statewide multidisciplinary, multi-agency advisory committee, regularly review 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 control.
8. The trauma, public health, and emergency preparedness systems are closely linked.

## CORE FUNCTION: ASSURANCE

**Assurance**

*Ensuring 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.*

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 performance improvement through an assurance process. The assurance process shapes the system as it matures and benefits from experience.

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

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

In *trauma systems*, assurance frequently, although not always, equates with those activities associated with secondary and tertiary prevention. Assurance includes:

- Enforcing laws, rules, and regulations and complying with treatment protocols, interfacility transfer procedures, maintenance of trauma center criteria, and other guidelines
- Ensuring that the injured patients are transported to the facility with the appropriate resources for their care (patient triage and trauma facility designation) and that the right patients get to the right facility
- Ensuring effective coordination of trauma, EMS, and other systems of care
- Ensuring a competent, well-trained workforce
- Implementing performance improvement initiatives

The core function of assurance is broad and also includes, for example, enforcing traffic laws or establishing a suicide prevention hotline.

### 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 part of the system. The lead agency should define processes to monitor and identify noncompliance 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 with the review of compliance with statutes, rules/regulations, protocols, and system operational guidelines.

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

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 rules/regulations
- Collaboration and consensus among stakeholders
- System participants willing 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 trauma patients' 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/regulations, including appropriate training of the trauma system community. The lead agency also is 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 provision of technical assistance to local governing bodies in developing, if appropriate, local trauma system rules/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/regulations 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.[43] For the effective implementation of trauma system enforcement activities, operational policies and procedures can 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 an important trauma system activity 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 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 ensuring the most cost-effective system.

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 patients with special needs (e.g., burn, spinal injury, and children) to specialty care centers when appropriate, 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 communication system. The trauma system must be supported by a communication system that provides immediate citizen access, for example, Enhanced 9-1-1 (E 9-1-1) 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 on-line or off-line bidirectional voice communications that allow field-to-medical receiving facility medical instructions even during interfacility transfers and mass casualty or all-hazards incidents.

Additional examples of EMS and trauma system integration include:

- 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

Each of these system components must 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 aforementioned examples emphasize the need for ongoing evaluation of key assurance indicators defined within the trauma management information system. To adequately assess a trauma system, all acute care facilities, regardless of trauma center designation, should use standardized data elements, definitions, and value labels for data submission.

### Training and Educating a Competent Workforce

The lead agency assists in ensuring 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/regulations 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 trauma-specific statewide multidisciplinary, multi-agency advisory 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 add value by ensuring 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.

Examples of courses that have been established by professional organizations as important and successful for trauma care include:

- 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
- Emergency Nursing Pediatric Course (ENPC), Emergency Nurses 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
- Rural Trauma Team Development Course (RTTDC), American College of Surgeons
- Disaster and Mass Casualty for Surgeons, American Association for the Surgery of Trauma

**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,[44] ABA *Burn Unit Referral Criteria*,[45] 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 performance improvement in trauma care. That is, the lead agency should assist 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 is required, by ACS standards, to demonstrate prevention outreach activities within the facility's service area. Interventions should be matched to the community's needs and should be 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:

- Use the previously completed assessment studies
- Have communicated with the injury community including other nearby trauma facilities
- Develop nonduplicative programs and integrated systems/strategies within the community

A trauma lead agency should monitor the adequacy of rehabilitation facilities and should ensure that these resources are made available to all populations as medically necessary.

Through partnerships with public, private, and voluntary sectors, it is also important that all populations, including the underserved, and uninsured and 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 and EMS system participation) by developing the process improvement program statewide. This program should include 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 also at the entire trauma system 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, and rehabilitation services. 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 State Trauma Office can ensure consistency in the strategies used for process improvement statewide and can receive data to ensure and report back the improvements in the system along with deficiencies to be addressed.

The State Trauma Office can:

- 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 rules/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 a comprehensive 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 including 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 communications, 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 that its trauma system plan is integrated with, and complementary to, the comprehensive mass casualty plan for both natural and man-made incidents, including an all-hazards approach to 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 will continually work to improve the trauma care as measured by patient outcomes.
8. 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.
9. The financial aspects of the trauma systems are integrated into the overall performance improvement system to ensure ongoing "fine-tuning" and cost-effectiveness.
10. The lead trauma authority ensures a competent workforce.
11. The lead agency acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to the trauma system.

## TRAUMA SYSTEMS: RESPONSE TO MASS CASUALTY INCIDENTS

The system of trauma care permits application of primary, secondary, and tertiary prevention principles in mass casualty incidents as it does when described earlier in this document. The planning, response, and evaluation components remain as trauma system components regardless of the number of patients, or the magnitude or consequence of the threat. Incidents differ, however, in the *degree* to which consequences occur and disrupt the normal medical and public health services of the affected area. 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. Using the model depicted earlier in this guide, one can find MCI-related essential services under each of the core functions of assessment, policy development, and assurance.

### Assessment

The assessment core function includes, for example, assessment of risks and hazards likely to trigger trauma system response, adequacy of resources including hospital capacity, personnel and supplies, contingency options for surge capacity and resources, and preparedness levels of system components such as training levels, protocols for patient triage, transport, and destination. Prevention-related actions are also a consideration under assessment. Although primary prevention of disasters is not usually within the purview of the trauma system, under some situations, it is.

A trauma system, as a result of risk assessment, may identify the need to evacuate patients from a specific location if the trauma center is in a high-risk environment (e.g., the severe flooding experienced in hurricanes). Trauma practitioners trained to associate suspicious injury and history consistent with terrorist activity can alert appropriate officials to the threat and reduce public harm. Trauma systems and centers are also valuable participants in primary prevention for mass casualties when they participate in the strategic planning for the health and safety of the population.

Complex disasters such as those involving terrorism and weapons of mass destruction (i.e., blast, chemical, biological, or nuclear) are not beyond possibility and may result in an austere environment. The severe constraints to providing adequate and immediate care for the population in need imposed by the austere environment would result from physical, social, political, and economic challenges that affect the availability of resources, transportation, and access to trauma care in a community or larger geographic area. Weapons of mass destruction that contaminate environments have the greatest potential to produce the ultimate austere environment, and the resulting number of casualties would overwhelm emergency medical and public health systems.

Weather-related disasters have the same potential to disrupt normal trauma system operations. This situation was experienced in Hurricanes Katrina and Rita in 2005 when many hospitals and health care facilities, road, transportation, supply support, and communication systems were damaged so extensively that entirely new patterns of care delivery had to be established.

### Policy Development

Policy development includes the planning and response to all-hazards and specific threats, the function of the trauma system and trauma center in response, and the interface with local, regional, State, and Federal components. It also includes the supporting legal considerations for implementation such as policies, regulations, intrastate

and interstate compacts, mutual aid agreements, and recognition of practitioner licenses across State lines. Even though the trauma center and trauma system are not the lead agencies for disaster response, integration of the trauma system in pre-planning is important because of the extensive impact of disasters on the trauma system and the value of the system in providing care. The Public Health Service Act, Title XII, Trauma Care statute, requires States to develop and maintain State Trauma System Plans. Additionally, the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 requires that trauma and burn care be a component of the State's preparedness plan.[46, 47]

The numbers of casualties resulting from a mass casualty incident may be large enough to overwhelm not only the public health and medical services of the affected communities, but also entire States and even regions composed of several States. Trauma centers and systems under these circumstances are instrumental in preventing deaths and disabilities by activating their emergency plans to provide the necessary surge in both numbers of practitioners and numbers of patients that a facility can manage. Comprehensive plans include interstate and intrastate mutual aid, for example, the ability to transport patients and resources throughout the State, as well as out of State, to ensure that patients receive the level of care they require even when facilities in the impact location are saturated, damaged, or destroyed.

Surge capacity is expanding the capability and capacity of the existing health care system for an increase in patients over the daily operational levels, for disaster response, and for ensuring that all trauma care personnel are synchronized in their efforts. The concept of surge can be thought of in two ways: expanding capacity in place (trauma center) and finding alternative capacity offsite. Surge in place is often accomplished through the use of dual-purpose areas within existing hospitals such as opening closed areas, and using cafeteria space and hallways. Off-site surge looks to other existing or unique facilities such as the prototype Advanced Surgical Suite for Trauma Casualties (ASSTC), a lightweight, highly mobile, self-contained surgical facility under development by the military for Project ER One, an expansion of emergency department capacity developed by Washington Hospital Center (Washington, D.C.), which embodies scalability, dual use, and modularity.[48] The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) now encourages new hospital construction to be dual use. The surge in place concept for trauma centers must integrate plans for important considerations such as air filtering, power, and support operations necessary for patient care.

Personnel and volunteer responders are a significant resource required in larger numbers, not only for staffing existing trauma system operations, but also for staffing other locations such as on- and off-site triage, care, and transportation of severely injured or ill patients. Efforts to identify and credential volunteer health practitioners prior to an incident are important so that qualified individuals are prepared for response. The Emergency System for Advance Registration of Volunteer Health Professionals (ESAR-VHP), which is administered as part of the National Bioterrorism Hospital Preparedness Program (NBHPP) within HRSA, is one such project that trauma systems and trauma centers should be collaborating with to pre-plan volunteer identification and credentialing.[49]

Surge in resources also includes equipment and supplies. It is likely that a rapid increase in demand will be accompanied by interruption of normal supply communications and delivery in an all-hazards event. Planning considerations for such incidents should include maintaining an adequate flow of expendable supplies and support for equipment, inclusive of a power supply for the increased use of ventilators, monitors, and other technological adjuncts for patient care. When all-hazards incidents cripple entire regions, mutual aid agreements within States and with other States are important. Links with Federal and State resources such as logistics and supply stockpiles are time dependent so that they will arrive quickly enough to make a difference. Trauma system participation in

this planning is essential to ensure that the needs for system support are integrated. The provision of trauma care and burn supplies is essential to minimizing death and disability.

Trauma centers and systems should work closely with State lead agencies to provide essential input and to prepare the system for response. Policies and plans should include:

- Re-positioning of essential supplies.
- A rapid and coordinated response that activates support elements and resources such as the Strategic National Stockpile (SNS)[50] from the CDC and Disaster Medical Assistance/Strike Teams[51] from the National Disaster Medical System. The supply packages contain significant equipment and supplies designed to provide a limited degree of support for in-hospital care.
- Mobilization of credentialed and trained practitioners who can function across organizational boundaries.

**Assurance**

The core function of assurance includes elements of trauma system operation such as adequacy of training for personnel preparedness, exercises to test adequacy of response plans and their integration with other systems (e.g., EMS, public health, and incident management), patient-tracking systems, and measures to protect the public such as credentialing practitioners, enforcing regulations, or making exceptions when needed.

Evaluation is an essential service in the public health model and part of the assurance core function. The trauma registry provides a mechanism for reviewing patient care and outcomes after a mass casualty incident. This registry is a database of standardized data points managed by a trained professional in trauma management information systems. Every trauma patient meeting criteria for entry is included in the registry. At a minimum, each patient file represents care from admission through discharge. In a mature system, the trauma registry exists at both the local, individual trauma center and at the statewide level. This repository of data provides an opportunity to evaluate the response phase of mass casualty care. Although individual patient data are confidential, the trauma registrar can produce aggregated reports that do not violate patient confidentiality. The information gathered can assist in reviewing many aspects of the MCI response such as triage protocol compliance and effectiveness, volume and distribution of patients, interventions required, patterns of injury, survival rates, and use of specialty beds (e.g., trauma, burn, and pediatric). The ACS National Trauma Data Bank (NTDB) is the only trauma care-specific database in the Nation. Over the past years, the NTDB has grown significantly to well over 1 million patient cases. Most States have either statewide trauma registries or trauma centers that contribute data. Additionally, the American Trauma Society's Trauma Information Exchange Program (TIEP) maintains the only database that monitors, tracks, maps, and analyzes the total number of each level of trauma center.

Integration of plans across systems is another element under the core function of assurance. At local levels, trauma center leaders planning with city and community emergency teams such as the Metropolitan Medical Response System (MMRS) is one example of integrated planning. At the State trauma system level, the planning must be integrated with State incident management response plans and with contiguous States' trauma response plans. At all levels, the response plans are multidisciplinary, all-hazards focused and include mutual support among the disciplines statewide and beyond. Plans should include consideration of evacuation of inpatients to make room for incoming patients, supply lines, back-up communications, personnel, and alternative care facilities. Close coordination with the EMS system is a high priority since this system controls much of the severely injured patient flow into trauma centers. Additionally, the EMS system assists with the evacuation of inpatients from trauma centers and other facilities as they increase available bed space.

## RESOURCES FOR TRAUMA SYSTEM DISASTER PLANNING

Guidelines on how to plan for delivering health and medical care in a mass casualty incident are outlined in a report from HHS's Agency for Healthcare Research and Quality (AHRQ) and Office of Public Health Emergency Preparedness (OPHEP). The report *Altered Standards of Care in Mass Casualty Events*[52] offers a framework for how to provide optimal care during a health emergency involving thousands, or even tens of thousands, of injured patients. The document suggests that some of the challenges for planners include:

- Developing or revising triage guidelines for specific types of events and allocation guidelines for the use of scarce resources such as ventilators, burn beds, or surgical suites
- Defining circumstances that trigger a call for altered standards of care, and who is authorized to make that call
- Enacting laws and mechanisms that allow for legal, regulatory, or accreditation adjustments in provider liability, licensing, facility standards, and patient privacy
- Identifying financial resources and reimbursement of medical care costs
- Establishing public communication strategies before, during, and after a mass casualty incident
- Providing support for populations with special needs, such as children, persons with physical or cognitive disabilities, and non-English speakers

Like the fundamentals of trauma care, an all-hazards response includes basic public health and medical elements that are similar in all incidents. A major difference is the degree that these responses are used in a specific incident and the degree that outside assistance is needed. All responses are based upon the belief that local communities are the first to respond and serve as the primary manager of the incident until they determine that they are overwhelmed. An incremental approach to incident response begins on the local level and ranges to the Federal level as requested by the State. All levels must be involved in the regular validation of plans through exercises (e.g., tabletop and simulated incident drills testing the system).

In response to attacks on September 11, 2001, the President issued Homeland Security Presidential Directive 5 (HSPD-5)[53] in 2003. The directive calls for a National Incident Management System (NIMS)[54] and identified steps for improved coordination of Federal, State, local, and private industry response to incidents. The directive also describes the way Federal agencies will prepare for such a response. Under the leadership of the U.S. Department of Homeland Security, the NIMS goal is to integrate effective practices in emergency preparedness and response into a comprehensive national framework for incident management. When fully implemented, NIMS will enable responders at all levels to work together more effectively to manage domestic incidents no matter what the cause, size, or complexity.

NIMS is an important concept for trauma leaders to understand so that they can participate in both the implementation and the continued development of NIMS, since it is a dynamic process that will continue to evolve and improve over time. Trauma leaders involved in incident response planning and activities would benefit from the NIMS introductory course offered by the Federal Emergency Management Agency's (FEMA's) Emergency Management Institute (IS-700 NIMS, *An Introduction*).[55] The course is intended to familiarize persons in the emergency preparedness and response community with NIMS. Providing educational support systems and training the workforce are important to the development of surge capacity.

Trauma systems and trauma centers are significant national resources in the support of our country's response to mass casualty incidents. They are available and on standby every hour of the day and every day of the year to resuscitate seriously injured patients and provide them with emergency surgery and critical care. The trauma

team consists of nurses, physicians, therapists, and others who maintain a skill level specific to the needs of the injured. The teams are prepared to manage injuries for both adults and children. Some situations involve the need for transfer to a pediatric trauma center. Life-support equipment, supplies, blood and blood products, and diagnostic tools are maintained in the highest state of readiness so that they are waiting for the patient to arrive. The teams are trained to function smoothly in the most challenging and chaotic circumstances.

For all of these reasons, integrating trauma system planning with the National Response Plan (NRP) supports rapid mobilization and surge in capabilities when needed. The NRP "establishes a comprehensive, all-hazards approach to enhance the ability of the United States to manage domestic incidents and incorporates best practices and procedures from incident management disciplines, integrating them into a unified structure. It forms the basis of how the federal government coordinates with state, local, and tribal governments and the private sector during incidents."[56]

The NRP divides response and coordination responsibilities into Emergency Support Functions (ESFs). DHHS is the Federal agency responsible for actions defined within ESF #8, Health, Mental Health, and Medical Services. Within ESF #8, trauma care resources and coordination are assigned.[57] Trauma system leaders must understand the process for receiving assistance during incidents of national significance. The types of support provided include assessment of public health and medical needs, public health surveillance, medical care personnel, and medical equipment, medications, and supplies.

Most State emergency/all-hazards response plans use this same template for organizing State response to and recovery from mass casualty incidents. The Department of Health is the lead agency for State health and medical coordination. Integration of the statewide trauma system and trauma centers into these plans permits important assets for a response to be included for a more rapid and organized support system for saving lives and preventing disability.

The NIMS concept, the NRP, and State plans include the Incident Command System (ICS) framework for organizing management of response efforts.[58] The ICS is a proven management system based upon successful business practices and is the result of decades of lessons learned in the organization and management of emergency incidents. The ICS is adapted for hospital use through the Hospital Emergency Incident Command System (HEICS) to take into consideration some of the unique aspects of in-patient resources.[59] Trauma leaders should be fluent in and knowledgeable about these systems to be effective in integrating the trauma system response into the larger effort.

Other resources of importance to trauma systems are the standards developed by ASTM International (formerly the American Society for Testing and Materials). This organization publishes references useful for trauma system and center development in an all-hazards response. The standards are developed through a voluntary consensus process using experts for the specific standards addressed. Three of the standards of great importance to trauma systems and trauma centers are the following:

1. *Standard Guide for Hospital Preparedness and Response* - Addresses an all-hazards comprehensive emergency management program for the planning, mitigation, response, recovery, and coordination of hospitals in response to a major incident.[60]
2. *Standard Guide for Planning for and Response to a Multiple Casualty* - Addresses assessment, training, integration, coordination, mutual aid, implementation, provision of resources, and evaluation of the response of a local EMS organization or agency to a multiple patient-producing situation.[61]

3. *Standard Guide for Organization and Operation of Emergency Medical Services Systems* - Addresses the scope, methods, procedures, and participants in . . . development and implementation of an incident medical system; overall coordination of EMS and related programs within the State and in concert with other States or Federal authorities.[62]

Public health agencies also represent an important resource, especially for managing nuclear, biological, and chemical casualties. Experts in epidemiology, nuclear medicine, and infectious disease can often be accessed through the State health department. The lead agency for the EMS system is also often located in the State health department. State health departments are the important link to the Strategic National Stockpile for patient care supplies such as ventilators, antidotes, and intravenous solutions. State health departments are also the coordinators for the pre-positioned CHEMPACs[63] that are distributed across States for rapid deployment to hospitals and prehospital responders to chemical casualties.

## IMPORTANCE OF TRAUMA SYSTEMS AND CENTERS TO RESPONSE

A consistent medical and public health approach to incidents, based on an understanding of common features and the level of response required, is the accepted practice throughout the world. The primary objective during the acute response phase is to reduce the mortality and morbidity caused by the incident and to achieve the key principle of all-hazards care, *the greatest good for the greatest number of individuals*. To accomplish this objective, experienced personnel make rapid assessments that allow initial responders to select the appropriate key elements for use in this phase.

Established trauma systems are important assets during the acute response phase. The trauma centers within these systems operate on a daily basis caring for the most severely injured patients during a mass casualty response. They are staffed with pre-planned, trained, and ready teams dedicated to saving patients' lives and minimizing disability.

In most States, trauma centers are designated by levels using the ACS standards. The levels indicate capability and range from the most comprehensive patient care levels (Levels 1 and 2) to the basic capability of immediate care for trauma patients and transport to higher levels of designation (Level 3 or higher). Level 1 trauma centers are involved in research and teaching in addition to the patient care capabilities found in Level 2 centers. A trauma system with its trauma centers is valuable for MCI response because it:

- Includes resources that are concentrated and organized specifically for the immediate life-saving response to severely injured, and ill, patients in an effective and efficient manner
- Maintains a specialty trained workforce that is prepared to provide a range of emergency care, including deployment of specialty trauma teams to the site of need, for example, entrapped patients needing specialty trauma care
- Includes prehospital services, acute care in trauma centers, and non-trauma acute care hospitals and rehabilitation services
- Uses the skills of a diverse professional and paraprofessional workforce that has a well-established communication system and patient care protocols
- 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 an incident to provide the essential elements of all-hazards medical care: triage and initial stabilization, definitive care (including critical care for non-trauma patients when the circumstances call for that as a priority), and rehabilitation
- Can provide surge capacity for trauma and burn patient care by integrating other specialty teams and resources, for example, Disaster Medical Assistance Team (DMAT), military, and other State trauma systems

Trauma centers, unlike facilities for cardiac and medical care, are fewer in number. Routing trauma patients to appropriate hospitals (trauma centers) is important but may require a rapid reordering of transport patterns after an incident that damages or eliminates an element of the trauma system, such as hospital power outage, flooding, or total destruction. The American College of Surgeons (ACS), in the early 1980s, took the position that transporting the severely injured patients to the nearest hospital without regard to the level of care available was generally no longer acceptable.

Alternate delivery patterns can be acceptable when transport distances are too great. When the patient cannot be delivered to the trauma center within 1 hour of the incident, the ACS recommends transporting the patient to a closer facility for stabilization, then transferring the person to a trauma center.[64] This underlying principle should be incorporated into State preparedness plans but more importantly, patient triage and transportation plans need to include the distribution of trauma patients to trauma centers whenever possible.

Some reasons for trauma consideration in triage and destination planning are that:
- Patients are afforded the best opportunity to minimize death and disability.
- Patients are taken to the facility with the appropriate resources to care for their injuries.
- No hospital receives patients that it is not prepared to manage.
- There is appropriate distribution of patients among the available facilities.
- There is appropriate use of air versus ground versus other modes of transportation.
- The specialists in one particular facility are not overburdened.

Review of many past incidents reveals that injured patients who are mobile will dispatch themselves to the closest hospital by any means available, often creating a major challenge for that hospital to care for the "walking wounded" and the "worried well." If this "closest" hospital is also a trauma center, the problem is compounded. Trauma systems should be prepared to alter destination directions to the field providers if trauma center operations become compromised. All trauma patients should not be transported to a hospital simply because it is the closest and shortest distance from an event.

The trauma patients resulting from a mass casualty incident can pose clinical challenges and support challenges to trauma systems and trauma centers (e.g., large numbers of burn patients; trauma patients with biological, chemical, or nuclear exposure; and the need for pharmaceuticals and other supplies to manage these unusual patient presentations in large volumes). Burn beds are few in our Nation as is specialty care for patients with hazardous material exposure. 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.[65] 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 incident.[66] The trauma system is experienced in managing special populations, including children, residents of the inner city, groups of low income, 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 incidents. These disruptions and special populations represent unique challenges in care for the public health and medical communities.

In summary, the success of a statewide all-hazards preparedness plan is contingent upon establishing and exploiting adequate logistical arrangements for materials, equipment, and personnel.[67] The lead agency should ensure that the comprehensive mass casualty plan is integrated with the trauma system plan to respond to both natural and man-made incidents, including terrorist events. The trauma system is a natural foundation on which to build 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. The trauma system can provide the important linkages between public health and medical systems necessary for an integrated approach to all-hazards preparedness, response, and recovery.

