



**Trauma System Consultation  
State of Texas  
Austin, Texas**

**May 18<sup>th</sup>-21<sup>st</sup>, 2010**

**American College of Surgeons  
Committee on Trauma**

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## **Executive Summary**

### **American College of Surgeons Trauma System Consultation Visit**

“Texas: It’s Like a Whole Other Country”

Texas comes from the word "teysha" which translates as "hello friend" in the language of the Caddo Indian tribes. “Friendship” is also the state motto, and its people are, indeed, known for being friendly. The “Lone Star State” was an independent republic from 1836 to 1846. With its unique history and diverse culture, it is not surprising that the state’s official tourism website boasts the slogan, “Texas: It’s like a whole other country.” The American College of Surgeons’ site visit team was often reminded of this during discussions.

Texas is a land of contrasts. It is green and brown; it is rich and poor. It has big cities and tiny towns. Three of the ten most populous cities in the United States are in Texas: Houston, San Antonio, and Dallas. The state also has counties with extremely low population density, such as Loving County, which has the lowest population density in the contiguous United States. The population density variation between Dallas County and Loving County is a 25,000:1 difference.

The estimated population for Texas is 25 million, and injury is the leading cause of death in all ages between 1 and 44 years. Injury results in more potential years of life lost (YPLL) in state residents than can be attributed to any other single health problem, or about 30% of total YPLL for the state’s residents. Texas is a place for big ideas and action, and it was an early leader in trauma system development. The division of the state into 22 trauma service areas was an important strategy because of the state’s size, variability in population density, and location of healthcare resources.

As of 1995, the 22 trauma service area (TSA) structure was in place with corresponding regional advisory councils (RACs). This structure was developed primarily through the work of health professionals, largely on a volunteer basis. RAC funding was initially appropriated in 1997. A *Strategic Plan for the Texas EMS/Trauma System* was published in 2002 to guide trauma system development. Contrasts exist in the range of emergency care services and the trauma system within Texas. For example, emergency medical services (EMS) systems serving some of Texas’ metropolitan areas are widely appreciated for their innovation, performance goals, and overall quality; however, some Texas counties do not even have basic life support EMS services.

Texas has 583 acute care hospitals. Of these, 256 have voluntarily sought designation as trauma centers (level I – 16 including 3 pediatric level I; level II – 8; level III – 45; and level IV – 187). An additional 18 hospital are pursuing

trauma center designation. Of the 77 Critical Access Hospitals, 54 have achieved level IV designation. The majority of trauma centers are located in the eastern half of the state, corresponding to the high population density of the area.

Texas cities support several hospitals considered to be among the best trauma centers in the world. Numerous clinical trauma care protocols used around the world originated within Texas. Following the early efforts of innovative system development, it appears that Texas trauma system development has slowed and may even be static. Texas is very fortunate to have state appropriations to support the trauma system infrastructure and to provide reimbursement for uncompensated care to the state-designated trauma centers; however, this funding is neither secure nor adequate.

Texas has tremendous natural riches and an economy that rivals many nations. In fact, the gross domestic product of Texas is second only to California among the 50 states. However, despite this solid and broad-based economy, the per capita (\$4,601 versus the national mean of \$5,283) spending on health care in Texas has been ranked 45<sup>th</sup> in the nation. These Texas financial contrasts may, in part, explain some of the more recent challenges in trauma system development. An additional challenge was an unintended consequence of the reorganization of the Department of State of Health Services (DSHS) into a functional structure from the prior programmatic structure.

Texas now has the opportunity to regain a leadership position in trauma system development. The RAC organizational structure is robust and ideal for the residents of Texas, but only if it can retain