## SYSTEM FINANCE

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. A trauma system and its individual components of care require substantial investments well in advance of an injured patient's episode of care. The trauma system, including its trauma centers, must be maintained in a state of readiness to respond any time individuals are seriously injured, 24 hours a day and 7 days a week. Like police, fire departments, and EMS, a trauma system should be seen as a vital service to the population.

Developing a sound financial framework and planning for it are essential. Adequate funding is needed for more than operation of individual trauma centers that provide care for the seriously injured patients in geographic regions of a State. Trauma systems need sufficient funding to implement a statewide and regional system of care—one focused on each component of care from prevention through acute care and rehabilitation, including all-hazards preparedness.

### FINANCIAL FRAMEWORK FOR THE TRAUMA SYSTEM

The financial framework for a trauma system is complex with many interrelated components and multiple organizations, each needing adequate funding to operate consistently and effectively. Many categories of cost should be considered in the financial review of the trauma system, such as administration and planning, infrastructure and equipment, communications, staffing, and patient care.[68]

Financial resources are needed to support the EMS system response for trauma care. Funds are needed to train EMS personnel to care for injured individuals. Although some EMS providers volunteer their time to care for injured patients, in many locations, salary support must be included in financial planning. Financial support for a medical director to provide oversight, protocols for care, and performance improvement guidance is required. Local EMS agencies also must have the resources for ambulances, as well as the equipment and supplies for patient care.

Interfacility transportation between community hospitals and trauma centers by ambulance, helicopter, and in some cases fixed-wing aircraft, is needed to ensure that injured patients get to the trauma facility appropriate for their severity of injury. Trained personnel, in addition to supplies and equipment, must be available to transport injured patients between facilities.

Redundant communication systems are essential for effective management of injured individuals. Communication systems are needed to dispatch prehospital providers to the scene of injury and to provide trauma centers with advance notification of an injured patient's arrival. Additional communication systems are essential to provide prehospital providers with instructions for managing the injured patient en route to the emergency department or trauma center. Coordination of a mass casualty response depends on an effective communication system.

Financing for individual trauma centers at all levels is essential to support their readiness to provide care for injured individuals. According to ACS standards, skilled and qualified trauma center health professionals and needed resources of care must be immediately available at all times. Specialty physicians (e.g., neurosurgeons and orthopedic surgeons) must be on call to respond when needed for patients with specific injuries, and in some cases on-call compensation is paid. The trauma center must maintain one or more dedicated trauma suites (or resuscitation areas) in the emergency department, as well as one or more dedicated operating room suites (depending on the volume of injuries treated). Dedicated surgical intensive care unit beds, as well as medical equipment and devices, must be immediately available to care for seriously injured patients. Trauma centers have an obligation to provide education for trauma center personnel, and outreach education to prehospital providers and other health professionals in the region, to maintain the preparedness of health care providers to ensure high-quality trauma care. Trauma centers also have an obligation to reduce injury in the community, often sponsoring specific injury prevention programs, driven by local need and supporting data. Facility administration and operation costs must be covered for such activities as trauma registry data entry, patient care coordination, performance improvement initiatives, trauma center designation and verification requirements, and the periodic reverification process. The costs for preparation of trauma centers for mass casualties must include funding for development of a hospital disaster plan inclusive of triage planning, performance of tabletop and simulated incident drills, establishment and maintenance of a management information system, and training of trauma system personnel. Because trauma care is provided to all patients without regard to financial status, funds to pay for the trauma care provided to uninsured patients are needed to assist in maintaining the overall trauma center infrastructure. The fixed expense of the trauma center readiness cannot be captured by billing for patient care costs.[69] In urban Level I trauma centers, financial stability is of great concern because of the large numbers of uninsured and underinsured patients, and additional funding sources are needed to maintain their participation in the trauma system.[70]

An important aspect of trauma system finance is the funding needed to support the State's trauma system infrastructure, outlined below. The lead agency for the trauma system is responsible for its planning, implementation, and evaluation.

- The process of statewide and regional planning involving stakeholders that addresses initial development of a trauma system plan as well as ongoing monitoring and planning for system improvements
- Maintenance of a trauma-specific statewide multidisciplinary, multi-agency advisory committee
- Staff at the State and regional levels to coordinate and facilitate the State trauma system program
- Development and implementation of the process for designation and de-designation of hospitals as trauma centers and monitoring of compliance with accepted standards of care
- Regulatory activities
- Management of statewide trauma data collection, trauma registry maintenance, data linkage, data analysis, and reporting for trauma system evaluation
- Performance improvement initiatives
- Health care provider educational activities
- Prevention programs
- Public awareness and public education activities

The provision of comprehensive trauma care requires a significant financial commitment by all trauma care providers, health care plans, regional and local jurisdictions, and health care facilities. Funding for a comprehensive trauma system must be dedicated to and sufficient to cover its development, implementation, delivery of care, and evaluation across all core public health functions of assessment, policy development, and assurance.

## FINANCIAL PLANNING

The lead agency, in cooperation with trauma system policy makers, should plan for sufficient startup funding and ongoing financial support for system sustainability. Dedicated revenue sources should be established to support the trauma system infrastructure in a manner consistent with the State's Trauma System Plan and priorities for administration and operations.[71]

An operational budget for each component in the trauma system plan should be developed to match and adequately fund the trauma system's administrative and program priorities. The operational budget of the larger EMS system and the all-hazards response system for the State may integrate trauma system costs. For example, an organized EMS system requires communication systems, equipment, and operations personnel, and these same resources also support the trauma system. Estimating the contribution of the larger EMS and disaster response systems to the trauma system's financial structure aids in illustrating the true costs associated with a statewide trauma system, as well as the benefits of overlapping system infrastructures.

Financial support is essential for ensuring system integrity to develop, maintain, and improve the trauma system over time. Because an effective trauma care system relies heavily on maintaining trauma care services and facilities in a constant state of readiness, long-term financial and community support is required. State legislatures have identified various ways to ensure ongoing trauma system funding in addition to general fund appropriations. Some State trauma programs are supported by the following:[72]

- Motor vehicle fees, fines, and penalties
- Court fees, fines, and penalties (not motor vehicle related)

- 9-1-1 system surcharges
- Intoxication offense fees
- Controlled substance act or weapons violation fees
- Taxes on sales of tobacco
- Tribal gaming

### REPORTING THE TRAUMA SYSTEM FINANCIAL STATUS

It is recommended that each State Trauma Office have a method for assessing the financial health of its trauma system and regularly provide a report of costs by trauma system component. Important sources of financial data include health plans, emergency departments, EMS, trauma centers, rehabilitation facilities, and the trauma system lead agency. A method for collecting financial data from all participating health care facilities can include patient costs and charges, as well as administrative and system costs and revenue. Financial data should be linked and analyzed to estimate total system costs contrasted with trauma system financial resources. The financial report of the trauma system can then be used for ongoing strategic and budgetary planning.

An important challenge in the management of trauma systems is documenting the costs and benefits of a trauma system. Trauma system expenses must be linked ultimately to a description of the cost-effectiveness of trauma care and its demonstrated benefit to society, such as lives saved and injured persons returned to maximum preinjury productivity. This information will assist the public in understanding the relationship between trauma system costs and the system's value to society and will generate support for sustained trauma system funding.

## CORE FUNCTIONS, ESSENTIAL SERVICES, AND TRAUMA SYSTEM BENCHMARKS

This living document is a reflection of trauma system development using the public health approach. The following diagram, **Figure 4**, presents a model illustrating the interrelationship of the Core Functions, Essential Services, and Trauma System Benchmarks. It depicts:

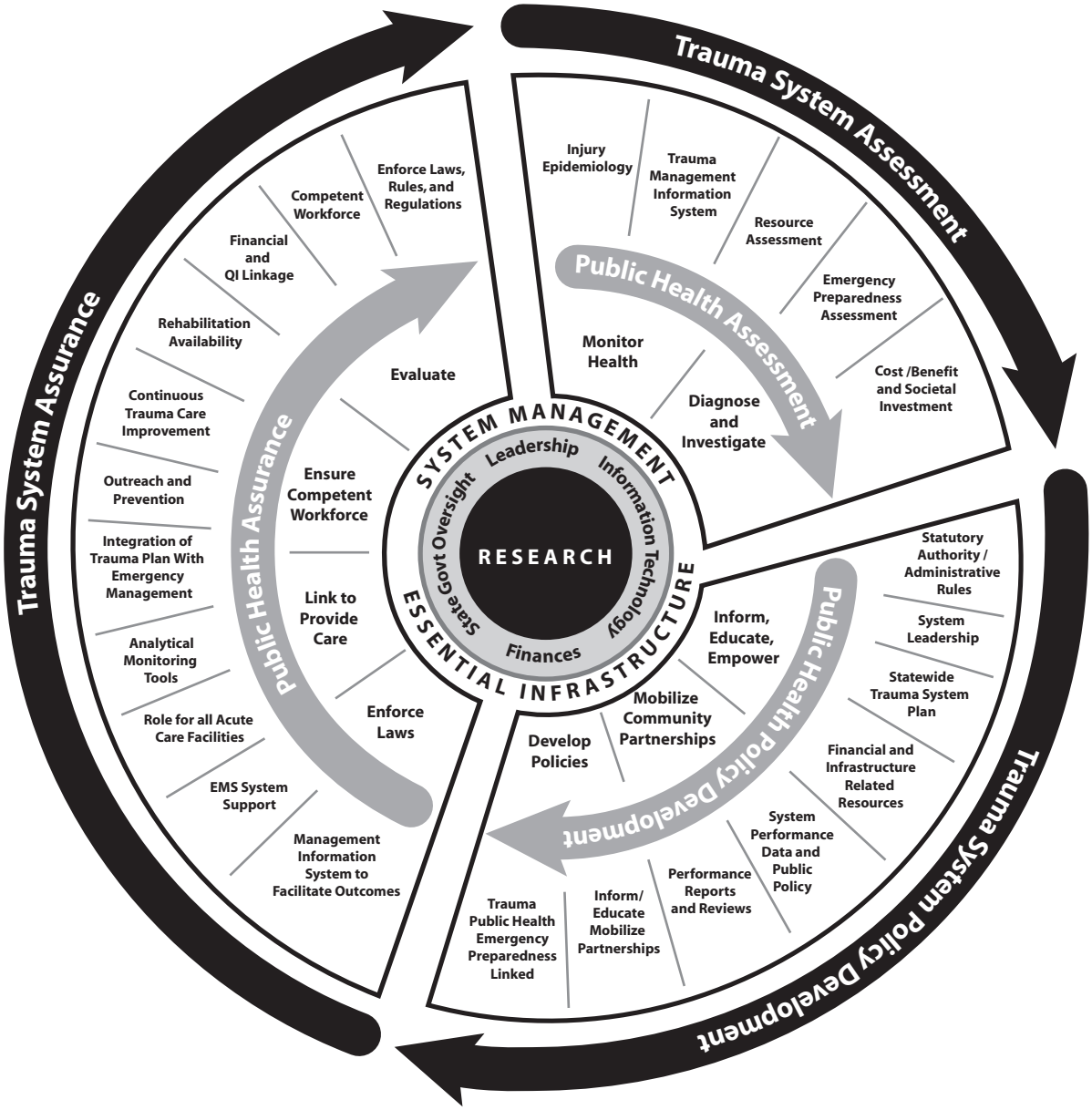
- **Research**, the core of **Figure 4**, drives the system and will provide the foundation for both system development and performance improvement.
- **Essential Infrastructure**, the next layer of the model, includes:
  - State Government Oversight
  - Leadership
  - Finances
  - Information Technology

As described earlier, these areas support System Management and provide the Essential Infrastructure to ensure continued system development.

- **Trauma System Benchmarks**, which circulate around the core constructs, consist of essential system target areas. These benchmarks provide a mechanism for measuring the status of State and regional system development and assist in determining areas of needed development. The benchmarks are arranged within the core functions of public health and trauma.

- Assessment, Policy Development, and Assurance, represented within the arrows of the figure, portray the core functions of public health and link the processes necessary for trauma system development using the public health system framework.

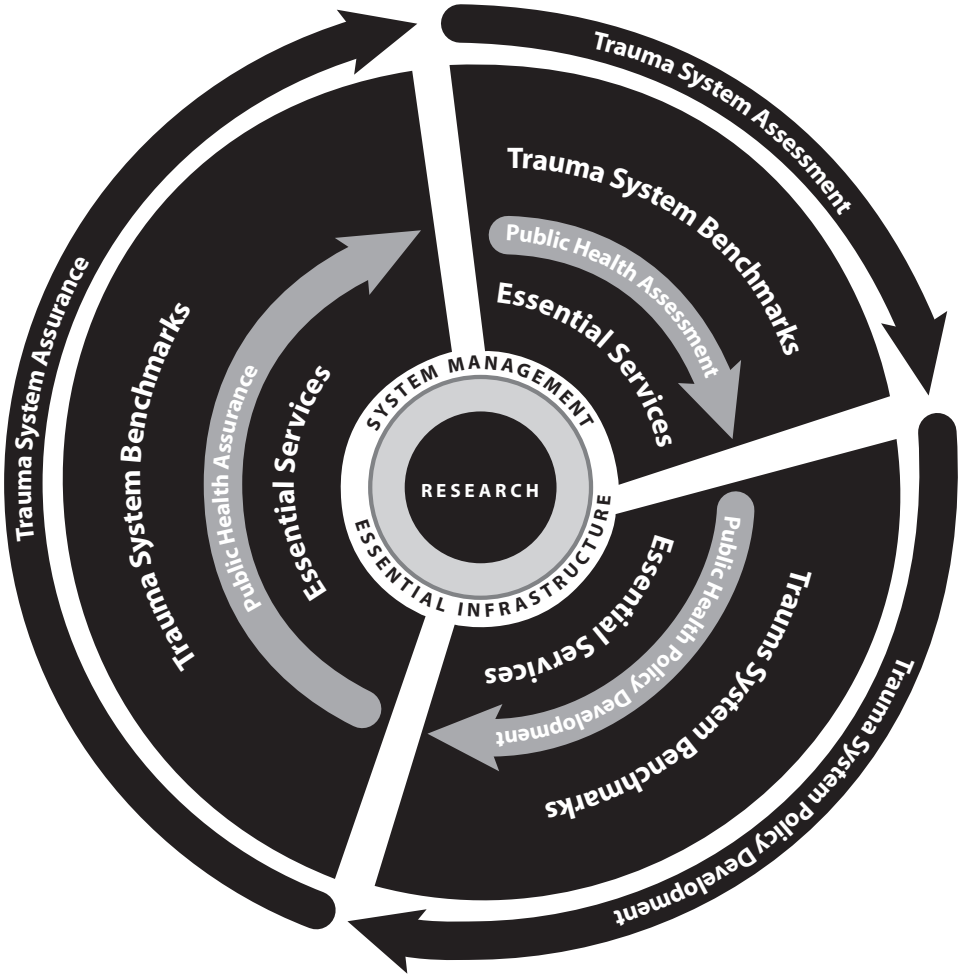
**FIGURE 4.** Core Functions, Essential Services, and Trauma System Benchmarks



A State trauma system should be built on sound principles and evidence-based practices that are grounded in research. As research identifies methodologies and practices to further enhance the continuum of care for the injured, the system improves. Research becomes the driving force for continued system development. The essential infrastructure facilitating system management is multifaceted. State government oversight, supported by authorizing statutes, assumes responsibility for both system development and performance, focusing on data-driven outcomes. Leadership, providing guidance for system development and performance measurement, comprises both public and private partnerships with vested interest in enhancing the local health care capacity for trauma in their communities. Development and monitoring of the system is dependent upon financial support and information technology to sustain and maintain both communication and measurement of performance. Benchmarks facilitate system measurement as well as function to plan the next steps for development of a comprehensive trauma system.

The next section of this document, "Trauma System Self-Assessment: Benchmarks, Indicators, and Scoring," introduces indicators and a scoring mechanism to each identified benchmark. This information is presented in the format of a State or Regional Self-Assessment Tool. This section of the document will provide a mechanism to evaluate the status of system development as well as assist with the necessary identification and prioritization of needed initiatives to better improve the trauma system.

# TRAUMA SYSTEM SELF-ASSESSMENT:
## *Benchmarks, Indicators, and Scoring*



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

*In the absence of validated national benchmarks, or 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 portion of the document focuses on an objective State and sub-State (regional) trauma system self-assessment. How a question is answered will depend on a group agreement on the "jurisdiction" being assessed, for example, State, regional, or local. Such an agreement is essential to ensuring consistency among participants during the assessment. This fact notwithstanding, some indicators refer to entities with specific "authority," for example, to regulate, and may therefore shift the focus from a locality or region to the State. As long as there is agreement among the stakeholders about what is being rated in each section, the tool can aid in identifying and prioritizing areas that need attention. 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 to assess 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 assist in assessing the status of trauma care and move 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 assist in identifying progress, efforts, or compliance, or any combination of these. 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 |
|---|---|
| 0 | Not known |
| 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 |
|---|---|
| 0 | The scorer does not know enough about the indicator to evaluate it effectively. |
| 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 statewide and sub-State jurisdictions. 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 and 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** |

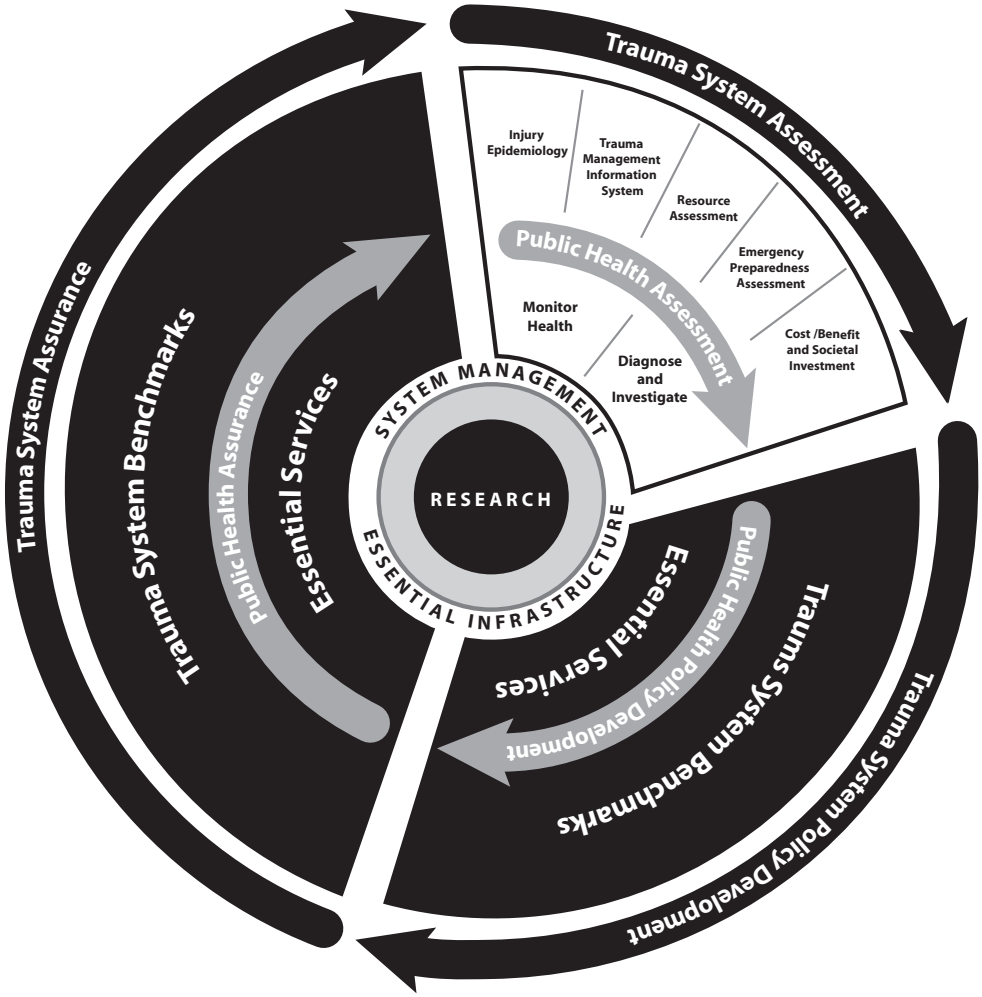
In this benchmark, the median score of "3" would indicate that, overall, there is evidence of limited, but demonstrable progress in meeting the expectation. Although this scoring mechanism provides a quantitative descriptor of each indicator and, ultimately, of the entire trauma system, the scoring process 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 benchmarks, indicators, and scoring (BIS) are 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.*



## 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. | 0. Not known<br>1. There is no thorough description of the epidemiology of injury mortality in the system jurisdiction.<br>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.<br>3. Death certificate data, by E-code, are reported on a statewide basis, but are not reported by sub-State jurisdiction.<br>4. Death certificate data, by E-code, are reported on statewide and sub-State jurisdictions. These data are compared to national benchmarks, if available.<br>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 and 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, elder, distinct cultural/ethnic, rural, and others), incidence, prevalence, mechanism, manner, intent, mortality, contributing factors, determinants, morbidity, injury severity (including death), and patient distribution using any or all the following: vital statistics, emergency department (ED) data, EMS 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.<br><br>**Note:** Injury severity should be determined through the consistent and system-wide application of one of the existing injury scoring methods, for example, Injury Severity Score (ISS). | 0. Not known<br>1. There is no written description of injuries within the trauma system jurisdiction.<br>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.<br>3. One or more population-based data sources and one or more clinical data sources are used to describe injury within the jurisdiction.<br>4. Multiple population-based and clinical data sources are used to describe injury within the jurisdiction, and the description is systematically updated at regular intervals.<br>5. Multiple population-based and 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 using local, regional, statewide, and national data. | 0. Not known<br>1. There is no written comparison of injury mortality using local, regional, statewide, and national data.<br>2. There is a written descriptive comparison of at least the leading cause of injury death using local, regional, and statewide data.<br>3. There is a written descriptive, graphic, and tabular comparison of the leading cause of injury death using local, regional, statewide, and national data.<br>4. There is a written descriptive, graphic, and tabular comparison of the *top three* leading causes of injury death using local, regional, statewide, and national data.<br>5. There is a written descriptive, graphic, and tabular comparison of the *top ten* leading causes of injury death using local, regional, statewide, and national data. |

Essential Service: *Monitor Health*

| Indicator | Scoring |
|---|---|
| 101.4 Collaboration exists between EMS, public health officials, and trauma system leaders to complete injury risk assessments. | 0. Don't know<br>1. No injury risk assessments are conducted.<br>2. Trauma system officials conduct injury assessments; however, there is no involvement of EMS or public health officials in those assessments.<br>3. Public health officials, along with EMS and trauma system participants, assist with the design of injury risk assessments.<br>4. Public health officials, along with EMS and trauma system leaders, assist with the design and analysis of injury risk assessments.<br>5. The public health epidemiologist, along with EMS and trauma system leaders, 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 occurs at State, regional, and community levels, resulting in the integration into key reports and planning documents such as *Healthy People 2010*. | 0. Not known<br>1. No injury risk assessments are completed.<br>2. Injury risk assessments are conducted in a segregated manner by the trauma program, separate from other public health risk assessments.<br>3. Injury risk assessments are combined with other assessment data, after separate collection and analysis efforts.<br>4. Injury risk assessments are conducted by public health officials as an integrated component with other health risk assessments.<br>5. Injury risk assessments are conducted by public health officials as an integrated component with other health risk assessments. Comparisons and contrasts between injury death and disability rates are made, fully integrated, and published, along with other leading health risk indicators, for example, HIV/AIDS, cardiac, and cancer, 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 EMS and the public health system to complete a jurisdiction-wide study of the determinants of injury using existing data sources and public health tools. | 0. Not known<br>1. There is no jurisdiction-wide study of the determinants of injury.<br>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.<br>3. The trauma system, EMS, and public health officials (including EMS) use existing data sources such as the Youth Risk Behavior Survey (YRBS) to describe determinants of injury among high-risk subpopulations.<br>4. Statewide data from all potential sources, for example, BRFSS, YRBS, Fatality Analysis Reporting System (FARS), vital records, and others, pertaining to the risk of injury, are summarized, electronically linked, and analyzed to determine the potential target areas for injury prevention activities.<br>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. | 0. Not known<br>1. There is no effort to describe risks to special at-risk populations such as age categories, cultural/ethnic populations, geographic variances, pediatrics, and high-risk co-morbidities, for example, substance abuse, or children with special health care needs, or any combination of these.<br>2. Risk assessments have been conducted for various age groupings, for example, adolescents and elder persons.<br>3. In addition to risk assessments for age cohorts, cultural/ethnic variations have been analyzed.<br>4. In addition to risk assessments for age and cultural/ethnic cohorts, geographic distribution of injury within the jurisdiction has been analyzed, for example, inner city versus suburban.<br>5. There is strong evidence that multiple special at-risk populations have been identified during the assessment processes. |

***BENCHMARK***

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

Essential Service: *Monitor Health*

| Indicator | Scoring |
|---|---|
| 102.1 There is an established injury surveillance process that can, in part, be used as an MIS performance measure. | 0. Not known<br>1. There is no established system-wide injury surveillance process.<br>2. There is a system-wide trauma registry, but not all hospitals in the service area contribute to the trauma management information system.<br>3. There is a system-wide trauma registry with all hospitals in the service area contributing data.<br>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.<br>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 injury surveillance and MIS performance measures. |

Essential Service: *Monitor Health*

| Indicator | Scoring |
|---|---|
| 102.2 Injury surveillance is coordinated with statewide and local community health surveillance. | 0. Not known<br>1. Injury surveillance, as described in 102.1, does not occur within the system.<br>2. Injury surveillance occurs in isolation from other health risk surveillance and is reported separately.<br>3. Injury surveillance occurs in isolation but is combined and reported with other health risk surveillance processes.<br>4. Injury surveillance occurs as part of broader health risk assessments.<br>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 Trauma data are electronically linked from a variety of sources.<br><br>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. | 0. Not known<br>1. Trauma registry data exist but are not deterministically or probabilistically linked to other databases.<br>2. Trauma registry data exist and can be deterministically linked through hand-sorting processes.<br>3. Trauma registry data exist and can be deterministically linked through computer-matching processes.<br>4. Trauma registry data exist and can be deterministically and probabilistically 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.<br>5. All data stakeholders (insurance carriers, FARS, and rehabilitation, in addition to typical trauma system resources) have been identified, data access agreements executed, hardware and software resources secured, and the "manpower" designated to deterministically and probabilistically link, analyze, and report a variety of data sources in a timely manner. |

Essential Service: *Monitor Health*

| Indicator | Scoring |
|---|---|
| 102.4 There is a process to evaluate the quality, timeliness, completeness, and confidentiality of data. | 0. Not known<br>1. There is no process or written policy to evaluate the quality, timeliness, completeness, and confidentiality of the data collected in the system.<br>2. There is a process of evaluation and written policy but no compliance with governance. Confidentiality of information is not ensured.<br>3. The process of reviewing the quality, timeliness, completeness, and confidentiality of data is just beginning. There is some compliance with a draft written policy.<br>4. There are draft written policies in place for evaluating the quality (including both reliability and validity), timeliness, and completeness of data and for ensuring confidentiality.<br>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 data from all health care facilities and trauma agencies including patient charges as well as administrative and system costs. | 0. Not known<br>1. Financial data are not collected as part of the trauma system registry.<br>2. Financial data are collected as part of the trauma system registry at individual facilities but are not reported to the lead trauma authority.<br>3. Financial data are collected as part of the trauma system registry and are analyzed and reported by the lead trauma authority.<br>4. Financial data from the trauma registry are linked with at least one other source of cost data such as hospital discharge data.<br>5. Financial data are linked and analyzed from the trauma registry, insurers, emergency department, 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. | 0. Not known<br>1. There is no statewide resource assessment.<br>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.<br>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, workforce resources, education, EMS, transport, communications, trauma care facilities, interfacility transfer, medical rehabilitation, information systems, medical oversight, system evaluation, performance improvement, and research.<br>4. A trauma jurisdiction-specific resource assessment has been completed for at least half of the trauma jurisdictions.<br>5. Trauma jurisdiction-specific resource assessments have been completed for the State, regional, and local areas and are updated at least biennially. |

Essential Service: *System Management*

| Indicator | Scoring |
|---|---|
| 103.2 The trauma system has completed a gap analysis based on the inventories of internal and external system status as well as system resource standards. | 0. Not known<br>1. There are no resource standards on which to base a gap analysis.<br>2. The State trauma advisory committee has begun to develop statewide trauma system resource standards so that a gap analysis can be completed.<br>3. State trauma system resource standards have been approved by the appropriate approving authority.<br>4. A gap analysis of statewide trauma system resources has been completed for the entire State based on the system resource standards adopted.<br>5. A gap analysis of statewide trauma system resources 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. | 0. Not known<br>1. No preventable mortality assessment has been conducted on a system-wide basis.<br>2. A system-wide preventable mortality study has been completed.<br>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.<br>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, for example, prehospital, rehabilitation, and others, has been conducted.<br>5. The system has completed preventable mortality 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. | 0. Not known<br>1. No external examination of the trauma system or individual components has occurred.<br>2. Individual trauma centers have undergone outside consultation and verification.<br>3. In addition to trauma center verification, at least one other component of the system has been analyzed by external reviewers, for example, prehospital, rehabilitation, burns, and others.<br>4. An outside group of trauma system "experts" has conducted a formal trauma system external assessment and has made specific recommendations to the system.<br>5. Independent, external reassessment occurs regularly, at least every 5 years. |

## BENCHMARK

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

Essential Service: *System Management*

| Indicator | Scoring |
|---|---|
| 104.1 There is a resource assessment of the trauma system's ability to expand its capacity to respond to mass casualty incidents (MCIs) in an all-hazards approach. | 0. Not known<br>1. There is no resource assessment of the trauma system's ability to expand its capacity to respond to mass casualty incidents for in an all-hazards approach.<br>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.<br>3. An assessment of the ability of all components of the trauma system to respond to a mass casualty incident has been conducted on a jurisdiction-wide basis.<br>4. A written inventory of system-wide MCI capacity has been completed and includes: medical reserve personnel, facility surge capacity, additional equipment resources and caches, communication interoperability, overall management structure such as NIMS (National Incident Management System), and SEMS (Standardized Emergency Management System).<br>5. The written inventory of trauma system-wide MCI capacity 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 assist in identifying current status and needs of the trauma system to be able to respond to mass casualty incidents. | 0. Not known<br>1. No external examination of the trauma system's performance or ability to respond within the all-hazards response system has occurred at the State, regional, or local level.<br>2. Individual trauma centers have undergone outside consultation during tabletop and simulated incident drills.<br>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, for example, prehospital, communications, information systems, and others.<br>4. Preparations are under way for a formal system-wide review of the trauma system response to a mass casualty incident (to occur within the next 6 months).<br>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 emergency preparedness. | 0. Not known<br>1. There are no resource standards on which to base a gap analysis.<br>2. The statewide trauma advisory committee, in conjunction with appropriate incident management personnel, has begun to develop statewide MCI response resource standards.<br>3. State resource standards for trauma system response during a mass casualty incident have been developed and approved.<br>4. Some components (e.g., prehospital) of the trauma system, or facilities within it, have completed a gap analysis based on the adopted standards.<br>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 the trauma system, in terms of years of productive life lost (YPLL), quality-adjusted life years (QALY), disability-adjusted life years (DALY), and so on, are described. | 0. Not known<br>1. There are no cost data available to the system to compare to quality of life indicators.<br>2. Trauma system costs are included in the trauma management information system that can serve as the basis for these calculations.<br>3. Additional sources of data, in terms of other economic and quality of life measures, are available.<br>4. Cost and quality of life measures can be analyzed and presented in descriptive and graphic form.<br>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. | 0. Not known<br>1. No effort is made to gather, catalogue, or report cases that document the societal benefit of the trauma system so that the community sees and hears the benefit of the trauma system to society. Such cases, for example, document descriptive information on dramatic "saves" within the trauma system.<br>2. Dramatic saves and functional outcome returns are documented at each facility or within various components of the system.<br>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.<br>4. Dramatic saves and functional outcome returns are provided to, and reported by, the press.<br>5. Cases are used as part of information fact sheets that are distributed to the press and other segments of the community. These information fact sheets document the cost-benefit of the trauma system to 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. | 0. Not known<br>1. There is no routine or planned contact with the media.<br>2. Plans are in place to feed information to the media in response to a particular traumatic event.<br>3. The media have been formally asked about what types of information would be helpful in reporting on trauma cases and issues.<br>4. Information resources for the media have been developed, based on the stated needs of the media; media representatives are included in trauma system informational events.<br>5. In addition to routine media contact, the media are involved in various oversight activities such as local, regional, and State trauma advisory councils. |

Essential Service: *System Management*

| Indicator | Scoring |
|---|---|
| 105.4 An assessment of the needs of public officials concerning trauma system information has been conducted. | 0. Not known<br>1. There is no routine or planned contact with public officials.<br>2. Plans are in place to provide information to public officials in response to a particular traumatic event.<br>3. 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.<br>4. Information resources for public officials have been developed, based on the stated needs of the public officials; public officials are included in trauma system informational events.<br>5. In addition to routine contact, public officials are involved in various oversight activities such as local, regional, and State trauma advisory councils. |

Essential Service: *System Management*

| Indicator | Scoring |
|---|---|
| 105.5 An assessment of the needs of the general public concerning trauma system information has been conducted. | 0. Not known<br>1. There is no routine or planned contact with the general public.<br>2. Plans are in place to provide information to the general public in response to a particular traumatic event.<br>3. The general public has been formally asked about what types of information would be helpful in understanding and supporting trauma system issues.<br>4. Information resources for the general public have been developed, based on the stated needs of the general public; general public representatives are included in trauma system informational events.<br>5. In addition to routine contact, the general public is involved in various oversight activities such as local, regional, and State trauma advisory councils. |

Essential Service: *System Management*

| Indicator | Scoring |
|---|---|
| 105.6 An assessment of the needs of health insurers concerning trauma system information has been conducted. | 0. Not known<br>1. There is no routine or planned contact with health insurers.<br>2. Plans are in place to provide information to health insurers during a response to a particular payment, reimbursement, and cost issue.<br>3. Health insurers have been formally asked about what types of information would be helpful in reporting on trauma cases and issues.<br>4. Information resources for health insurers have been developed, based on the stated needs of the insurers; insurance representatives are included in trauma system informational events.<br>5. In addition to routine contact, health insurers are involved in various oversight activities such as local, regional, and State trauma advisory councils. |

Essential Service: *System Management*

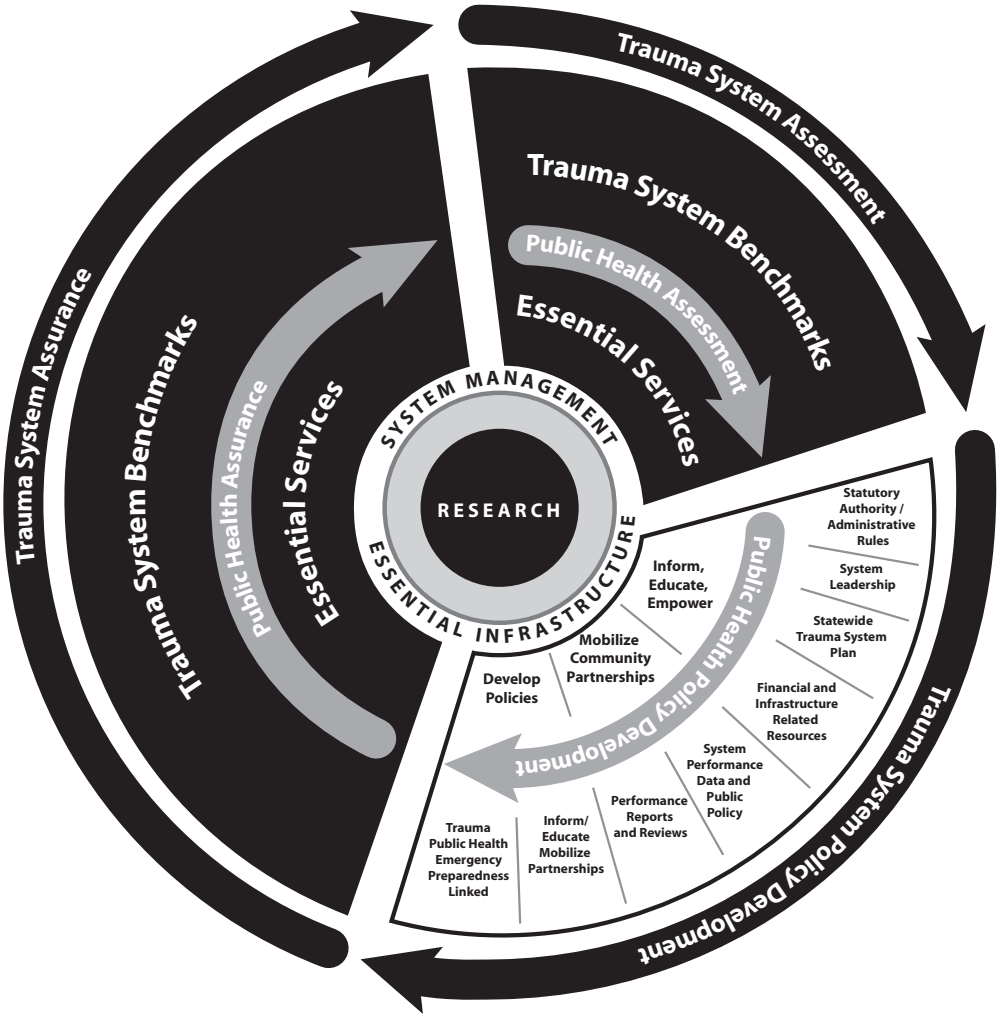
| Indicator | Scoring |
|---|---|
| 105.7 An assessment of the needs of the general medical community, including physicians, nurses, prehospital care providers, and others, concerning trauma system information, has been conducted. | 0. Not known<br>1. There is no routine or planned contact with the broad medical community.<br>2. Plans are in place to provide information to the broad medical community in response to a particular trauma system event or issue.<br>3. The broad medical community has been formally asked about what types of information would be helpful in reporting on trauma cases and issues.<br>4. Information resources for the general medical community have been developed, based on the stated needs of the general medical community; general medical community representatives are included in trauma system informational events.<br>5. In addition to routine contact, the broad medical community is involved in various oversight activities such as local, regional, and State trauma advisory councils. |

## 100. Assessment

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

# 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 ensuring the public's health and safety.*



## 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 ensuring the public's health and safety.*

## BENCHMARK

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

Essential Service: *Develop Policies*

| Indicator | Scoring |
|---|---|
| 201.1 The 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. | 0. Not known<br>1. There is no specific legislative authority to plan, develop, implement, manage, and evaluate, or fund, the trauma system and its component parts.<br>2. There is legislative authority for establishing a trauma system, and specific timelines for adoption are being drafted and reviewed by trauma and injury constituencies.<br>3. The lead agency is identified in State statute and is required to plan and develop a statewide trauma system.<br>4. The lead agency is authorized to take actions to implement the trauma system and to report on the progress and effectiveness of system implementation.<br>5. The lead agency is required to plan, develop, implement, 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, incident management, and planning documents, work together for the effective implementation of the trauma system (infrastructure is in place). | 0. Not known<br>1. There is no legislative authority or integrated management, and system participants do not routinely work together.<br>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.<br>3. There is no legislative authority, but people are working together to improve system effectiveness and management within their individual jurisdictions.<br>4. There is legislative authority, although it is not clearly evident that system components are integrated and working together.<br>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/regulations direct the development of operational policies and procedures at the State, regional, and local levels. | 0. Not known<br>1. There is no legal authority to adopt administrative rules/regulations regarding the development of a trauma system at the State, regional, or local level.<br>2. There is legal authority, but there are no administrative rules/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 all-hazards preparedness plans.<br>3. There are draft State, regional, or local rules/regulations for the different components of trauma system development including integration with public health and all-hazards preparedness plans.<br>4. There are existing statewide administrative rules/regulations for planning, developing, and implementing the trauma system and its components at the State, regional, and local levels.<br>5. The lead agency regularly reviews, through established committees and stakeholders, the rules/regulations governing system performance, including policies and procedures for system operations at the State, regional, and local levels that include integration with public health and all-hazards preparedness plans. |

Essential Service: *Develop Policies*

| Indicator | Scoring |
|---|---|
| 201.4 The lead agency has adopted clearly defined trauma system standards (e.g., facility standards, triage and transfer guidelines, and data collection standards) and has sufficient legal authority to ensure and enforce compliance. | 0. Not known<br>1. The lead agency does not have sufficient legal authority and has not adopted or defined trauma system performance and operating standards, nor is there sufficient legal authority to do so.<br>2. Sufficient authority exists to define and adopt standards for trauma system performance and operations, but the lead agency has not yet completed this process.<br>3. There is sufficient legal authority to adopt and implement operation and performance standards including enforcement. Draft process procedures have been developed.<br>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.<br>5. The authority exists; operational policies and procedures and trauma system performance standards are in place; and compliance is being actively monitored. |

## *BENCHMARK*

### 202. Trauma system leaders (lead agency, trauma center personnel, and other stakeholders) use a process to establish, maintain, and constantly evaluate and improve a comprehensive trauma system in cooperation with medical, professional, governmental, and citizen organizations.

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. | 0. Not known<br>1. There is no evidence of partnerships, alliances, or organizations working together to implement and maintain a comprehensive trauma system.<br>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.<br>3. The lead agency has multiple committees meeting regularly to develop and implement a comprehensive trauma system plan.<br>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 and education).<br>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 trauma-specific statewide multidisciplinary, multi-agency advisory committee. |

## 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 ensuring the public's health and safety.*

Essential Service: *Mobilize Community Partnership*

| Indicator | Scoring |
|---|---|
| 202.2 The lead agency has developed and implemented a trauma-specific statewide multidisciplinary, multi-agency advisory 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. | 0. Not known<br>1. There is no trauma-specific statewide multidisciplinary, multi-agency advisory committee providing guidance to the State lead agency in planning and developing a statewide trauma system.<br>2. There is no trauma-specific statewide multidisciplinary, multi-agency advisory committee, and attempts to organize one have not been successful but are continuing.<br>3. There is a trauma-specific statewide multidisciplinary, multi-agency advisory committee, but its meetings are infrequent and guidance is not always sought or available. Collaborative working arrangements have not been realized.<br>4. There is a trauma-specific statewide multidisciplinary, multi-agency advisory committee. Committee members and stakeholders regularly attend meetings. Collaboration and consensus are beginning.<br>5. There is a trauma-specific multidisciplinary, multi-agency advisory 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 on system issues. Multiple subcommittees meet as often as necessary to resolve specific system issues and to report back to the trauma-specific statewide multidisciplinary, multi-agency 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. | 0. Not known<br>1. There is no defined decision-making process (written policy and procedure) regarding the trauma program within the trauma system lead agency or its committees.<br>2. There is an unwritten decision-making process that stakeholders use when convenient, although not regularly or consistently.<br>3. The decision-making process is articulated within the State Trauma System Plan, although it has not been fully implemented. Policies are not written.<br>4. The decision-making process is contained within the trauma system plan, and there are current policies and procedures in place to guide decision making. Use of the decision-making process is infrequent.<br>5. There is a clearly defined process for making decisions affecting the trauma program. The process is articulated in the trauma system plan and is further identified within system policies. Stakeholders know and understand the process and use it to resolve issues and to improve the program. |

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 202.4 Trauma system leaders have adopted and use goals and time-specific, quantifiable, and measurable objectives for the trauma system. | 0. Not known<br>1. There are no goals or time-specific, quantifiable, and measurable objectives for the trauma system.<br>2. Trauma system leaders have met to discuss time-specific, quantifiable goals.<br>3. Trauma system leaders are beginning the process of identifying measurable program goals and outcome-based, time-specific, quantifiable, and measurable objectives.<br>4. Trauma system leaders have adopted goals and time-specific, quantifiable, and measurable objectives that guide system performance.<br>5. Trauma system leaders, in consultation with their trauma-specific statewide multidisciplinary, multi-agency advisory committee, have established measurable program goals and outcome-based, time-specific, quantifiable, and measurable objectives that 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 incident 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 a trauma-specific multidisciplinary, multi-agency advisory committee, has adopted a trauma system plan. | 0. Not known<br>1. There is no trauma system plan, and one is not in progress.<br>2. There is no trauma system plan, although some groups have begun meeting to discuss the development of a trauma system plan.<br>3. A trauma system plan was developed and adopted by the lead agency. The plan, however, has not been endorsed by trauma stakeholders.<br>4. A trauma system plan has been adopted, developed with multi-agency groups, and endorsed by those agencies.<br>5. A comprehensive trauma system plan has been developed, adopted in conjunction with trauma stakeholders, and includes the integration of other systems (e.g., EMS, public health, and emergency preparedness). |

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 203.2 A trauma system plan exists and is based on analysis of the trauma demographics and resource assessments. | 0. Not known<br>1. There is no effort under way to develop a trauma system plan.<br>2. The lead agency is developing a trauma system plan without reference to the trauma demographics and resource assessments and analyses.<br>3. The lead agency is actively developing a trauma system plan based on trauma demographics and resource assessments and analyses.<br>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 preparedness plans.<br>5. The trauma system plan is updated at least biennially based on changes in trauma demographics and resource assessments and analyses. It is reviewed for integration of other relevant plans such as EMS, emergency preparedness, and public health. |

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 203.3 There is within the trauma system plan congruence of the population demographics with system development and resource allocation priorities.<br><br>Note: Needs of specific populations (e.g., pediatric, burn, and Native American) are integrated into the plan. Considerations should be given to age, population characteristics, and urban and rural environments. | 0. Not known<br>1. There is no evidence that population demographics drive resource allocation or that this information is used to establish system priorities in developing or implementing the trauma system plan.<br>2. Population demographics and system resources have been identified. It is not clear that this information is used for system allocation, priority setting, or system planning.<br>3. There is evidence that planning processes take into consideration the needs of special populations and other cultural or geographic parameters.<br>4. There is evidence within the trauma system plan that consideration of the needs of differing groups, cultural, geographic, and others, has been included. Specific application of information regarding the needs of special groups is occurring at the provider level.<br>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. For example, the plan includes references to regulatory standards and documents, and includes methods of data collection and analysis. | 0. Not known<br>1. There is no trauma system plan.<br>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 all-hazards preparedness, EMS, or public health integration.<br>3. The trauma system plan provides general information about all the components including all-hazards preparedness, EMS, and public health integration; however, it is difficult to determine who is responsible and accountable for system performance and implementation.<br>4. The trauma system plan addresses every component of a well-organized and functioning trauma system including all-hazards 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.<br>5. The trauma system 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. | 0. Not known<br>1. There is no written plan for a coordinated injury prevention and control program.<br>2. There are multiple injury prevention and control programs that may conflict with one another or with the goals of the trauma system, or both.<br>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.<br>4. The injury prevention and control plan is being implemented in accordance with established timelines.<br>5. The injury prevention and control plan is being implemented in accordance with established 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 emergency preparedness plans (all hazards). | 0. Not known<br>1. There is no trauma system plan and no integration between trauma and emergency preparedness.<br>2. There is an established trauma system plan; but it is silent on emergency integration, and no evidence is present to demonstrate integrated incident management and trauma systems.<br>3. The trauma system plan addresses the interaction of the lead agency of the trauma system and emergency preparedness service system. Close coordination and clearly defined goals and objectives are in process.<br>4. The trauma system plan addresses coordination between the lead agency of the trauma system and the lead agency for emergency preparedness. Plans are integrated, and working collaboration exists and is demonstrated. Routine working drills and training exercises are incorporated into operational plans.<br>5. The trauma system plan addresses the lead agency coordination between EMS and emergency preparedness. Plans are well integrated, and routine simulated incident 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, and public health preparedness plans. | 0. Not known<br>1. There is no mention of integration between the trauma system plan and the EMS, emergency, and public health preparedness plans.<br>2. There is some cross-reference between plans, but defined methods of working collaboratively are not developed.<br>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.<br>4. The trauma system plan has been integrated with other relevant plans. There is evidence of system integration activity.<br>5. The trauma system planning and operations have been fully integrated with the EMS, emergency, and public health preparedness plans. 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.) | 0. Not known<br>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.<br>2. The trauma system plan addresses resource needs and identifies gaps in resources within the trauma system, but no mechanism for correcting resource deficiencies has been identified.<br>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.<br>4. Resource needs are clearly identified, and action plans are being implemented to correct deficiencies in both clinical areas and administrative support functions.<br>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. | 0. Not known<br>1. There is no funding to support the trauma system planning, implementation, or ongoing management and operations for either trauma system administration or trauma clinical care.<br>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.<br>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.<br>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.<br>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 planning, implementation, maintenance, and ongoing program enhancements. |

Essential Service: *System Management*

| Indicator | Scoring |
|---|---|
| 204.3 Designated funding for trauma system infrastructure support (lead agency) is legislatively appropriated.<br><br>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. | 0. Not known<br>1. There is no designated funding to support the trauma system infrastructure.<br>2. One-time funding has been designated for trauma system infrastructure support, and appropriations have been made to the lead agency budget.<br>3. Limited funds for trauma system development have been identified, but the funds have not been appropriated for trauma system infrastructure support.<br>4. Consistent, though limited, infrastructure funding has been designated and appropriated to the lead agency budget.<br>5. The legislature has identified, 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 the communication system. | 0. Not known<br>1. There are no operational budgets.<br>2. There are limited operational budgets, not sufficient to cover related program costs for the lead agency, the EMS system, or the trauma center.<br>3. There are operational budgets that may be sufficient to cover most program costs, but they are without regard to the trauma system plan or priorities.<br>4. There are operational budgets that have some ties to the trauma system plan and that include consideration for the extraordinary costs to the trauma system (e.g., providers).<br>5. An operational budget exists for each component in the plan and matches system needs and priorities with program 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 incidents. | 0. Not known<br>1. The trauma system plan does not include the identification of additional resources necessary to respond to mass casualty incidents.<br>2. The trauma system plan addresses mass casualty incidents but has not identified additional resources.<br>3. The trauma system plan identifies resources, but it is unclear how the needs are going to be met.<br>4. The trauma system plan identifies both equipment and manpower resources available currently and additional resources needed; it also defines a process for securing and ensuring that equipment and human resources are available.<br>5. There is a well-drafted and rehearsed trauma system 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. | 0. Not known<br>1. There is no central data repository that can be accessed for strategic or budgetary planning.<br>2. There are varying databases that can be accessed but no single reporting structure to produce reports and to analyze findings.<br>3. Data are collected and stored in a central repository; however, reports are not routinely generated that could be used for strategic or budgetary planning.<br>4. There is a central warehouse for trauma and system financial data that are used for annual reporting of system performance.<br>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.<br>**Note:** The format of the reports in this and other sections may be written, Web-based, or other electronic media. | 0. Not known<br>1. There are no written, quantifiable trauma system performance standards or performance improvement mechanisms.<br>2. There are draft written, quantifiable system performance standards or performance improvement mechanisms for each component of the trauma system.<br>3. There are written, quantifiable system performance standards and performance improvement mechanisms that have been adopted by the lead agency in consultation with the trauma-specific statewide multidisciplinary, multi-agency advisory committee.<br>4. Data from trauma, EMS, 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.<br>5. The lead agency, in cooperation with the trauma-specific statewide multidisciplinary, multi-agency advisory committee, uses compliance data from trauma, EMS, public safety, and other sources to improve 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 management information system (MIS) 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. | 0. Not known<br>1. There is no trauma management information system.<br>2. There is a limited trauma management 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.<br>3. There is a trauma management 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.<br>4. Routine trauma MIS 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.<br>5. Trauma MIS reports are used extensively to improve and report on system performance. The lead agency issues regular and routine reports to providers. Trauma leaders assess reports to determine system deficiencies and to allocate resources to areas of greatest need. System performance and standard compliance are assessed and reported. |

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 205.4 Injury prevention programs use trauma MIS data to develop intervention strategies. | 0. Not known<br>1. There is no evidence to suggest that trauma MIS data are used to determine injury prevention strategies.<br>2. There is some evidence that trauma MIS data are available for injury prevention program strategies, but the use of these data is limited and sporadic.<br>3. Trauma MIS 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 program strategies and decision making.<br>4. Trauma MIS 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.<br>5. A well-integrated trauma and injury reporting system exists. Evidence is available to demonstrate how system providers routinely use MIS data 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 MIS data. | 0. Not known<br>1. There is no correlation between training programs for providers and the trauma management information system.<br>2. There is limited use of trauma MIS reports to target educational opportunities.<br>3. There is evidence that some providers are using trauma MIS reports to identify educational needs and to incorporate them into training programs.<br>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 trauma MIS reports.<br>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 MIS data are used to measure outcomes and effectiveness. |

## *BENCHMARK*

**206. Trauma system leaders, including a trauma-specific statewide multidisciplinary, multi-agency advisory committee, regularly review system performance reports.**

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 206.1 Trauma data reports are generated by the trauma system no less than once per year and are disseminated to trauma system leaders and stakeholders to evaluate and improve system performance effectiveness. | 0. Not known<br>1. No trauma data reports are generated to evaluate and improve system performance effectiveness.<br>2. Some general trauma system information is available for the stakeholders, but it is not consistent or regular.<br>3. Trauma data reports are done on an annual basis, but are not used for decision making and evaluating system effectiveness.<br>4. Routine reports are generated using trauma system data and other databases so that the system can be analyzed, standards evaluated, and performance measured.<br>5. Regularly scheduled reports are generated from trauma system data and are used by the stakeholder groups to evaluate and improve system performance effectiveness. |

## 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 ensuring the public's health and safety.*

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 206.2 The trauma-specific statewide multidisciplinary, multi-agency advisory 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. | 0. Not known<br>1. There is no trauma-specific statewide multidisciplinary, multi-agency advisory committee, and there are no regular reports of system performance.<br>2. There is a trauma-specific statewide multidisciplinary, multi-agency advisory committee, but it does not routinely review trauma system data reports.<br>3. The trauma-specific statewide multidisciplinary, multi-agency committee meets regularly and reviews process-type reports; no critical assessment of system performance has been completed.<br>4. The trauma-specific statewide multidisciplinary, multi-agency advisory committee meets regularly and routinely assesses reports from trauma data to determine system compliance and operational issues needing attention.<br>5. The trauma-specific statewide multidisciplinary, multi-agency advisory committee and related stakeholder groups meet regularly and review trauma data reports to assess system performance over time, 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, regional, and local systems. | 0. Not known<br>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).<br>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.<br>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.<br>4. The lead agency, through its multidisciplinary committee, engages in open, 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.<br>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 between 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. |

## 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 ensuring the public's health and safety.*

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 207.2 The trauma system leaders (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. | 0. Not known<br>1. No targeted messaging or media campaigns have begun to educate and inform community and State leaders or policy makers about either injury prevention needs or trauma system development activities.<br>2. Limited interfaces with policy makers and the media, aimed at both injury prevention and trauma system development, have occurred. Community development activities have been limited to incident-specific response opportunities.<br>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.<br>4. Trauma system leaders are 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.<br>5. A well-orchestrated and continuing trauma media campaign is under way. 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 Trauma system leaders (lead agency; trauma-specific statewide multidisciplinary, multi-agency advisory committees; and others) mobilize 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. | 0. Not known<br>1. No State lead agency exists to establish, maintain, or mobilize community partners in identifying the injury problem or in building community coalitions.<br>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.<br>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-specific statewide multidisciplinary, multi-agency advisory committee or trauma system leaders (government, acute care, or rehabilitation) has been limited.<br>4. Trauma system leaders (lead agency; trauma-specific statewide multidisciplinary, multi-agency advisory committees; and others) for injury prevention have 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 trauma-specific statewide multidisciplinary, multi-agency advisory committee. Trauma system and injury prevention leaders have begun to identify strategies and are working collaboratively. Key policy makers are well informed about the burden of injury in the State.<br>5. Trauma system and injury prevention leaders regularly inform and educate policy makers on trauma system development and injury prevention. Injury coalitions and trauma-specific statewide multidisciplinary, multi-agency advisory committees are integrated and work collaboratively to inform the community and to educate community leaders. |

## 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 ensuring the public's health and safety.*

Essential Service: *Inform, Educate, Empower*

| Indicator | Scoring |
|---|---|
| 207.4 A trauma system public information and education plan exists that heightens public awareness of trauma as a disease, the need for a trauma care system, and the prevention of injury. | 0. Not known<br>1. There is no written public information and education plan on trauma system or injury prevention and control.<br>2. There is a trauma system public information and education plan, but linkages between programs and implementation of specific objectives have waned.<br>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.<br>4. The trauma system public information and education plan are being implemented in accordance with the timelines established and agreed on by the stakeholders and coalitions.<br>5. The trauma system public information and education plan are 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. | 0. Not known<br>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, and evaluation, for acute or chronic traumatic injury and injury prevention has not been integrated with the trauma system.<br>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.<br>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.<br>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.<br>5. The trauma system and the public health system are integrated. Routine reporting, program 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 to and notification of incidents, integrated data systems, communication cross-operability, and regular epidemiology report generation.) |

## 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 ensuring the public's health and safety.*

Essential Service: *Mobilize Community Partnerships*

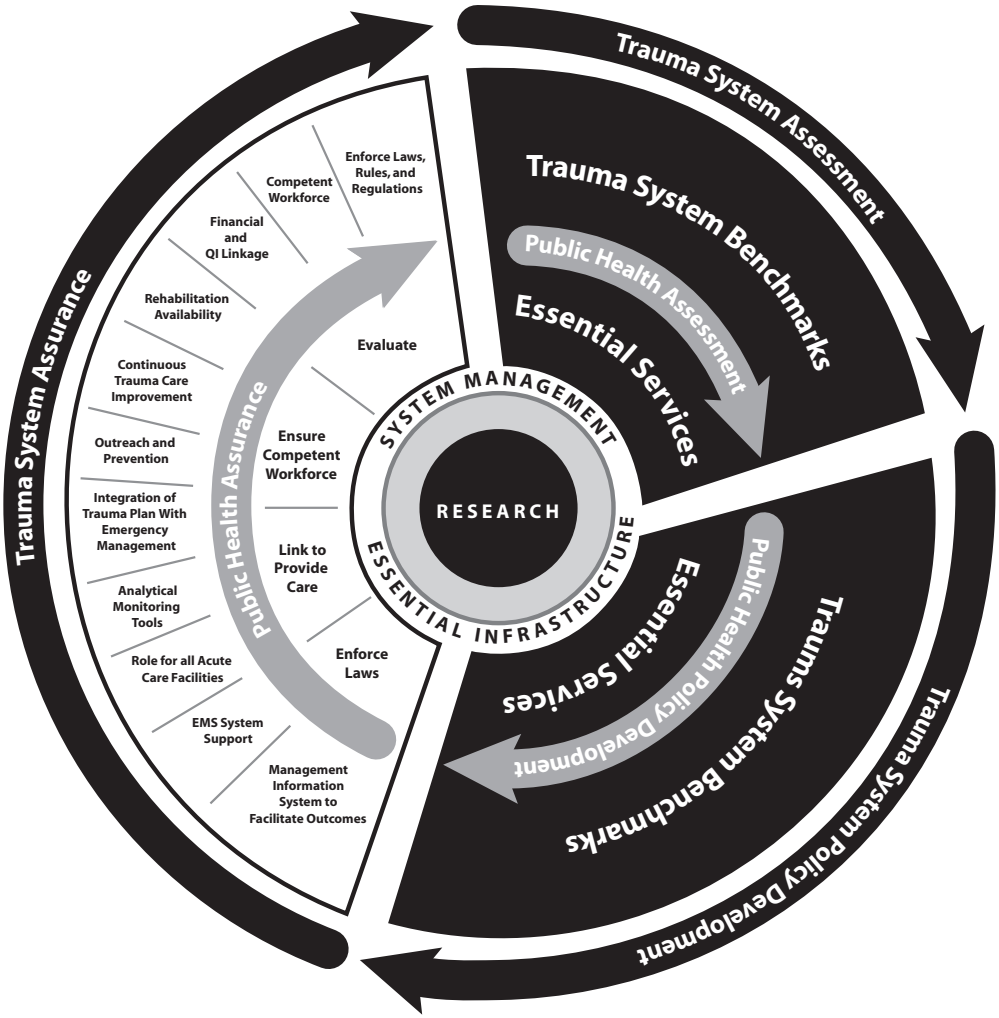
| Indicator | Scoring |
|---|---|
| 208.2 The incident management and trauma systems have formal established linkages for system integration and operational management. | 0. Not known<br>1. There are no formal established linkages for system integration or operational management between the incident management and trauma systems.<br>2. There are limited linkages or interfaces between the incident management and trauma systems specific to mass casualties.<br>3. Plans are in place for both incident management 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.<br>4. There is evidence of program linkages between the incident management and trauma systems. Operational management guidelines exist and are routinely evaluated and tested.<br>5. Strong program linkages and interfaces are present. The incident management and trauma systems 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 incident management system are shared. |

## 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 ensuring the public's health and safety.*

# 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.*



## 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. | 0. Not known<br>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.<br>2. There is a trauma registry system in place in the trauma centers, but it is used by neither all facilities within the system nor the lead trauma authority to assess system performance.<br>3. The trauma management information system contains information from all facilities within a geographic area.<br>4. The trauma management information system is used by the trauma centers to assess provider and system performance issues.<br>5. Hospital trauma registry data are routinely submitted to the lead trauma authority, are aggregated, 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. | 0. Not known<br>1. There is no jurisdiction-wide prehospital data collection.<br>2. Prehospital care providers have a patient care record for each episode of care, but it is not yet automated or integrated with the trauma management information system.<br>3. The prehospital patient care record electronically captures patient care provided by field personnel and can be transferred or entered into the trauma registry system within individual trauma centers.<br>4. The prehospital patient data system is integrated into the trauma management information system and is used by prehospital and hospital personnel to review and evaluate prehospital and system performance.<br>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 (ED), prehospital, rehabilitation, and other databases are linked or combined to create a trauma system registry. | 0. Not known<br>1. Some trauma registry and prehospital patient records are manually entered into a database when needed to answer system questions. There is no rehabilitation registry.<br>2. There are databases for trauma, emergency departments, prehospital, and rehabilitation as well as statewide injury databases. None of the databases are routinely linked.<br>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.<br>4. There is an integrated management information 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.<br>5. There is an integrated management information system that includes, at a minimum, trauma, ED, prehospital, 9-1-1 dispatch, and rehabilitation databases that are regularly used by the lead trauma authority and system provider agencies to monitor trauma system performance. |

Essential Service: *Evaluation*

| Indicator | Scoring |
|---|---|
| 301.4 The lead 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 programs within the trauma system. | 0. Not known<br>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.<br>2. There are integrated computer/technology systems, but the development and use of those systems for analytical monitoring and reporting has not yet begun.<br>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.<br>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.<br>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 communications, 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.<br><br>**Note:** The EMS system medical director and the trauma medical director may, in fact, be the same person. | 0. Not known<br>1. There is no medical oversight for EMS providers within the trauma system.<br>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.<br>3. The EMS and trauma medical directors have integrated prehospital medical oversight for prehospital personnel caring for trauma patients.<br>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 on-line and off-line medical oversight.<br>5. The EMS and trauma system fully integrate the most up-to-date medical oversight and regularly evaluate program effectiveness. 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 physician leaders (e.g., trauma medical director within each trauma center) and the EMS system medical director. | 0. Not known<br>1. The trauma specialty physician leaders and the EMS system medical director provide conflicting medical oversight to emergency care providers.<br>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.<br>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 system medical director meet or visit informally to resolve problems, "to plan strategies," and to coordinate efforts.<br>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.<br>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 performance improvement system, to restrict the practice of prehospital care providers, and to generally ensure medical appropriateness of the EMS system. | 0. Not known<br>1. There is no EMS system medical director.<br>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 those tasks.<br>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 performance improvement program, and is generally taking steps to improve the medical appropriateness of the EMS system.<br>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.<br>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 performance improvement program, is restricting the practice of prehospital care providers, 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: *Ensure 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 ensure they are congruent with the trauma system design. These protocols include, but are not limited to, which resources to dispatch, for example, Advanced Life Support (ALS) versus Basic Life Support (BLS), air-ground coordination, early notification of the trauma care facility, pre-arrival instructions, and other procedures necessary to ensure resources dispatched are consistent with the needs of injured patients.<br><br>Note: The trauma system medical director and the EMS system medical director may be the same person. However, specific responsibility for, and oversight of, the trauma system must be ensured. | 0. Not known<br>1. There are no trauma system dispatch protocols.<br>2. Trauma system dispatch protocols have been adopted, but without regard to the design of the trauma system.<br>3. Trauma system 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.<br>4. Trauma system dispatch protocols have been developed in close coordination with the trauma system medical director and are congruent with the trauma system design.<br>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 performance improvement and a "feedback loop" 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, communications, treatment, and transport is closely coordinated with the established performance improvement processes of the trauma system. | 0. Not known<br>1. There is no retrospective medical oversight procedure for trauma triage, communications, treatment, and transport.<br>2. There is a retrospective medical oversight procedure for trauma triage, communications, 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.<br>3. There is a retrospective medical oversight procedure for trauma triage, communications, treatment, and transport by the performance improvement processes of the trauma system or by the EMS system; however, this procedure is not coordinated.<br>4. By the performance improvement processes of the trauma system, there is retrospective medical oversight for trauma triage, communications, treatment, and transport that is coordinated with the EMS system retrospective medical direction, or by performance improvement processes of the EMS system that are coordinated by the trauma system.<br>5. There is retrospective medical oversight of the trauma triage, communications, treatment, and transport that is coordinated with the EMS system retrospective medical direction. 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. | 0. Not known<br>1. There are no mandatory universal triage criteria to ensure trauma patients are transported to the most appropriate hospital.<br>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.<br>3. Universal triage criteria are in the process of being linked to the management information system for future evaluation.<br>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 in ensuring that they are transported to the appropriate facility.<br>5. System participants routinely evaluate the triage criteria for effectiveness. There is linkage with the trauma system, and sensitivity and specificity (over- and under-triage rates) of the tools used are 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 communication system for the EMS/trauma system to ensure field-to-facility bidirectional communications, interfacility dialogue, and all-hazards response communications among all system participants.<br><br>**Note:** In some systems with limited resources, for example, rural, the available resources are, at least initially, the "appropriate resources." | 0. Not known<br>1. There is no universal access number (9-1-1) for easy citizen access to the EMS/trauma system and no coordinated communication system for triage, treatment, and transport of trauma patients for either single or multiple patient encounters.<br>2. There is a universal access number (9-1-1) for quick citizen access to care. However, there is no coordinated communication system within a jurisdiction to allow for communications to occur among system participants either routinely or during all-hazards events.<br>3. There are a universal access number (9-1-1) and a central communication system for quick citizen access to care. A communication plan for the trauma system has been completed.<br>4. The universal access number (9-1-1) and central communication system are integrated and communications regularly occur among dispatch, field providers, hospitals, and other system providers. The communication plan is implemented. Evaluation of the effectiveness of the communication system is done routinely, and corrective action is implemented as needed.<br>5. A state-of-the-art electronic communication system is available within the jurisdiction. The trauma system communication plan is integrated with other system plans. The system is also available in all-hazards responses 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 communication 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. | 0. Not known<br>1. There is no coordination of transportation resources within a jurisdiction. Multiple ambulances or aeromedical providers, or both, can all arrive on scene unannounced.<br>2. There is a priority dispatch system in place that sends transportation resources to the scene.<br>3. There is a priority dispatch system that ensures appropriate resources arrive on scene promptly and transport patients to the hospital. A plan for transporting trauma patients from the field to the hospital has been completed.<br>4. There is a priority dispatch and transportation system that ensures appropriate system resources for prompt transport of trauma patients to trauma centers. A trauma transportation plan has been implemented. System issues are evaluated, and corrective plans are implemented as needed.<br>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 patients by using the correct mode of transportation. The transportation system is part of the overall EMS, trauma, and all-hazards response 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. | 0. Not known<br>1. There are no specific communication plans or procedures to ensure communications among medical facilities when arranging for interfacility patient transfers.<br>2. Interfacility communication procedures are generally included in the patient transfer protocols for each medical facility, but there is no system-wide procedure.<br>3. There are uniform, system-wide procedures to facilitate communications among medical facilities when arranging for interfacility patient transfers, but there are no redundant procedures in the event of power or other communication system failures.<br>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 communication system failures.<br>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 communication system failures. The effectiveness of these procedures is regularly reviewed and changes made, if necessary, during the performance improvement process. |

Essential Service: *Link To Provide Care*

| Indicator | Scoring |
|---|---|
| 302.10 There are established procedures for EMS and trauma system communications in an all-hazards or major EMS incident that are effectively coordinated with the overall all-hazards response plan for the jurisdiction. | 0. Not known<br>1. There are no written procedures for EMS and trauma system communications in the event of an all-hazards incident.<br>2. Local EMS systems have written procedures for EMS communications in the event of an all-hazards or major EMS incident. However, there is no coordination among the local jurisdictions.<br>3. There are statewide or regional EMS communication procedures in the event of an all-hazards or major EMS incident. These plans do not involve other jurisdictions and are not coordinated with the overall all-hazards response plan and incident management system.<br>4. There are statewide or regional EMS communication procedures in the event of an all-hazards or major EMS incident that are coordinated with other jurisdictions, with the overall all-hazards response plan, and with the incident management system.<br>5. There are statewide or regional EMS communication procedures in the event of an all-hazards or major EMS incident that are coordinated with other jurisdictions, with the overall all-hazards response plan, and with the incident management system. There are one or more communication system redundancies. These procedures are regularly tested in simulated incident drills, and changes are 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 roles and responsibilities of all acute care facilities treating trauma and of facilities that provide care to specialty populations (e.g., burn, pediatric, spinal cord injury, and others). | 0. Not known<br>1. There is no trauma system plan that outlines roles and responsibilities of all acute care facilities treating trauma and of facilities that provide care to special populations.<br>2. There is a trauma system plan, but it does not address the roles and responsibilities of licensed acute care and specialty care facilities.<br>3. The trauma system plan addresses the roles and responsibilities of licensed acute care facilities or specialty care facilities, but not both.<br>4. The trauma system plan addresses the roles and responsibilities of licensed acute care facilities and specialty care facilities.<br>5. The trauma system plan clearly defines the roles and responsibilities of all acute care facilities treating trauma within the system jurisdiction. Specialty care 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 that the number, levels, and distribution of trauma centers required to meet system demand are available. | 0. Not known<br>1. There is no trauma system plan to identify the number, levels, and distribution of trauma centers required to meet system demand.<br>2. There is a trauma system plan, but it does not identify the number, levels, or distribution of trauma centers needed for the jurisdiction served.<br>3. There is a trauma system plan that identifies the number, levels, and distribution of trauma centers needed for the jurisdiction. The plan, however, is not based on available data.<br>4. There is a trauma system plan that identifies the number and levels of trauma centers needed based on actual available data. However, this plan is not used to make decisions about trauma facility designations.<br>5. There is a trauma system plan that identifies the number and levels of trauma centers based on needs identified through the needs assessment process. The plan is used to make decisions about trauma center designations and should account for facility resources and their geographic distribution, population densities, injured patient volumes, and transportation resource capabilities and 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. | 0. Not known<br>1. There is no requirement for trauma facilities to monitor patient outcomes and quality of care.<br>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.<br>3. Designated trauma facilities are required to maintain a trauma registry and to use data from the registry in an ongoing performance improvement program to monitor and to improve the quality of care and patient outcomes.<br>4. Designated trauma facilities are required to maintain a trauma registry including patient outcomes, to use these data in an ongoing performance improvement program, to provide regular comparisons to local trauma system standards, and to report those findings to the lead trauma authority.<br>5. Designated trauma facilities are required to maintain a trauma registry including patient outcomes, to use these data in an ongoing 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 these variations. |

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. | 0. Not known<br>1. There is no system to regularly review the conformity of interfacility transfers within the trauma system according to pre-established procedures.<br>2. There is a fragmented system, usually event based, to monitor the interfacility transfer of trauma patients.<br>3. The system for monitoring interfacility transfers is new, the procedures are in place, but training has yet to occur.<br>4. There is an organized system of monitoring interfacility transfers within the trauma system.<br>5. The monitoring of interfacility transfers of trauma patients has been integrated into the overall program of system performance 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, for example, English As a Second Language (EASL), socially disadvantaged, migrant/transient, remote, rural, and others, are accommodated within the existing trauma system. | 0. Not known<br>1. There has been no consideration of the specific needs of unique populations, for example, EASL, in making an impact on the patient's access to care within the trauma system.<br>2. The lead agency and stakeholders are beginning to consider the specific needs of unique populations in implementing the trauma system.<br>3. The lead agency has, within the trauma system plan, identified the unique populations that may require special accommodations with the trauma system to effectively meet their needs.<br>4. The lead agency has, within the trauma system plan, accommodations for unique populations that allow them to effectively access trauma care. Monitoring processes are in development.<br>5. The trauma system has accommodated the specific needs of unique populations by allowing 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 prevention and trauma care in State, regional, or local areas.<br>**Note:** Annual reports may be distributed electronically rather than, or in addition to, printed copies. | 0. Not known<br>1. No annual reports are available on the status of injury prevention or trauma care in State, regional, or local areas.<br>2. Annual reports are prepared but are not based on input from providers and other key stakeholders.<br>3. Annual reports are written by the lead agency with input from the trauma centers.<br>4. Annual reports are written by the lead agency in conjunction with the trauma centers and other stakeholders. Multiple sub-reports on the status of trauma care and injury prevention in State, regional, or local areas are distributed throughout the year.<br>5. There is an integrated annual reporting system that is electronically available to stakeholders. The lead agency, along with partner organizations, prepares and disseminates regular annual reports on the status of injury prevention and trauma care in 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, prehospital 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.<br>Note: All legal requirements for confidentiality and safeguarding of patient information must be met when sharing data between or among agencies. | 0. Not known<br>1. There is no sharing of databases between emergency department, trauma, prehospital, medical examiner, or public health epidemiology.<br>2. The databases can be accessed by only the owner of the data, and sharing of information goes through a formal request process.<br>3. There is concurrent access to the databases (emergency department, trauma, prehospital medical examiner, and public health epidemiology) but no sharing of databases that would support public health surveillance.<br>4. The databases are shared among emergency department, trauma, prehospital, medical examiner, and public health epidemiology. Access issues have been resolved, and epidemiologic monitoring is beginning to routinely monitor the data for unusual events.<br>5. The databases of emergency departments, trauma, prehospital, 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 ensures that its trauma system plan is integrated with, and complementary to, the comprehensive mass casualty plan for both natural and man-made incidents, including an all-hazards approach to planning and operations.**

Essential Service: *Link To Provide Care*

| Indicator | Scoring |
|---|---|
| 305.1 The EMS, the trauma system, and the all-hazards medical response system have operational trauma and all-hazards response plans and have established an ongoing cooperative working relationship to ensure trauma system readiness to all-hazards events. | 0. Not known<br>1. There is no system for integration between the EMS, the trauma system, and the all-hazards response system.<br>2. There have been some discussions between the EMS, the trauma system, and the all-hazards medical response system, but no formal plans have been developed.<br>3. Formal plans for the EMS, the trauma system, and the all-hazards medical response systems integration are in development and have started the approval process. Working relationships have formed and cooperation is evident.<br>4. There are plans in place to ensure that the EMS, the trauma system, and the all-hazards medical response system are integrated and operational. All-hazards exercises and simulated incident drills have the cooperation and participation of the trauma system.<br>5. The EMS, the trauma system, and all-hazards response plans are integrated and operational. Routine working relationships are present with cooperation and sharing of information to improve trauma system readiness for all-hazards responses. |

Essential Service: *Evaluation*

| Indicator | Scoring |
|---|---|
| 305.2 All-hazards events 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. | 0. Not known<br>1. All-hazards training is not a routine part of the trauma system.<br>2. Training in response to all hazards is solely the responsibility of the EMS and of emergency management agencies. Trauma response has not been integrated into the system.<br>3. All-hazards exercises are conducted routinely and include both trauma and EMS response capabilities.<br>4. The trauma, EMS, and public health stakeholders have begun exercises in an all-hazards approach to mass casualty incidents.<br>5. Exercises and training in all-hazards responses including testing of facility/clinic surge capacity are regularly conducted with trauma, EMS, and public health stakeholders. Debriefing sessions occur after each drill or event. |

Essential Service: *Link To Provide Care*

| Indicator | Scoring |
|---|---|
| 305.3 The trauma system, through the lead agency, has access to additional equipment, materials, and personnel for large-scale traumatic events.<br>Note: The lead agency will work with other appropriate national, State, regional, and local agencies to secure these additional resources. | 0. Not known<br>1. There is no surge capacity (prehospital, hospital, clinic, or coroner) built into the system for either smaller multi-patient events or mass casualty incidents.<br>2. The trauma system has begun to identify additional equipment, materials, and personnel needed to respond to all-hazards events in light of new threats and emergencies.<br>3. The lead agency, working with the trauma stakeholders, has in place additional equipment and materials for mass casualty incidents. A process to utilize additional personnel resources is in development. Testing of newly acquired equipment, material, and personnel resources has not yet been completed.<br>4. The lead agency, in conjunction with the trauma stakeholders, has begun to test a method of deploying additional equipment, materials, and personnel during all-hazards events.<br>5. The lead agency has acquired additional equipment and materials for both the prehospital and hospital response to all-hazards 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 general medical community and other system participants in their research findings and performance improvement efforts. | 0. Not known<br>1. There is no evidence that the trauma system reaches out to the general medical community at large to integrate it into trauma system improvements.<br>2. There is some evidence of general medical community interface with the trauma centers, but it is sporadic and not well coordinated.<br>3. The trauma system can demonstrate routine interface with the general medical community regarding trauma care updates and performance improvements.<br>4. The trauma system has a formal mechanism to discuss trauma care, system improvements, and research results with the general medical community within its jurisdiction.<br>5. There is strong evidence of active participation between the trauma system and the general medical community. Routine discussions are held; performance 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 community-based activities and injury prevention and response programs. | 0. Not known<br>1. There is no active participation by the trauma system in the evaluation of community-based activities and injury prevention and response programs.<br>2. There is some activity by the trauma system in the evaluation of community-based activities and injury prevention and response programs.<br>3. The trauma system evaluates community-based activities and injury prevention and response programs.<br>4. The trauma system is an active participant in community activities and in injury prevention and response programs, including the evaluation of program effectiveness.<br>5. The trauma system has integrated community-based activities and injury prevention and response programs with similar efforts 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 training/support and prevention activities) is evaluated as part of a system performance improvement process.<br><br>**Note:** "Evaluation" implies both informal evaluation processes and more structured research. | 0. Not known<br>1. There is no effort by the lead agency to review the efforts of the trauma centers in either medical community training/support or prevention activities.<br>2. There is no routine evaluation of medical community training/support or prevention activities accruing within the jurisdiction.<br>3. Trauma centers do internal monitoring and evaluations of their efforts in medical community training/support and prevention activities.<br>4. The lead agency participates with trauma centers in evaluating their efforts in medical community training/support and prevention activities. The outreach programs are regularly assessed for effectiveness.<br>5. The lead agency and trauma centers routinely use the data both to implement outreach 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 programs. |

## *BENCHMARK*

**307. To maintain its State, regional, or local designation, each hospital will 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 all licensed acute care facilities that provide trauma care to trauma patients and designated trauma hospitals. Such evaluation involves independent external reviews. | 0. Not known<br>1. There is no ongoing mechanism for the trauma system to assess or evaluate the quality of trauma care delivered by all licensed acute care facilities that provide trauma care to trauma patients and designated trauma hospitals.<br>2. There is a mechanism for the trauma system to evaluate trauma care services in designated trauma hospitals through internal performance improvement processes.<br>3. There is a mechanism to evaluate trauma care services across the entire trauma care system through performance improvement processes.<br>4. Review of trauma care quality is both internal (through routine monitoring and evaluation) and external (through independent review during redesignation or reverification of trauma centers).<br>5. Quality of trauma care is ensured 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.<br>Note: This process may include clinical and bench research. | 0. Not known<br>1. There is no evidence that the trauma system engages in any review of patient care outcome data to evaluate its performance against national norms.<br>2. There is some standardized measurement of outcomes for trauma patients within the trauma system and applied to the trauma centers.<br>3. Through the 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 performance improvement committee reports.<br>4. The trauma system has established standardized measurements of trauma patient care 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.<br>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 regular 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 services including interfacility transfer of trauma patients to rehabilitation centers. | 0. Not known<br>1. There are no written standards or plans for the integration of rehabilitation services with the trauma system or with trauma centers.<br>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.<br>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.<br>4. The trauma system plan incorporates rehabilitation services throughout the continuum of care. Trauma centers have actively included rehabilitation services and their programs in trauma patient care plans.<br>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 ensure quality outcomes for trauma patients. |

Essential Service: *Evaluation*

| Indicator | Scoring |
|---|---|
| 308.2 Rehabilitation centers and out-patient rehabilitation services provide data on trauma patients to the central trauma system registry that include final disposition, functional outcome, and rehabilitation costs and also participate in performance improvement processes. | 0. Not known<br>1. There is no requirement for the rehabilitation centers or out-patient rehabilitation services to contribute data on trauma patient outcomes.<br>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 the central trauma system registry.<br>3. Rehabilitation centers and out-patient rehabilitation services are integrated into the trauma plan, and rehabilitation care is begun early in the patient's treatment plan within the acute care hospital. Data submission to the central trauma system registry is yet to be realized.<br>4. Some trauma centers and rehabilitation facilities and out-patient rehabilitation services have close links, and integration of services is routine. Data sharing between individual trauma centers and rehabilitation centers and services is accomplished, and some integration with the central trauma system registry is ongoing. Rehabilitation personnel participate in trauma system performance improvement processes.<br>5. The trauma plan integrates rehabilitation centers and out-patient rehabilitation services. Trauma centers integrate rehabilitation care early in the patient's treatment plan. Rehabilitation data, including final disposition, functional outcome, and rehabilitation costs, are collected. These data are routinely submitted to trauma centers and to the central trauma system registry for inclusion in system evaluation reports. Rehabilitation personnel are fully integrated into trauma system performance improvement processes. |

## BENCHMARK

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

Essential Service: *Evaluation*

| Indicator | Scoring |
|---|---|
| 309.1 Cost data are collected and provided to the trauma system registry for each major component including prevention, prehospital, acute care, all-hazards response planning, and rehabilitation. | 0. Not known<br>1. No cost data are collected.<br>2. Administrative and program cost data are collected and included in the annual trauma system report.<br>3. In addition to administrative and program costs, clinical charges and costs are included in one or more major component areas and are provided to the trauma system registry for inclusion in the annual trauma system report.<br>4. The costs associated with individual system components, for example, prehospital, can be determined and are provided to the trauma system registry for inclusion in the annual trauma system report.<br>5. The cost of an aggregate system can be determined and is provided to the trauma system registry for inclusion in 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. Common definitions exist for collection and reimbursement data and are submitted by each agency. | 0. Not known<br>1. Collection and reimbursement data are not gathered, nor do common definitions exist.<br>2. Common definitions exist, and collection and reimbursement data are available and reported to the lead agency for one or more clinical components.<br>3. Common definitions exist. Collection and reimbursement data are available and reported to the lead agency for one or more clinical components, and are compared to cost data for those components.<br>4. Common definitions exist. Collection and reimbursement data are available and reported to the lead agency for all clinical components, and are compared to cost data for those components.<br>5. Common definitions exist. Collection and reimbursement data are available and reported to the lead agency for all 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.<br><br>**Note:** "Outside" financial data means costs that may not routinely be captured in trauma center or registry data, for example, transportation, communications, training, infrastructure, and the overall cost of readiness. | **0.** Not known<br>**1.** No outside financial data are captured.<br>**2.** Outside financial data are collected from one or more sources (e.g., Medicaid or private insurers).<br>**3.** Extensive financial data, for example, cost, charge, collection, and reimbursement, are collected from one or more sources. Sufficient expertise is available to the trauma system to analyze and report complex fiscal data.<br>**4.** Outside financial data are combined with internal trauma system data and are used to estimate total system costs.<br>**5.** Outside financial data are combined with internal trauma system data and are used to estimate total system costs. These financial data are described in detail in the annual trauma system report. |

Essential Service: *Evaluation*

| Indicator | Scoring |
|---|---|
| **309.4** Financial data are combined with other cost, outcome, or surrogate measures, for example, years of potential life (YPLL), quality—adjusted life years (QALY), and disability—adjusted life years (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. | **0.** Not known<br>**1.** No nonfinancial burden of disease costs and outcome measures are collected or modeled.<br>**2.** Estimated savings using various burdens of disease costs or outcome measure models are calculated for all injury prevention programs.<br>**3.** Estimated savings using various burdens of disease costs or outcome measure models are calculated for actual system costs.<br>**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.<br>**5.** Estimated savings using various burdens of disease costs or outcome measure models are calculated for all injury prevention programs, are combined with actual system cost data to determine costs and savings of the total system, and are described in detail in the annual trauma system report. |

## BENCHMARK

### 310. The lead trauma authority ensures a competent workforce.

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.1 In cooperation with the prehospital certification and licensure authority, set guidelines for prehospital personnel for initial and ongoing trauma training including trauma-specific courses and those courses that are readily available throughout the State. | 0. Not known<br>1. There are no trauma training guidelines for prehospital personnel as part of initial or ongoing certification or licensure.<br>2. Trauma training is incorporated into initial prehospital training programs following the National Highway Traffic Safety Administration (NHTSA) curricula.<br>3. Prehospital personnel are offered trauma training during their initial education, and specialty trauma continuing education courses are available periodically.<br>4. Prehospital trauma continuing education courses are regularly scheduled throughout the State.<br>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: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.2 In cooperation with the prehospital certification and licensure authority, ensure that prehospital personnel who routinely provide care to trauma patients have a current trauma training certificate, for example, PHTLS, BTLS, and others, or that trauma training needs are driven by the performance improvement process. | 0. Not known<br>1. There is no mechanism to ensure that prehospital personnel, for example, Emergency Medical Technicians (EMTs) routinely providing care to trauma patients are certified in PHTLS and BTLS or have completed other trauma training.<br>2. There is a requirement for EMTs routinely providing care to trauma patients to complete a certification course in trauma; however, no mechanism to ensure compliance has been instituted.<br>3. There is a requirement for EMTs providing care to trauma patients to complete a prehospital trauma course. Compliance with training requirements is the responsibility of the employing agency as part of the quality assurance process.<br>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.<br>5. Regular 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 (e.g., trauma center, lead agency, and licensing body) to ensure a collectively competent prehospital workforce in issues of trauma care. |

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.3 As part of the established standards, set appropriate levels of trauma training for nursing personnel who routinely care for trauma patients in acute care facilities. | 0. Not known<br>1. There are no trauma training standards for nursing personnel who routinely care for trauma patients in acute care facilities, for example, 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.<br>2. There are trauma training standards for nursing personnel but no requirement for them to attend courses or to achieve certifications.<br>3. There are trauma training standards for nursing personnel written into the trauma plan.<br>4. There are trauma training standards (and associated rules/regulations) for nursing personnel written into the trauma plan, and nurses who care for trauma patients attend trauma training courses.<br>5. Nursing personnel working in 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 performance improvement and subsequent training opportunities. |

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.4 Ensure that appropriate, approved trauma training courses are provided for nursing personnel on a regular basis. | 0. Not known<br>1. There is no mechanism to provide appropriate, approved trauma training courses for nursing personnel throughout the jurisdiction.<br>2. There is a process to provide appropriate, approved trauma training courses for nursing personnel, but courses are sporadic and uncoordinated with needs.<br>3. There are appropriate, approved trauma training courses for nursing personnel throughout the jurisdiction.<br>4. Appropriate trauma training courses for nursing personnel have been approved and are provided regularly. There are initial trauma courses and opportunities for special courses as needed.<br>5. Appropriate trauma training courses for nursing personnel have been approved and are provided regularly 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: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.5 In cooperation with the nursing licensure authority, ensure that all nursing personnel who routinely provide care to trauma patients have a current trauma training certificate (e.g., ATCN, TNCC, or any national or State trauma nurse verification course). As an alternative after initial trauma course completion, training can be driven by the performance improvement process. | 0. Not known<br>1. There is no mechanism to ensure that nurses providing care to trauma patients are certified in an ATCN, TNCC, or any national or State trauma nurse verification course.<br>2. There is a requirement for nurse verification in trauma; however, no mechanism to ensure compliance has been instituted.<br>3. There is a requirement for nurse verification in trauma for nursing personnel who routinely provide care to trauma patients. Compliance with training requirements is the responsibility of the trauma center as part of the quality assurance process.<br>4. Requirements for nurse verification in trauma are provided by the trauma centers and the lead agency. Monitoring compliance with meeting the requirement is beginning.<br>5. Courses for nurse verification in trauma are 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 ensure a collectively competent nursing workforce in issues of trauma care. |

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.6 As part of the established standards, set appropriate levels of trauma training for physicians who routinely care for trauma patients in acute care facilities. | 0. Not known<br>1. There are no trauma training standards for physicians who routinely care for trauma patients in acute care facilities.<br>2. There are physician trauma training standards but no mechanism to ensure course attendance or successful completion.<br>3. There are physician trauma training standards written into the trauma plan.<br>4. There are physician trauma training standards written into the trauma plan, and physicians who care for trauma patients participate in trauma training.<br>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: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.7 Ensure that appropriate, approved trauma training courses are provided for physicians on a regular basis. | 0. Not known<br>1. There is no mechanism to approve or provide appropriate trauma training courses for physicians throughout the jurisdiction.<br>2. There is a process to provide appropriate, approved trauma training courses for physicians, but courses are sporadic and uncoordinated with needs.<br>3. There are appropriate, approved trauma training courses provided regularly for physicians.<br>4. Trauma courses appropriate for physicians have been approved and are provided regularly. There are initial trauma courses and opportunities for special courses as needed.<br>5. Trauma courses for physicians are provided regularly 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: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.8 In cooperation with the physician licensure authority, ensure that physicians who routinely provide care to trauma patients have a current trauma training certificate of completion, for example, Advanced Trauma Life Support (ATLS) and others. Alternatively, physicians may maintain trauma competence through continuing medical education programs after initial ATLS completion. | 0. Not known<br>1. There is no mechanism to ensure that physicians who routinely provide care to trauma patients are certified in ATLS.<br>2. There is a requirement for ATLS for physicians who provide trauma care; however, no mechanism to ensure compliance has been instituted.<br>3. There is a requirement for ATLS for physicians who provide trauma care. Compliance with trauma course completion is the responsibility of the trauma center as part of the quality assurance process.<br>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 requirements is beginning.<br>5. Regular 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 ensure a collectively competent physician workforce in issues of trauma care. |

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.9 Conduct at least one multidisciplinary trauma conference annually that encourages system and team approaches to trauma care. | 0. Not known<br>1. There are no multidisciplinary trauma conferences conducted within geographic boundaries of the trauma system.<br>2. There are sporadic multidisciplinary trauma conferences conducted.<br>3. Multidisciplinary trauma conferences are conducted occasionally, and attendance by trauma practitioners is monitored and reviewed.<br>4. Multidisciplinary trauma conferences are conducted at least annually.<br>5. Multidisciplinary (EMS, physicians, nurses, physiatrists, policy makers, consumers, and others) trauma conferences are conducted regularly; new findings from quality assurance and performance improvement processes are shared; and the conferences are open to all practitioners within the system. Regular attendance is required. |

Essential Service: *Ensure 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. | 0. Not known<br>1. There is no structured mechanism to inform or educate personnel in new protocols or treatment approaches within the jurisdiction.<br>2. A structured mechanism is in place to inform or educate personnel in new protocols or treatment approaches, but it has not been tried or tested.<br>3. A structured mechanism is in place to inform personnel in new protocols or treatment approaches as changes in the system are identified.<br>4. A structured mechanism is in place to educate personnel in new protocols and treatment approaches.<br>5. A structured mechanism exists to educate personnel in new protocols and treatment approaches in a timely manner, and there is a method to monitor compliance with new procedures as they are instituted. |

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.11 There are mechanisms within the system performance improvement processes to identify and correct systemic personnel deficiencies within the trauma system.<br><br>Note: Systemic personnel deficiencies are those that cut across multiple agencies and institutions and impact the system as a whole. For 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 performance improvement issues. | 0. Not known<br>1. There is no mechanism to identify, through performance improvement processes, systemic personnel deficiencies within the trauma system.<br>2. The trauma system has begun to identify systemic personnel deficiencies.<br>3. The trauma system has a mechanism to identify systemic personnel deficiencies and is working on a process for corrective action.<br>4. The trauma system has a mechanism to identify systemic personnel deficiencies and is instituting corrective actions across the system.<br>5. Trauma stakeholders, including trauma centers and the lead agency, monitor and correct personnel deficiencies as identified through quality assurance and performance improvement processes. A method of corrective action has been instituted, and appropriate followup is occurring. Monitoring of system deficiencies and corrective actions is ongoing. |

Essential Service: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.12 There are mechanisms in place within agency and institutional performance improvement processes to identify and correct deficiencies in trauma care practice patterns of individual practitioners (e.g., EMTs, paramedics, nurses, physicians, and others) within the trauma system. | 0. Not known<br>1. There is no mechanism in place to routinely assess the deficiencies in trauma care practice patterns of individual practitioners (e.g., EMTs, paramedics, nurses, physicians, and others) within the trauma system.<br>2. The trauma system has begun a process to evaluate deficiencies in trauma care practice patterns of individual practitioners.<br>3. A mechanism is in place to monitor and report on deficiencies in practice patterns of individual practitioners within the trauma system. The process is evolving as part of the quality assurance and performance improvement processes.<br>4. There is a well-defined process to assess care provided by practitioners within the trauma system. The quality assurance and performance improvement processes identify deficiencies, and corrective action plans are instituted.<br>5. Practice patterns of individual practitioners performing 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: *Ensure Competent Workforce*

| Indicator | Scoring |
|---|---|
| 310.13 There is authority for a trauma medical director, and a clear job description, including requisite education, training, and certification, for this position.<br>**Note:** The trauma medical director and the EMS system medical director may be the same person. | 0. Not known<br>1. There is no requirement for a trauma medical director, and no job description has been developed.<br>2. There is authority for a trauma medical director, but no job description has been developed.<br>3. There is authority for a trauma medical director, and a job description is under development. Approval to hire is pending.<br>4. There is authority for a trauma medical director. The plan to hire one has been developed along with a comprehensive job description, including requisite education, training, and certification.<br>5. There is authority for a trauma medical director, and the job description, including requisite education, training, and certification, 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 agency acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to the trauma system.**

Essential Service: *Enforce Laws*

| Indicator | Scoring |
|---|---|
| 311.1 The lead agency works in conjunction with the prehospital regulatory agency to ensure that prehospital care is provided by licensed agencies that 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).<br>**Note:** In many cases, the lead agency and the prehospital regulatory agency are the same entity. | 0. Not known<br>1. There is no evidence that the lead agency and the prehospital regulatory agency work together to ensure appropriate provider agency licensure and compliance.<br>2. The lead agency refers complaints concerning issues of prehospital agency performance to the prehospital regulatory agency.<br>3. The trauma system lead agency and the prehospital regulatory agency work together to resolve complaints involving prehospital agencies that relate to trauma systemperformance.<br>4. The trauma system and the prehospital regulatory agency work together to monitor compliance of prehospital provider agencies with any rules, regulations, or protocols specific to prehospital trauma delivery.<br>5. The prehospital regulatory agency, working cooperatively with the lead agency, is involved in ongoing trauma system performance improvement processes and prehospital 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). |

Essential Service: *Enforce Laws*

| Indicator | Scoring |
|---|---|
| 311.2 The lead agency refers issues of personnel noncompliance with trauma laws, rules, and regulations to appropriate boards or licensure authorities. | 0. Not known<br>1. Individual personnel performance is not monitored.<br>2. Complaints about individual personnel noncompliance with trauma laws, rules, and regulations go directly to appropriate boards or licensure authorities.<br>3. Trauma authority personnel collaborate actively with licensure authorities to resolve complaints involving individual personnel noncompliance with trauma laws, rules, and regulations.<br>4. Individual personnel performance issues are addressed within trauma performance improvement processes unless they involve breaches of State or Federal statute.<br>5. Appropriate boards or licensure authorities are involved in the system performance improvement processes addressing individual personnel performance issues. |

Essential Service: *Enforce Laws*

| Indicator | Scoring |
|---|---|
| 311.3 The lead agency enforces laws, rules, and regulations concerning the verification of trauma centers, including the ability to de-designate trauma facilities for matters of noncompliance. | 0. Not known<br>1. The lead agency does not have the authority to de-designate trauma facilities for matters of noncompliance.<br>2. The lead agency has the authority to de-designate trauma facilities for matters of noncompliance but does not monitor facility performance.<br>3. The lead agency has the authority to de-designate trauma facilities for matters of noncompliance and monitors facility performance.<br>4. The lead 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.<br>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 revised to continually strengthen and improve the trauma system. | 0. Not known<br>1. There is no process for examining laws, rules, or regulations.<br>2. Laws, rules, and regulations are reviewed and revised only in response to a "crisis" (e.g., malpractice insurance costs).<br>3. Laws, rules, and regulations are reviewed and revised on a periodic schedule (e.g., every 5 years).<br>4. Laws, rules, and regulations are reviewed by agency personnel on a continuous basis and are revised as needed.<br>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 system components to ensure compliance with various laws, rules, and regulations pertaining to their role and performance within the trauma system. | 0. Not known<br>1. The lead agency does not have the authority to evaluate all system components (e.g., prehospital).<br>2. Complaints concerning individual component performance within the trauma system go directly to the licensure agency responsible for that component.<br>3. Trauma agency personnel collaborate actively with licensure agencies to resolve complaints involving component performance within the trauma system.<br>4. Deficiencies in individual system components are addressed as part of the trauma system performance improvement process.<br>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, is 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 agencies and institutions to seek State or nationally recognized accreditation in areas that will contribute to overall improvement across the trauma system, for example, Commission on Accreditation of Ambulance Services (CAAS) for prehospital agencies, Council on Allied Health Education Accreditation (CAHEA) for training programs, and American College of Surgeons (ACS) verification for trauma facilities. | 0. Not known<br>1. There are no incentives for outside review and accreditation.<br>2. Accreditation processes are generally encouraged but are not specifically acknowledged; for example, no special dispensation is offered to agencies or institutions completing such accreditation.<br>3. Accreditation processes are strongly encouraged, and some incentives are provided, for example, extension of EMS agency review from 2 years to 3 years after CAAS accreditation.<br>4. Incentives are provided to agencies that successfully complete outside accreditation processes, for example, acceptance of CAAS accreditation instead of local EMS agency review.<br>5. As part of the system performance improvement process, the impact of outside review and accreditation on various agencies and institutions is monitored, and incentives are provided as appropriate. |

## 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.*

## REFERENCES


1. Centers for Disease Control and Prevention (1994). Ten essential public health services. Retrieved on September 7, 2005, from http://www.cdc.gov/od/ocphp/nphpsp/EssentialPHServices.htm
2. Centers for Disease Control and Prevention (2005). All injuries. Fast stats A to Z. Retrieved on August 24, 2005, from http://www.cdc.gov/nchs/fastats/injury.htm
3. Morrison, W., Wright, J. L., & Paidas, C. N. (2002). Pediatric trauma systems. Critical Care Medicine, 30 (11, Suppl), S448–S456.
4. Centers for Disease Control and Prevention, National Center for Health Statistics (2005). NCHS data on injuries. Retrieved on August 24, 2005, from http://www.cdc.gov/nchs/data/factsheets/injury.pdf
5. National Center for Injury Prevention and Control (2005). Years of potential life lost (YPLL) before age 65, 2002 United States, all races, both sexes, all deaths. Retrieved on August 24, 2004, from http://webappa.cdc.gov/cgi-bin/broker.exe
6. Vyrostek, S. B., Annest, J. L., & Ryan, G. W. (2004, September 3). Surveillance for fatal and nonfatal injuries—United States, 2001. In Surveillance summaries. Morbidity and Mortality Weekly Report, 53 (No. SS-7), 2–11.
7. Centers for Disease Control and Prevention, National Center for Health Statistics (2003). All injuries. Retrieved on August 24, 2005, from http://www.cdc.gov/nchs/faststats/injury.htm
8. Centers for Disease Control and Prevention, National Center for Health Statistics (2005). NCHS data on injuries. Retrieved on August 24, 2005, from http://www.cdc.gov/nchs/data/factsheets/injury.pdf
9. Heinen, M., Hall, M. J., Boudreault, M. A., & Fingerhut, L. A. (2005). National trends in injury hospitalizations, 1979–2001. Hyattsville, MD: National Center for Health Statistics.
10. National Safe Kids Campaign (2003). Report to the nation: Trends in unintentional childhood injury mortality, 1987–2000. Washington, DC: Author.
11. National Center for Injury Prevention and Control (2001). Injury fact book 2001–2002. Atlanta, GA: Centers for Disease Control and Prevention. Retrieved on August 24, 2005, from http://www.cdc.gov/ncipc/fact_book/factbook.htm
12. Centers for Disease Control and Prevention (2004). Medical expenditures attributable to injuries—United States, 2000. Morbidity and Mortality Weekly Report, 53(01), 1–4.
13. National Center for Injury Prevention and Control (2001). Injury fact book 2001–2002. Atlanta, GA: Centers for Disease Control and Prevention. Retrieved on August 24, 2005, from http://www.cdc.gov/ncipc/fact_book/factbook.htm
14. National Research Council (1966). Accidental death and disability: The neglected disease of modern society. Washington, DC: National Academy of Sciences.
15. Coalition for American Trauma Care. (2005). American College of Surgeons, Coalition, and other trauma organizations to sponsor Roll Call ad. Retrieved on October 28, 2005, from http://www.aast.org/CATV/Coalition051905.html#rollcall
16. Branas, C. C., MacKenzie, E. J., Williams, J. C., Schwab, C. W., Teter, H. M., Flanagan, M. C., et al. (2005, June 1). Access to trauma centers in the United States. Journal of the American Medical Association, 293(21), 2626–2633.

17. National Highway Traffic Safety Administration (2004). Trauma system agenda for the future. DOT HS 809 675. Washington, DC: U.S. Department of Transportation.
18. U.S. Department of Health and Human Services. (2000, November). Healthy People 2010: Understanding and improving health. 2nd ed. Washington, DC: U.S. Government Printing Office, http://www.healthypeople.gov
19. Highway Safety Act of 1996 (PL 89–564, September 9, 1966).
20. Emergency Medical Services Systems Act of 1973 (PL 93–154, November 16, 1973).
21. West, J. G., Trunkey, D. D. & Lim, R. C. (1979). Systems of trauma care. A study of two counties. Archives of Surgery, 114(4), 455–460.
22. O'Keefe, G. E., Jurkovich, G. J., Copass, M., & Maier, R. V. (1999). Ten-year trend in survival and resource utilization at a level 1 trauma center. Annals of Surgery, 229(3), 409–415.
23. The Trauma Systems Planning and Development Act of 1990 (PL 101–590, 1990).
24. Health Resources and Services Administration (1992). Model trauma care system plan. Rockville, MD: Author.
25. Committee on Trauma, American College of Surgeons (1998). Resources for optimal care of the injured patient: 1999. Chicago: Author.
26. Trauma-EMS Systems Program (2003). A 2002 national assessment of State trauma system development, emergency medical services resources, and disaster readiness for mass casualty events. Rockville, MD: U.S. Department of Health and Human Services, Health Resources and Services Administration.
27. National Research Council (1985). Injury in America: A continuing public health problem. Washington, DC: National Academy Press.
28. Institute of Medicine (1988). The future of public health. Washington, DC: National Academy Press, 1.
29. ——— (2003). The future of the public's health. Washington, DC: National Academy Press, 28.
30. ——— (1988). The future of public health. Washington, DC: National Academy Press, 42.
31. ——— (2003). The future of the public's health. Washington, DC: National Academy Press, 28.
32. ——— (2003). The future of the public's health. Washington, DC: National Academy Press, 31.
33. Haddon, W., Jr. (1968). The changing approach to the epidemiology, prevention, and amelioration of trauma: The transition to approaches etiologically rather than descriptively based. American Journal of Public Health, 58(8), 1431–1438.
34. Haddon, W., Jr. (1980). Options for the prevention of motor vehicle crash injury. Israel Journal of Medicine, 16, 45–68.
35. Runyan, C. W. (1998). Using the Haddon Matrix: Introducing the third dimension. Injury Prevention, 4, 302–307.
36. Institute of Medicine (1999). Reducing the burden of injury: Advancing prevention and treatment. Washington, DC: National Academy Press.
37. Institute of Medicine (1988). The future of public health. Washington, DC: National Academy Press.
38. Public Health Functions Steering Committee (1994). The public health workforce: An agenda for the 21st century. Full Report of the Public Health Functions Project. U.S. Department of Health and Human Services.
39. Esposito, T. J. (2000). Trauma and trauma care systems in the throes of an identity crisis. Archives of Surgery, 135, 716–719.

40. ——— (2000). Trauma and trauma care systems in the throes of an identity crisis. Archives of Surgery, 135, 716–719.

41. National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. (2003). Behavior Risk Factor Surveillance System. Retrieved on January 3, 2005, from http://www.cdc.gov/BRFSS/about.htm

42. Brener, N. D., Kann, L., Kinchen, S. A., Grunbaum, J. A., Whalen, L., et al. (2004). Methodology of the Youth Risk Behavior Surveillance System. Morbidity and Mortality Weekly Report, 53(RR12), 1–13.

43. Health Insurance Portability and Accountability Act of 1996, Public Law 104–191.

44. Committee on Trauma, American College of Surgeons. (1998). Resources for the optimal care of the injured patient: 1999. Chicago: Author.

45. American Burn Association. (1999). Burn unit referral criteria. Retrieved January 6, 2006, from http://www.ameriburn.org/BurnUnitReferral.pdf.

46. Trauma Care Systems Planning and Development Act of 1990, Public Law No. 101-590, 104 Stat. 2915 (1990).

47. Public Health Security and Bioterrorism Preparedness and Response Act of 2002, Public Law No. 107-188, 116 Stat. 594 (2002).

48. Washington Hospital Center. (2005). ER One, Retrieved January 6, 2006, from http://www.whcenter.org/1227/cfm.

49. Health Resources and Services Administration. (2005). Emergency Systems for Advance Registration of Health Professional Volunteers, Retrieved January 6, 2006, from http://www.hrsa.gov/bioterrorism/esarvhp/.

50. Centers for Disease Control and Prevention. (2005). Strategic National Stockpile Program. Retrieved on November 7, 2005, from http://www.bt.cdc.gov/stockpile/

51. U.S. Department of Homeland Security. (2005). National Disaster Medical System, Disaster Medical Assistance Teams. Retrieved on November 7, 2005, from http://www.oep-ndms.dhhs.gov/dmat.html

52. Agency for Healthcare Research and Quality (2005, April). Altered standards of care in mass casualty events: bioterrorism and other public health emergencies. AHRQ Publication No. 05-0043. Rockville, MD: Author. Retrieved on November 9, 2005, from http://www.ahrq.gov/research/altstand/

53. Office of the Press Secretary, The White House (Feb. 28, 2003). Management of domestic incidents. Homeland Security Presidential Directive/HSPD-5. Retrieved on November 9, 2005, from http://www.whitehouse.gov/news/releases/2003/02/20030228-9.html

54. U.S. Department of Homeland Security. (2004). National Incident Management System. Retrieved on November 7, 2005, from http://www.dhs.gov/interweb/assetlibrary/NIMS-90-web.pdf

55. Federal Emergency Management Agency. (2005). FEMA Independent Study Program: IS-700 National Incident Management System (NIMS), http://training.fema.gov/emiweb/IS/is700.asp, accessed 11-9-2005.

56. U.S. Department of Homeland Security. (2005). National Response Plan fact sheet, Retrieved on November 9, 2005, from http://www.dhs.gov/interweb/assetlibrary/NRP_FactSheet_2005

57. U.S. Department of Homeland Security. (2004). National Response Plan Emergency Support Function Annexes, pp 115–233. Retrieved on November 7, 2005, from http://www.dhs.gov/interweb/assetlibrary/NRP_FullText.pdf

58. Federal Emergency Management Agency. (2005). FEMA Independent Study Program: IS-100 Introduction to Incident Command System, I-100. Retrieved on November 9, 2005, from http://training.fema.gov/emiweb/IS/is100.asp

59. American Hospital Association. (2005). Hospital Emergency Incident Command System. Retrieved on November 7, 2005, from http://www.hospitalconnect.com/aha/key_issues/disaster_readiness/readiness/MaIncidentB1107.htm

60. ASTM International. (2004). Standard Guide for Hospital Preparedness and Response, E2413-04. Retrieved on November 7, 2005, from http://www.techstreet.com/cgi-bin/detail?product_id=1188325

61. ASTM International. (2003). Standard Guide for Planning for and Response to a Multiple Casualty Incident, F1288-90. Retrieved on November 7, 2005, from http://www.techstreet.com/cgi-bin/detail?product_id=1132710

62. ASTM International. (2003). Standard Guide for Organization and Operation of Emergency Medical Services Systems, F1339-92. Retrieved on November 7, 2005, from http://www.techstreet.com/cgi-bin/detail?product_id=1132711

63. Geberding, J.H. (2003). 2004 Budget Hearing on Terrorism Preparedness and Emergency Response at CDC, Chemical Terrorism Preparedness and Response. Retrieved on November 7, 2005, from http://www.cdc.gov/washington/testimony/bt040903.htm

64. Committee on Trauma, American College of Surgeons. (1998). Resources for optimal care of the injured patient: 1999. Chicago: Author.

65. American Burn Association. (2002). Burn center verification. Retrieved on November 7, 2005, from http://www.ameriburn.org/pub/BurnCenterVerification.htm

66. Trauma-EMS Systems Program (2003). A 2002 national assessment of State trauma system development, emergency medical services resources, and disaster readiness for mass casualty events. Rockville, MD: U.S. Department of Health and Human Services, Health Resources and Services Administration.

67. Federal Emergency Management Agency. (2004). State and local preparedness guidance. Retrieved on November 9, 2005, from http://www.fema.gov/preparedness/state_local_prepare-guide.shtm

68. Bonnie, R. J., Fulco, C. E., & Liverman, C. T. (Eds.) (1999). Reducing the burden of injury, Washington, DC: National Academy Press, p. 156.

69. Taheri, P. A., Butz, D. A., Lottenberg, L., Clawson, A., & Flint, L. M. (2004). The cost of trauma center readiness. American Journal of Surgery, 187(1), 7-13.

70. Selzer, D. (2001). Public hospital-based level I trauma centers: Financial survival in the new millennium. Journal of Trauma, 51(2), 301-307.

71. _____. (2004). Trauma system agenda for the future. (DOT HS 809 675), Washington, DC: National Highway Traffic Safety Administration, p. 25.

72. Eads Role, S., & Belli, K. (2004). State trauma care systems: Revenue statutes organized by topic, Silver Spring, MD: Trauma-EMS Technical Assistance Center.

# APPENDIX A

**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 exists for statewide trauma systems to respond effectively and to be able to minimize injury, death, and disability.

Source of Data: CDC, National 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 B

## 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, nursing care modeled after that established by Florence Nightingale in the Crimean War, is introduced.[1] |
| 1872 | The American Public Health Association is established.[6] |
| 1895 | William Roentgen advances the diagnosis of traumatic wounds with the invention of the x-ray in 1895. Before this period, it was common to probe wounds.[7] |
| 1898 | The American Hospital Association is established.[8] |
| 1901 | The Army Nurse Corps became permanent[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.[7] |
| 1922 | The ACS establishes the Committee on Treatment of Fractures (later the Committee on Trauma).[13] |
| 1925 | Dr. Lorenz Böhler forms the first trauma care system for civilians in Austria.[14] |
| 1938 | The American Association for the Surgery of Trauma is established.[15] |
| 1943 | During World War II, antibiotics greatly reduce wound infections. Transport time to definitive care facilities is reduced to 4 hours, with a subsequent reduction in mortality.[16] |

| Date | Event |
|---|---|
| 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.[17] |
| 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.[10] |
| 1961 | Dr. R Adams Cowley opens a two-bed research unit at the University of Maryland Hospital that later becomes the R Adams Cowley Shock Trauma Center in Baltimore, Maryland.[9] |
| 1966 | The National Research Council of the National Academy of Sciences publishes *Accidental Death and Disability: The Neglected Disease of Modern Society*.[18] 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 U.S. 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.[19] |
| 1966 | Cook County Hospital opens first U.S. Trauma Unit with Dr. Robert Freeark as Medical Director.[9] |
| 1967 | The American Burn Association is established.[20] |
| | The American College of Emergency Physicians is established.[21] |
| | The American Trauma Society (ATS) is established.[22] |
| 1969 | The American Association of Critical-Care Nurses is established.[23] |
| 1970 | The Emergency Nurses Association is established.[24] |
| | The American Pediatric Surgical Association is established.[25] |
| 1972 | First Trauma Nurse Coordinator is hired in Illinois to direct the education of nurses working with trauma patients.[9] |
| 1973 | Extensive use of helicopters in the Vietnam Conflict reduces the time from injury to definitive surgical care to less than 1 hour.[17] |
| | Congress passes the Emergency Medical Services Systems (EMSS) Act and directs the U.S. Department of Health, Education, and Welfare (now the U.S. 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.[26] |
| 1975 | The National Association of Emergency Medical Technicians is established.[27] |

| Date | Event |
|---|---|
| 1976, 1979 | The Public Health Service Act Amendment renews Federal Emergency Medical Services (EMS) funding.[28] |
| 1980 | State EMS Directors establish the National Association of State EMS Directors.[29] |
| | The ACS creates Advanced Trauma Life Support.[30] |
| 1981 | Congress passes the Omnibus Budget Reconciliation Act of 1981, which consolidates EMS funding into State preventive block grants: EMSS Act funding is eliminated.[31] |
| 1984 | ongress passes Preventive Health Amendments of 1984 [(P.L. 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 EMS for Children Program.[32] |
| | EMS physicians establish the National Association of EMS Physicians.[33] |
| 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.[34] |
| 1985 | The Trauma Nurse Network was formed, predecessor to the Society of Trauma Nurses.[9] |
| 1986 | Reagan and the General Accounting Office release the report *Health Care: States Assume Leadership Role in Providing Emergency Medical Services*.[35] |
| 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.[36] |
| | The American Burn Association creates the "Advanced Burn Life Support (ABLS) Course."[37] |
| | The ACS establishes a trauma center verification program.[38] |
| 1988 | The National Highway Traffic Safety Administration (NHTSA) establishes the Statewide EMS Assessment Program and the "Development of Trauma Systems Course."[39] |
| | West et al. release the First National Assessment of Trauma Care Systems: *Trauma Systems: Current Status—Future Challenges*.[40] |
| 1989 | The Committees on Trauma establish the National Trauma Data Bank within the ACS.[41] |
| | Trauma nurses establish the Society of Trauma Nurses.[42] |
| 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.[43] |
| 1992 | HRSA establishes the Division of Trauma and EMS.[43]<br>The legislatively mandated Model Trauma Care Systems Plan is released in 1992.[43] |

| Date | Event |
|---|---|
| 1993 | 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. [44] |
| 1995 | Bazzoli et al. release the Second National Assessment of Trauma Care Systems: *Progress in the Development of Trauma Systems in the United States: Results of a National Survey*.[45] |
| 1996 | The ACS establishes the Trauma Systems Consultation Committee.[46] |
| 1998 | Bass et al. releases the Third National Assessment of Trauma Care Systems: *Update on Trauma System Development in the United States*.[47] |
| | The ACS publishes the 4th edition of *Resources for Optimal Care of the Injured Patient: 1999*.[48] |
| 2000 | ATS Trauma Information Exchange Program (TIEP) forms with CDC funding. TIEP begins and maintains the National Trauma Center Database.[49] |
| 2001 | HRSA establishes the Trauma-EMS Systems Program in accordance with Title XII of the Public Health Service Act.[50] |
| 2002 | HRSA's Trauma-EMS Systems Program establishes a National Trauma-EMS Stakeholder Group.[51] |
| | HRSA's Trauma-EMS Systems Program begins a State Trauma-EMS Technical Assistance Center.[51] |
| | Title XII—Trauma Care legislation expires in September 2002.[52] |
| 2002 | NHTSA releases *Trauma System Agenda for the Future*.[53] |
| 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*.[54] |
| | HRSA Office of Rural Health Policy establishes the Rural EMS and Trauma Technical Assistance Center.[55] |
| 2005 | NHTSA's National EMS Information System (NEMSIS) version 2 released, and NEMSIS Technical Assistance Center contract is awarded.[56] |
| | U.S. Department of Homeland Security releases National Response Plan.[57] |
| 2006 | HRSA and the ACS National Trauma Data Bank release *Standardized Trauma Care Data Elements* for national registry quality improvement.[58] |
| | HRSA releases *Model Trauma System Planning and Evaluation*. HRSA integrates trauma systems with public health and preparedness and provides benchmarks, indicators, and a scoring mechanism for State self-assessment.[59] |

## TRAUMA SYSTEM HISTORICAL INFORMATION

### References


1. Rutkow, I. M. (1993). The eighteenth century. In *Surgery: An illustrated history*. St. Louis: C.V. Mosby, 312–315.
2. Trunkey, D. D. (2000). History and development of trauma care in the United States. *Clinical Orthopaedics and Related Research*, 374, 36–40.
3. Loria, F. L. (1968). Gunpowder and the development of firearms. In *Historical aspects of abdominal injuries*. Springfield, IL: Charles C. Thomas, 39–40.
4. Faria, M. A., Jr., M.D. (1990, September). Dominique-Jean Larrey: Napoleon's surgeon from Egypt to Waterloo. *Journal of the Medical Association of Georgia*, 693–695.
5. Mentes, C. The City of Saint Paul, Minnesota's capital city EMS history. Retrieved on July 12, 2004, from http://www.ci.stpaul.mn.us/debts/fire/Division/emshistory.htm
6. American Public Health Association. Available at http://www.apha.org (e-mail: comments@apha.org).
7. Wangensteen, O. H., & Wangensteen, S. D. (1978). Surgery of war. In *The rise of surgery: From empiric craft to scientific discipline*. Minneapolis: University of Minnesota Press, 507–512.
8. American Hospital Association. About the AHA. Retrieved on July 12, 2004, from http://www.aha.org
9. Beachley, M. The evolution of trauma nursing and the Society of Trauma Nurses: A noble history. *Journal of Trauma Nursing*, 2005, 12(4), in production.
10. American Heart Association. History of CPR. Retrieved on July 12, 2004, from http://www.americanheart.org
11. American College of Surgeons. What is the American College of Surgeons? Retrieved on July 12, 2004, from http://www.facs.org
12. Mebane, R., & Mackovec, J. H. Timeline events in the history of air evac. Retrieved on June 15, 2001, from http://icehouse.net/jmakovec/ae_tmlne.htm
13. Hanlon, C. R. (2003). The American College of Surgeons at 90. *Bulletin of the American College of Surgeons*, 10, 19–25.
14. Freeark, R. J. (1986). The accident hospital. *Bulletin of the American College of Surgeons, 71*, 24–30.
15. American Association for the Surgery of Trauma. Available at http://www.aast.org (e-mail: curcur@msn.com).
16. Trunkey, D. D. (1993). Lessons learned. *Archives of Surgery*, 128, 216–264.
17. Trunkey, D. D., & Slater, M. (2000). Management of battlefield casualties. In K. Mattox, D. Feliciano, & E. E. Moore. *Trauma*. New York: McGraw-Hill.
18. National Academy of Sciences (1966). *Accidental death and disability: The neglected disease of modern society*. Washington, DC: Author.
19. Highway Safety Act 1966 (P.L. 89-564, September 9, 1966) Legislative History, Section 403.
20. American Burn Association. About the ABA. Retrieved on July 12, 2004, from http://www.ameriburn.org
21. American College of Emergency Physicians. Available at http://www.acep.org (e-mail: pjay@acep.org).

22. American Trauma Society. Our history. Retrieved on July 12, 2004, from http://www.amtrauma.org
23. American Association for Critical-Care Nurses. History. Retrieved on July 12, 2004, from http://www.aacn.org
24. Emergency Nurses Association. History. Retrieved on July 12, 2004, from http://www.ena.org
25. American Pediatric Surgical Association. Available at http://www.eapsa.org (e-mail: eapsa@eapsa.org).
26. Emergency Medical Services Systems Act (P.L. 93-154, November 16, 1973).
27. National Association of Emergency Medical Technicians. The history of NAEMT. Retrieved on July 12, 2004, from http://www.naemt.org
28. Emergency Medical Services Amendments of 1979 (P.L. 96-142, December 12, 1979).
29. National Association of State EMS Directors. About NASEMSD. Retrieved on July 14, 2004, from http://www.nasemsd.org
30. American College of Surgeons. Advanced trauma life support. Available at http://www.facs.org (e-mail: atls@facs.org).
31. Omnibus Budget Reconciliation Act of 1981 (PL 97-35, August 13, 1981).
32. Preventive Health Amendments of 1984 (PL 98-555, October 30, 1984).
33. National Association of EMS Physicians. About NAEMSP. Retrieved on July 12, 2004, from http://www.naemsp.org
34. National Research Council (1985). *Injury in America: A continuing public health problem*. Washington, DC: National Academy Press.
35. United States General Accounting Office (1986). *Health care: States assume leadership role in providing emergency medical services*. (GAO/HRD-86-132). Washington, DC: Author.
36. American College of Emergency Physicians (1987, April). Guidelines for trauma care systems. *Annals of Emergency Medicine*, 459–463.
37. Phone conversation with Elaine Barrett, American Burn Association, Chicago, IL, July 12, 2004.
38. American College of Surgeons. Verification process. Available at http://www.facs.org (e-mail: kdonnell@fac.org).
39. National Highway Traffic Safety Administration (1988). *EMS system development: Results of the Statewide EMS Assessment Program*. Washington, DC: Author.
40. West, J. G., Williams, M. J., Trunkey, D. D., & Wolferth, C. C. (1988). Trauma systems: Current status–future challenges. *Journal of the American Medical Association*, 259, 3597–3600.
41. American College of Surgeons. National Trauma Data Bank. Available at http://www.facs.org (e-mail: mneal@facs.org).
42. Society of Trauma Nurses. Available at http://www.traumanursesoc.org (e-mail: stn@traumanursesoc.org).
43. Trauma Systems Planning and Development Act of 1990 (P.L. 101-590, November 16, 1990).
44. Institute of Medicine (1993). *Emergency medical services for children: A report of the Institute of Medicine*. Washington, DC: National Academy Press.
45. Bazzoli, G. J., Madura, K. J., Cooper, G. F., MacKenzie, E. J., & Maier, R. V. (1995). Progress in the development of trauma systems in the United States: Results of a national survey. *Journal of the American Medical Association, 273*, 395–401.

46. American College of Surgeons, Trauma Systems Consultation Committee. Available at http://www.facs.org (e-mail: mwielgosz@facs.org).

47. Bass, R. R., Gainer, P. S., & Carlini, A. R. (1999). Update on trauma system development in the United States. *Journal of Trauma*, 47, S15–S21.

48. American College of Surgeons, Committee on Trauma (1999). *Resources for optimal care of the injured patient*, 3.

49. American Trauma Society. (2005). TIEP: Trauma Information Exchange Program, Retrieved January 17, 2006, from http://www.amtrauma.org/tiep/index.html

50. Fiscal Year 2001 Omnibus Consolidated Appropriations Act (P.L. 106-554, December 21, 2000).

51. Health Resources and Services Administration, Trauma-EMS Systems Program (2005). T*rauma-EMS Systems Program Report: FY 2001–FY 2004*, Rockville, MD: Author.

52. Health Professions Education Partnerships Act of 1998 (P.L. 105-392, November 13, 1998).

53. National Highway Traffic Safety Administration. (2003). *Trauma system agenda for the future*. Washington, DC: Author.

54. Health Resources and Services Administration, Trauma-EMS Systems Program. (2003). *National Assessment of State Trauma System Development, Emergency Medical Services Resources, and Disaster Readiness for Mass Casualty Events*. Rockville, MD: Author.

55. Health Resources and Services Administration. (2005). *Rural Emergency Medical Services and Trauma Technical Assistance Center*. Retrieved on November 9, 2005, from http://www.ruralhealth.hrsa.gov/ruralems/index.html

56. National EMS Information System. (2005). Retrieved on November 9, 2005, from http://www.nemsis.org/

57. Centers for Disease Control and Prevention. (2005). *CDC acute injury care research agenda: Guiding research for the future*. Retrieved on November 9, 2005, from http://www.cdc.gov/ncipc/didop/didop.htm

58. American College of Surgeons. (2005). *Trauma survey and registry comparisons*. Retrieved on November 9, 2005, from http://www.nedarc.org/comparison_grid_11_16_1_files/comparison_grid_11_16_1.htm

59. Health Resources and Services Administration, Trauma-EMS Systems Program. (2006). *Model Trauma System Planning and Evaluation*. Rockville, MD: Author.

# APPENDIX C

## ACKNOWLEDGMENTS

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

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 System Plan*. Authors of the original plan, Mrs. Gail Cooper, Dr. Christoph Kaufmann, and Mr. Drew Dawson, expressed an interest in collaborating on the project. They were asked to assist the Trauma-EMS Systems Program in determining a strategy for the revision. They identified the value of revising the *Model Trauma Care System Plan* to be consistent with the public health structure previously laid out by the U.S. Department of Health and Human Services. The concept was 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 used within the new model plan. The Trauma-EMS Systems Program contracted the American College of Surgeons (ACS) Committee on Trauma (Trauma Systems Consultation Committee) to coordinate the effort to finish and pilot the Model Plan's State Self-Assessment Tool. Through the dedicated efforts of Mrs. Gail Cooper, Dr. Robert Mackersie, Mr. Nels Sanddal, and others, the previous work was integrated into the new Model Plan's Benchmarks, Indicators, and Scoring (BIS) State Self-Assessment Tool.

On the basis of criteria established by the Federal Program and the ACS Consultants, the States of Virginia, Utah, and Texas pilot tested the State Self-Evaluation Tool. Each of these States coordinated meetings with multidisciplinary expert teams to evaluate the State Self-Evaluation Tool's BIS mechanism.

The National Trauma-EMS Stakeholder Group and other individuals provided content, consultation, and constructive recommendations. Significant, dedicated contributors and reviewers are listed on page 143. HRSA greatly appreciates all of those dedicated individuals who assisted in authoring, reviewing, and providing recommendations.

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American Association of Critical Care Nurses

American Burn Association

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

Coalition for American Trauma Care

Emergency Nurses Association

Healthcare Financial Management Association

HHS Centers for Disease Control and Prevention

HHS HRSA Emergency Medical Services for Children Program

HHS HRSA National Bioterrorism Hospital Preparedness Program

HHS HRSA Office of Rural Health Policy

HHS Office of Public Health Emergency Preparedness

International Association of Fire Chiefs

National Association of Emergency Medical Technicians

National Association of EMS Physicians

National Association of State EMS Officials

National Highway Traffic Safety Administration

National Organization of State Offices of Rural Health

Society of Trauma Nurses

State and Territorial Injury Prevention Directors Association

U.S. Department of Homeland Security

## GLOSSARY OF TERMS, ACRONYMS, AND ABBREVIATIONS

1. **Agency** - A division of government with a specific function offering a particular kind of assistance.
2. **All-Hazards Care** - A standardized, integrated, coordinated and trained response for the provision of care during all types of incidents.
3. **Altered Standards of Care** - Principles to ensure health care standards are altered sufficiently to respond to issues arising from a mass casualty incident.
4. **Assessment** - The regular systematic collection, assembly, analysis, and dissemination of information on the health of the community. These data, from a variety of sources, will assist in determining the status and cause of a problem and will identify potential opportunities for interventions.
5. **Assurance** - Services necessary to achieve agreed-on goals by encouraging actions of others (public or private), requiring action through rules/regulations, or providing services directly.
6. **Austere Environment** - A setting where resources, transportation, 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.
7. **Authorization** - Legal power or right; sanction.
8. **Available Resources** - In the context of trauma systems, components required to respond to injured patients and provide injury care (e.g., workforce, equipment, medications, supplies, and facilities). In the context of a National Response Plan (NRP), resources assigned to an incident, checked in, and available for use, normally located in a staging area.
9. **Benchmark** - Global overarching goals, expectations, or outcomes. In the context of the trauma systems, a benchmark identifies a broad system attribute.
10. **Capabilities-Based Planning** - Planning that provides capabilities suitable for a wide range of threats and hazards while working within an economic framework that requires setting priorities and making choices. Capabilities-based planning addresses uncertainty by analyzing a wide range of possible scenarios to identify required capabilities.
11. **Casualty** - Any person who is declared dead, missing, injured, or ill as a result of an incident.
12. **Catastrophic Incident** - Any natural or man-made disaster that results in extraordinary levels of mass casualties, damage, or disruption severely affecting the population, infrastructure, environment, economy, national morale, and/or government functions.
13. **Central Communication System** - An infrastructure that facilitates field-to-facility bidirectional connectivity, interfacility dialogue, and disaster service communications among all parties.
14. **Chain of Command** - A series of command, control, executive, or management positions in hierarchical order of authority.
15. **Community Health Surveillance** - Inspection and assessment of the physical and mental well-being of individuals living in a defined location, that is, city, district, and others.

16. Compliance - The process of performing acts according to what is expected or required. In the context of trauma systems, doing those things as required by the State to achieve trauma center status.
17. Comprehensive Trauma System - A coordinated inclusive system of care for the injured that encompasses all phases of care, from the prehospital setting to rehabilitation services and followup care. Such systems include data systems for injury surveillance and prevention as well as for performance measurement and improvement.
18. Concurrent - Occurring at the same time; existing together.
19. Continuum of Care - The concept of care including intentional and unintentional injury prevention, emergency medical services (EMS) 9-1-1/dispatch and medically supervised trauma care intervention, ground versus air transportation, emergency department (ED) trauma care, trauma center-organized teams, surgical intervention, intensive and general in-hospital care, rehabilitative services, and mental health and social services.
20. Cost-Benefit Analysis - Procedures implemented for classifying, recording, and allocating current or predicted costs that relate to a certain product, production process, or outcome. In the context of trauma systems, all known costs associated with the system and actual care of the injured compared to actual recovery and the good derived for both individuals and the community.
21. Cost Data - Data on the expenses and revenues incurred during the planning, implementation, and evaluation of the trauma system.
22. Cost Recovery - A method of revenue recognition that recognizes profits after costs are completely recovered. This term is generally used only when the total amount of collections is highly uncertain.
23. Critical Health Care Infrastructure - Systems and assets, whether physical or virtual, so vital that the incapacity or destruction of such systems and assets would have a debilitating impact on public health or safety.
24. Data Collection Standards - Clearly defined expectations and rules regulating the collection of data. In the context of trauma systems, such standards would include patient exclusion and inclusion criteria, common elements to be collected, as well as clear definitions for each element collected to ensure consistency in data collection and analysis.
25. Data Sources - A collection of information from which one may make conclusions or inferences. In the context of trauma systems, data sources aid in describing the epidemiology of injury, care and outcome data, as well as cost of system and care, and provide a tool for quality measurement in the system jurisdiction using population-based data, clinical databases, and accounting data. Such sources may include vital statistics and these types of data: EMS, ED, trauma center and hospital discharge, State police, medical examiner, trauma registry, rehabilitation, and mental health and social services.
26. De-designation - The revocation of trauma center designation for noncompliance with pre-established criteria and standards for verification and designation.
27. Definitive Care - Actions taken or implemented to ensure the needs of the patient are met.
28. Demographic Data - Consistent elements regarding the characteristics of a human population or part of it, especially its size, growth, density, distribution, and statistics regarding birth, marriage, disease, and death.

29. Designation (facility) - The identification of capabilities or status based upon predetermined criteria. In the context of trauma systems, the identification of trauma centers based upon the meeting of specific predetermined criteria.

30. Determinant (of injury) - A factor causing or contributing to the occurrence of trauma.

31. Deterministic Data Linkage - Data that are linked with patient identifiers such as name and date of birth.

32. Disabling Injury - Trauma resulting in varying degrees of permanent impairment or rendering injured persons unable to effectively maintain their previous lifestyle, or both.

33. Disaster - See Major Disaster.

34. Dispatch - The central location for incoming emergency calls requesting medical assistance. Based upon information received, the coordination level of prehospital providers and the Basic Life Support (BLS) or Advanced Life Support (ALS) ambulance is determined, and a response team is directed to respond to the emergency.

35. 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 an incident to provide the critical elements of all-hazards medical care: triage and initial stabilization, definitive care (including critical care), and rehabilitation.

36. E-Code - External cause of injury codes. They are used to describe environmental incidents, circumstances, and other conditions as the cause of injury. They are formatted as a numeric three-digit code preceded by an E and up to 1 decimal. More than one E-code can be used to describe an incident.

37. Emergency - In the context of trauma systems, the occurrence of critical or life-threatening injury requiring triage and transportation to resuscitation resources found in defined trauma centers. In the context of the NRP, as defined by the Stafford Act, an emergency is "any occasion or instance for which, in the determination of the President, Federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States."

38. Emergency Operations Center (EOC) - The physical location where the coordination of information and resources to support domestic incident management activities normally takes place. An EOC may be a temporary facility or may be located in a more central or permanently established facility, perhaps at a higher level of organization within a jurisdiction.

39. Emergency Operations Plan (EOP) - The "steady-State" plan maintained by various jurisdictional levels for managing a wide variety of potential hazards.

40. Emergency Public Information - Information that is disseminated primarily in anticipation of an emergency or during an emergency. In addition to providing situational information to the public, it also frequently provides directive actions required to be taken by the general public.

41. Emergency Response Provider (ERP) - This term includes Federal, State, local, and tribal emergency public safety, law enforcement, emergency response, emergency medical (including hospital emergency facilities), and related personnel, agencies, and authorities. Also known as "emergency responder."

42. Emergency Support Function (ESF) - A grouping of government and certain private-sector capabilities into an organizational structure to provide the support, resources, program implementation, and services that are most likely to be needed to save lives, protect property and the environment, restore essential services and critical infrastructure, and help injured persons and communities return to normal, when feasible, after domestic incidents. The ESFs serve as the primary operational-level mechanism to provide assistance to State, local, and tribal governments or to Federal departments and agencies conducting missions of primary Federal responsibility.
43. Enabling Legislation - Legislation that provides appropriate officials the authority to implement or enforce the law.
44. Epidemiology - The science that investigates the causes and control of epidemic diseases.
45. Essential Services and Core Functions of Public Health - Those central responsibilities of public health that contribute to and ensure the health of communities.
46. Etiology - The science or theory of the causes or origins of disease.
47. Evacuation - Organized, phased, and supervised withdrawal, dispersal, or removal of civilians from dangerous or potentially dangerous areas, and their reception and care in safe areas.
48. Facility Standards - Rules established as a basis of comparison for measuring or judging capacity, quantity, content, extent, value, and quality of services provided. In the context of trauma systems, rules defining resource availability determining trauma and burn care capabilities of hospitals.
49. Federal - Of or pertaining to the Federal Government of the United States of America.
50. First Responder - In the context of trauma systems, those who arrive at the scene in early stages to provide the medical care necessary for the injured. In the context of an NRP, local and nongovernmental police, fire, and emergency personnel who, in the early stages of an incident, are responsible for the protection and preservation of life, property, evidence, and the environment, including emergency response providers as defined in section 2 of the Homeland Security Act of 2002 [6 U.S.C. 101], as well as incident management, public health, clinical care, public works, and other skilled support personnel who provide immediate support services during prevention, response, and recovery operations. First responders may include personnel from Federal, State, local, tribal, or nongovernmental organizations.
51. Fixed Costs - Costs associated with the physical plant, real property, and equipment required for delivering patient care. Specifically, the fixed costs in a health care facility can be those associated with a given care unit, for example, intensive care unit (ICU), operating room (OR), or ED. Fixed costs can also be human resources, such as the unit clerk or charge nurse.
52. Frontier - The wilderness of woods, hills, mountains, plains, islands, and desert outside of urban and suburban centers. All communities with a population density of 20 or fewer persons per square mile and located more than either 60 miles or 60 minutes, or both, from the nearest market center.
53. Functional Outcome Assessment - The use of valid and reliable measurement tools, that is, Functional Inventory Measurement (FIM) and Wee-FIM, functional inventory measurement for pediatric patients, to assess the impact of disease and medical treatment on the lives of affected individuals. Domains assessed include mobility, activities of daily living, and cognitive capabilities.

54. Gap Analysis - The difference between trauma system standards and the compliance of the trauma system with those standards that result in the identification of system needs.

55. Haddon Matrix - A proven epidemiologic disease model for the investigation and control of injury and its associated factors.

56. Health and Human Services (HHS) - The United States government's principal agency for protecting the health of all Americans and for providing essential human services.

57. Health Insurance Portability and Accountability Act (HIPAA) - The Federal law regarding privacy provisions that apply to health information created or maintained by health care providers who engage in certain electronic transactions, health plans, and health care clearinghouses.

58. Healthy People 2010 - A statement of national health objectives designed to identify the most significant preventable threats to health and to establish national goals to reduce those threats.

59. Hospital Emergency Incident Command System (HEICS) - An incident management system that employs a logical management structure, defined responsibilities, clear reporting channels, and a common nomenclature to assist in unifying hospitals and other emergency responders.

60. Incidence - The degree or range of occurrence or effect.

61. Incident - An occurrence or event that requires an emergency response to protect life or property. Incidents may include major disasters, emergencies, terrorist attacks, wild land and urban fires, floods, hazardous material spills, nuclear accidents, aircraft accidents, earthquakes, hurricanes, tornadoes, tropical storms, war-related disasters, public health and medical emergencies, and other occurrences requiring an emergency response.

62. Incident Command System (ICS) - A standardized on-scene incident management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is the combination of facilities, equipment, personnel, procedures, and communications operating with a common organizational structure, designed to aid in the management of resources during incidents.

63. Incident Commander (IC) - The individual responsible for all incident activities, including the development of strategies and tactics and the ordering and release of resources. The IC has overall authority and responsibility for conducting incident operations and is responsible for the management of all operations at the incident site.

64. Incident Management - Refers to the totality of activities to be aware of, prevent, prepare for, respond to, and recover from incidents. *The term is emphasized in the NRP and replaces the terms emergency management, disaster management, crisis management, and consequence management*.

65. Incident Mitigation - In the context of trauma, the minimization of both death and disability as well as the medical care infrastructure. In the context of the NRP, actions taken during an incident designed to minimize impacts or contain the damages to property or the environment.

66. Inclusive Trauma System - A system that includes all health care facilities to the extent that their resources and capabilities allow and where the patient's needs are matched to hospital resources and capabilities. See Trauma System.

67. Indicator - Those tasks or outputs that characterize a benchmark. Indicators identify actions or capacities within the benchmark. Indicators are the measurable components of a benchmark.

68. Indirect Cost - Costs that cannot be directly allocated to a specific patient. All of these functions are important to the operational success of the system, but identifying and allocating a certain portion of these costs to a specific patient is difficult.

69. Information Technology - Processing of data via computer: the use of technologies from computing, electronics, and telecommunications to process and distribute information in digital and other forms.

70. Infrastructure - In the context of trauma systems, the identified lead agency within the State; State trauma manager; trauma advisory committee; and supporting legislative language, that is, rules/regulations; trauma data system; identified resource care facilities (e.g., levels of trauma centers and burn centers); workforce; and other essential components to facilitate the implementation, monitoring, and performance improvement of care rendered to the severely injured. In the context of the NRP, the man-made physical systems, assets, projects, and structures, publicly or privately owned, or both, that is, those that are used by or that benefit the public (i.e., utilities, bridges, drinking water systems, electrical systems, communication systems, and roads).

71. Injury - Physical harm or damage to the body resulting from the transfer of or exposure to mechanical, thermal, electrical, or chemical energy or from the absence of such essentials as heat or oxygen.

72. Injury Risk Assessment - The process employed to determine the likelihood that injury will result from an incident, taking into account the identification of the hazard type, population affected, severity of injury, and volume or number affected.

73. Interfacility Transfer - Movement of a patient from one care facility to another. In the context of trauma systems, interfacility transfer usually occurs in an effort to move an injured patient to a higher level of care where necessary resources optimize recovery.

74. Jurisdiction - A range or sphere of authority. Public agencies have jurisdiction at an incident related to their legal responsibilities and authorities. Jurisdictional authority at an incident can be political, geographical (e.g., city, county, tribal, State, or Federal boundary lines), or functional (e.g., law enforcement or public health).

75. Lead Agency - The agency responsible for trauma-EMS systems planning and program coordination within the State.

76. Legislative Authority - Statute and regulations. A statutory provision establishing and continuing a government agency, activity, or program for a fixed or indefinite period.

77. Local Government - A county, municipality, city, town, township, local public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency, or instrumentality of a local government; an Indian tribe or authorized tribal organization or, in Alaska, a Native Village or Alaska Regional Native Corporation; or a rural community, unincorporated town or village, or other public entity.

78. Major Disaster - As defined by the Stafford Act, any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought) or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby. *In the NRP, disaster management has been replaced by incident management*.

79. Management Information System (MIS) - This comprehensive system is the collection of data from different sources to enable the review of the entire trauma system. It includes trauma registry, EMS, incident after-action reports, death certificates, crash reports, and cost information. The purpose of the system is to identify and evaluate system best practices, identify and evaluate gaps, review the utilization of trauma resources, track patient outcomes, develop performance standards, and measure system performance against similar systems (benchmarking). *The term "management information system" is used interchangeably with "trauma management information system*."

80. Mass Casualty Incident (MCI) - A situation in which a large quantity or number of either physical injuries or deaths, or both, occur.

81. Medical Oversight - The responsibility of supervising something (*formal*) relating to, involving, or used in medicine or treatment.

82. Mitigation - See Incident Mitigation.

83. Morbidity - The relative incidence of disease. The condition of being diseased. The ratio of sick to well persons in a community.

84. Mutual Aid Agreement - A written agreement between agencies, organizations, or jurisdictions, or some combination of all of these, that they will assist one another on request by furnishing personnel, equipment, and/or expertise in a specified manner.

85. National - Of a nationwide character, including the Federal, State, local, and tribal aspects of governance and policy.

86. National Disaster Medical System (NDMS) - A coordinated partnership between DHS, HHS, DOD, and the U.S. Department of Veterans Affairs established for the purpose of responding to the needs of victims of a public health emergency. NDMS provides medical response assets and movement of patients to health care facilities where definitive medical care is received when required.

87. National Incident Management System (NIMS) - A system required by Homeland Security Presidential Directive 5 (HSPD-5) that provides a consistent, nationwide approach for Federal, State, local, and tribal governments; the private sector; and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents, regardless of cause, size, or complexity.

88. National Preparedness Goal (NPG) - A national strategy for homeland security to engage Federal, State, local, and tribal entities, their private and nongovernmental partners, and the general public to achieve and sustain risk-based target levels of capability to prevent, protect against, respond to, and recover from major incidents in order to minimize the impact on lives, property, and the economy.

89. National Response Plan (NRP) - A comprehensive, national, all-hazards approach to domestic incident management across a spectrum of activities including prevention, preparedness, response, and recovery. The NRP incorporates best practices and procedures from various incident management disciplines—homeland security, emergency management, law enforcement, firefighting, hazardous materials response, public works, public health, EMS, and responder and recovery worker health and safety—and integrates them into a unified coordinating structure. The NRP provides the framework for Federal interaction with State, local, and tribal governments; the private sector; and nongovernmental organizations in the context of domestic incident prevention, preparedness, response, and recovery activities.

90. Nongovernmental Organization (NGO) - A nonprofit entity that is based on interests of its members, individuals, or institutions and that is not created by government, but may work cooperatively with government. Such organizations serve a public purpose, not a private benefit. (e.g., faith-based charity organizations and the American Red Cross).

91. Patients with Special Needs - Those individuals who have or are at risk for chronic physical, developmental, behavioral, or emotional conditions and who also require health and related services of a type or amount beyond that required generally.

92. Performance Improvement (PI) - Methodology for evaluating and improving processes that employs a multidisciplinary approach and that focuses on data, benchmarks, and components of the system being evaluated.

93. Policy Development - A core function that uses the results of assessments and scientific knowledge, in an organized manner, to establish comprehensive policies intended to improve public health. A process of decision making that includes building constituencies; identifying needs and setting priorities; exercising legislative authority and providing funding to develop plans and policies to address needs; and ensuring the public's health and safety.

94. Population-Based Data - Analysis of data based upon a given population. The U.S. Census Bureau collects and publishes data on populations in the United States according to several different definitions. Various systems then use the appropriate population to calculate rates.

95. Preparedness - The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process involving efforts at all levels of government and between government and private-sector and nongovernmental organizations to identify threats, determine vulnerabilities, and identify required resources. *The term "preparedness" is used interchangeably with "readiness."*

96. Primary Prevention - Activities implemented to completely avoid the occurrence of an injury or injury-producing event. Actions taken in anticipation of potential injury events that eliminate or reduce the risk for injury.

97. Private Sector - Organizations and entities that are not part of any governmental structure. Includes for-profit and not-for-profit organizations, formal and informal structures, commerce and industry, private emergency response organizations, and private voluntary organizations.

98. Probabilistic Data Linkage - A method of linking data between two or more sources using a computerized judgment process. Linkage occurs through less certain identifiers such as date of incident, patient age, gender, and others.

99. **Protocol** - Detailed plans for the triage, transport, resuscitation, and eventual definitive care of the trauma patient. Protocols provide guidance for the care of the trauma patient.

100. **Public and Private Partnerships** - Public and private entities joining together 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).

101. **Public Health** - What we as a society do collectively to assure the conditions in which people can be healthy. A societal effort that addresses the health of the population as a whole rather than medical health care, which focuses on treatment of the individual ailment. Public health programs address the physical, mental, and environmental health concerns of communities and populations at risk for disease and injury.

102. **Public Health Approach** - 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.

103. **Public Health Surveillance** - To watch or monitor public occurrences of disease or injury, or both.

104. **Public Health System** - A system 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.

105. **Public Health Tools** - Assessments and surveys available to assist in monitoring occurrence and potential causation elements of disease and injury (i.e., the Behavioral Risk Factor Surveillance System).

106. **Recovery** - (NRP) The development, coordination, and execution of service and site-restoration plans for impacted communities and the reconstitution of government operations and services through individual, private-sector, nongovernmental, and public assistance programs that identify needs and define resources; provide housing and promote restoration; address long-term care and treatment of affected persons; implement additional measures for community restoration; incorporate mitigation measures and techniques, as feasible; evaluate the incident to identify lessons learned; and develop initiatives to mitigate the effects of future incidents.

107. **Regional** - In the context of trauma system development, this term refers to intrastate-designated trauma areas (regions).

108. **Rehabilitation** - Services that seek to return a trauma patient to the fullest physical, psychological, social, vocational, and cognitive levels of functioning of which he or she is capable, consistent with physiological or anatomical impairments and environmental limitations.

109. **Resources** - Personnel and major items of equipment, medications, supplies, and facilities available or potentially available for assignment to incident operations and for which status is maintained. Resources are described by kind and type and may be used in operational support or supervisory capacities at an incident or at an EOC.

110. **Resource Standards** - Components of the trauma system defined and identified by State as being essential State trauma system operations (i.e., ALS EMS, trauma centers, data repository, and others).

111. **Response** - In the context of the NRP, activities that address the short-term, direct effects of an incident. Response includes immediate actions to save lives, protect property, and meet basic human needs. Response also includes the execution of emergency operation plans and of incident mitigation activities designed to limit the loss of life, personal injury, property damage, and other unfavorable outcomes.

112. **Risk Assessments** - Risk priorities determined by collecting and evaluating data and comparing the level of risk against predetermined standards, target risk levels, or other criteria (i.e., Injury Risk Assessments).

113. **Robert T. Stafford Disaster Relief and Emergency Assistance Act** - This Act establishes the programs and processes for the Federal Government to provide disaster and emergency assistance to States, local governments, tribal nations, individuals, and qualified private nonprofit organizations. The provisions cover all-hazards incidents.

114. **Regulation** - A rule or an order having force of law issued by the executive authority of the government. *The term "regulation" is often used interchangeably with "rule."*

115. **Rule** - A principal or regulation set up by an authority, prescribing or directing action or forbearance. *The term "rule" is often used interchangeably with "regulation."*

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

117. **Secondary Prevention** - Initiatives used to maximally reduce the severity of the injury-producing event at the time of occurrence, such as through the use of safety devices.

118. **Specialty Care Facility** - An acute care facility that provides specialized services and specially trained personnel to care for a specific portion of the injured population, such as pediatric, burn injury, or spinal cord injury patients.

119. **Stakeholder** - A person or group of individuals with a direct interest, involvement, or investment in a matter. In the context of trauma, an individual with interest in trauma care or trauma system development. (e.g., trauma surgeon, epidemiologist, EMS, ED director, or hospital administrator).

120. **State** - Any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any possession of the United States. [As defined in section 2(14) of the Homeland Security Act of 2002, Public Law 107-296, 116 Stat. 2135, *et seq.* (2002).]

121. **Subject-Matter Expert (SME)** - An individual who is a technical expert in a specific area or in performing a specialized job, task, or skill (e.g., an experienced trauma care provider).

122. **Surge Capacity** - The accommodation of the health system to a transient sudden rise in demand for health care after an incident with real or perceived adverse health effects.

123. **Surveillance System** - The ongoing and systematic collection, collation, analysis, interpretation, and timely communications of information/health data in the process of describing and monitoring a health event for the purpose of appropriate personnel action steps and interventions.

124. **System** - The scheme of ideas, components, or principles by which something is organized. In the context of trauma systems, designation, for example, of trauma centers, State Trauma System Plans, triage protocols, and air medical and other transport procedures.

125. Target Capabilities List (TCL) - A list and description of the capabilities needed to perform critical tasks. Critical tasks are defined as those prevention, protection, response, and recovery tasks that require coordination among an appropriate combination of Federal, State, local, tribal, private sector, and nongovernmental entities during a major incident in order to minimize the impact on lives, property, and the economy.

126. Terrorism - (NRP) Any activity that (1) involves an act that (a) is dangerous to human life or potentially destructive of critical infrastructure or key resources and (b) is a violation of the criminal laws of the United States or of any State or other subdivision of the United States; and (2) appears to be intended (a) to intimidate or coerce a civilian population; (b) to influence the policy of a government by intimidation or coercion; or (c) to affect the conduct of a government by mass destruction, assassination, or kidnapping.

127. Tertiary Prevention - Actions taken to diminish the impact of the injury and to optimize the patient's outcome. Tertiary prevention focuses 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 for prehospital, acute, and post-acute care.

128. Trauma (traumatic injury) - Tissue or organ injury, or both, sustained by the transfer of environmental energy.

129. Trauma Center - A specialized hospital or facility with the immediate availability of specially trained health care personnel who provide emergency care on a 24/7 basis for the injured. These specially trained personnel are immediately available to treat patients with ready ORs, special equipment, and necessary supplies. The American College of Surgeons defines certain standards for each of the four levels of trauma centers that they identify.

130. Trauma Financial Information - Costs associated with both the system and care rendered to the injured, that is, State costs—lead agency staff salaries, fringe benefits, stakeholder meetings, registry operation and direct patient care—ED staff, on-call staff, surgeon fees, trauma team activation, and other costs.

131. Trauma System Plan - A document in which the lead agency's guiding members envision the future, identify system needs, and develop 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.

132. Trauma System - An organized, inclusive approach to facilitating and coordinating a multidisciplinary system response to preventing injuries and providing care to the injured. A trauma system encompasses a continuum of care delivery and is inclusive of injury prevention and control, public health, EMS field intervention, ED care, surgical interventions, intensive and general surgical in-hospital care, and rehabilitative services, along with the social services and the support groups that assist the injured and their significant others with their return to society at the most productive level possible.

133. Trauma System Costs - Expenditures associated with system development and maintenance.

134. Trauma System Manager - The individual within the lead agency for trauma care who is responsible for the management, coordination, facilitation, and evaluation of the trauma system.

135. Trauma System Standards - Those measures by which a trauma system can be determined or evaluated (e.g. facility standards, transfer protocols, triage protocols, and data collection standards).

136. Triage - Sorting and determining priority. In the context of trauma systems, a process for sorting patients by types and severity of injury to determine transport to facilities where appropriate resources will exist to ensure optimal outcome.

137. Triage Protocols - Established, written plans for sorting and setting priorities. In the context of this document, having written plans, often backed by rules/regulations that use severity of injury as a criterion for the determination of patient movement and transfer to appropriate facilities.

138. Tribe - Any Indian band, nation, or other organized group or community, including any Alaskan Native Village as defined in or established pursuant to the Alaskan Native Claims Settlement Act, that is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians.

139. United States - The term "United States," when used in a geographic sense, means any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, any possession of the United States, and any waters within the jurisdiction of the United States.

140. Universal Task List (UTL) - A list of tasks required to prevent, protect against, respond to, and recover from major all-hazards incidents and to support the achievement of the national preparedness goal. The UTL, as developed by DHS, serves as the basis for defining target capabilities required by the goal.

141. Variable Cost - Costs that are directly attributable to an individual patient and that vary with each care episode (e.g., costs of the delivery of an antibiotic, durable medical equipment, chest x-ray, and laboratory tests).

142. Verification - A process by which trauma care capability and performance of an institution are evaluated by experienced on-site reviewers.

143. Weapons of Mass Destruction (WMD) - (1) any explosive, incendiary, or poison gas, bomb, grenade, or rocket having a propellant charge of more than 4 ounces, or missile having an explosive or incendiary charge of more than one-quarter ounce, or mine or similar device; (2) any weapon that is designed or intended to cause death or serious bodily injury through the release, dissemination, or impact of toxic or poisonous chemicals or their precursors; (3) any weapon involving a disease organism; or (4) any weapon that is designed to release radiation or radioactivity at a level dangerous to human life.

## LIST OF ACRONYMS

1. AACN - American Association of Critical Care Nurses
2. AAST - American Association for the Surgery of Trauma
3. ABA - American Burn Association
4. ABLS - Advanced Burn Life Support
5. ACEP - American College of Emergency Physicians
6. ACS - American College of Surgeons
7. ACS COT - American College of Surgeons Committee on Trauma
8. AHA - American Hospital Association
9. AHRQ - Agency for Healthcare Research and Quality
10. ALS - Advanced Life Support
11. APHA - American Public Health Association
12. APSA - American Pediatric Surgical Association
13. ASSTC - Advanced Surgical Suite for Trauma Casualties
14. ASTM - American Society for Testing and Materials
15. ATCN - Advanced Trauma Care for Nurses
16. ATLS - Advanced Trauma Life Support
17. ATS - American Trauma Society
18. ATV - All-Terrain Vehicle
19. BIS - Benchmarks, Indicators, and Scoring
20. BLS - Basic Life Support
21. BRFSS - Behavioral Risk Factor Surveillance System
22. BTLS - Basic Trauma Life Support
23. CAAS - Commission on Accreditation of Ambulance Services
24. CAHEA - Council on Allied Health Education Accreditation
25. CATC - Coalition for American Trauma Care
26. CATN - Course in Advanced Trauma Nursing
27. CDC - Centers for Disease Control and Prevention
28. CFO - Chief Financial Officer
29. CNMI - Commonwealth of the Northern Mariana Islands
30. CONPLAN - Concept of Operations Plan
31. CPR - Cardiopulmonary Resuscitation

32. **DALY** - Disability-Adjusted Life Years
33. **DHP** - Division of Healthcare Preparedness
34. **DHS** – U.S. Department of Homeland Security
35. **DMAT** - Disaster Medical Assistance Team
36. **DMORT** - Disaster Mortuary Operational Response Team
37. **DOD** – U.S. Department of Defense
38. **DOT** – U.S. Department of Transportation
39. **DRC** - Disaster Recovery Center
40. **E 9-1-1** - Enhanced 9-1-1
41. **EASL** - English As a Second Language
42. **ED** - Emergency Department
43. **EMS** - Emergency Medical Services
44. **EMSC** - Emergency Medical Services for Children
45. **EMSS** - Emergency Medical Services Systems
46. **EMT** - Emergency Medical Technician
47. **ENA** - Emergency Nurses Association
48. **ENPC** - Emergency Nursing Pediatric Course
49. **EOC** - Emergency Operations Center
50. **EOP** - Emergency Operations Plan
51. **EPCRA** - Emergency Planning and Community Right-to-Know Act
52. **EPR** - Emergency Preparedness and Response
53. **ERP** - Emergency Response Provider
54. **ESAR-VHP** - Emergency System for Advance Registration of Voluntary Health Professionals
55. **ESF** - Emergency Support Function
56. **EST** - Emergency Support Team
57. **FARS** - Fatality Analysis Reporting System
58. **FEMA** - Federal Emergency Management Agency
59. **FIM** - Functional Inventory Measurement
60. **FTE** - Full-Time Equivalent
61. **GIS** - Geographical Information System
62. **HEICS** - Hospital Emergency Incident Command System
63. **HFMA** - Healthcare Financial Management Association

64. **HHS** - U.S. Department of Health and Human Services
65. **HIPAA** - Health Insurance Portability and Accountability Act
66. **HRSA** - Health Resources and Services Administration
67. **HSB** - Healthcare Systems Bureau
68. **HSPD** - Homeland Security Presidential Directive
69. **IAFC** - International Association of Fire Chiefs
70. **IC** - Incident Command
71. **ICS** - Incident Command System
72. **ICU** - Intensive Care Unit
73. **ISS** - Injury Severity Score
74. **JCAHO** - Joint Commission on Accreditation of Healthcare Organizations
75. **MCI** - Mass Casualty Incident
76. **MIS** - Management Information System
77. **MMRS** - Metropolitan Medical Response System
78. **MOA** - Memorandum of Agreement
79. **MOU** - Memorandum of Understanding
80. **MTCSP** - Model Trauma Care System Plan (1992)
81. **MTSPE** - Model Trauma System Planning and Evaluation (2006)
82. **NAEMSP** - National Association of Emergency Medical Services Physicians
83. **NAEMT** - National Association of Emergency Medical Technicians
84. **NASEMSO** - National Association of State Emergency Medical Services Officials
85. **NBHPP** - National Bioterrorism Hospital Preparedness Program
86. **NCIPC** - National Center for Injury Prevention and Control
87. **NDMS** - National Disaster Medical System
88. **NEMSIS** - National EMS Information System
89. **NGO** - Nongovernmental Organization
90. **NHTSA** - National Highway Traffic Safety Administration
91. **NIMS** - National Incident Management System
92. **NOSORH** - National Association of State Offices of Rural Health
93. **NPG** - National Preparedness Goal
94. **NRP** - National Response Plan
95. **NTDB** - National Trauma Data Bank
96. **OPHEP** - Office of Public Health Emergency Preparedness

97. **OR** - Operating Room
98. **ORHP** - Office of Rural Health Policy
99. **OSHA** - Occupational Safety and Health Administration
100. **OSLGCP** - Office of State and Local Government Coordination and Preparedness
101. **PALS** - Pediatric Advanced Life Support
102. **PHTLS** - Pre-Hospital Trauma Life Support
103. **PI** - Performance Improvement
104. **QA** - Quality Assurance
105. **QALY** - Quality-Adjusted Life Years
106. **RAC** - Regional Advisory Council
107. **ROC** - Regional Operations Center
108. **RTTDC** - Rural Trauma Team Development Course
109. **SAR** - Search and Rescue
110. **SCC** - Secretary's Command Center
111. **SEMS** - Standardized Emergency Management System
112. **SME** - Subject-Matter Expert
113. **SNS** - Strategic National Stockpile
114. **SOP** - Standard Operating Procedure
115. **STIPDA** - State and Territorial Injury Prevention Directors Association
116. **STN** - Society of Trauma Nurses
117. **TCCC** - Trauma Coordinator Core Course
118. **TCL** - Target Capabilities List
119. **TIEP** - Trauma Information Exchange Program
120. **TNCC** - Trauma Nursing Core Course
121. **TOPIC** - Trauma Outcome and Performance Improvement Course
122. **TRC-A** - Trauma Registrar Course-Advanced
123. **TRC-B** - Trauma Registrar Course-Basic
124. **UTL** - Universal Task List
125. **WISQARS** - Web-based Injury Statistics Query and Reporting System
126. **WMD** - Weapons of Mass Destruction
127. **YPLL** - Years of Productive Life Lost
128. **YRBS** - Youth Risk Behavior Survey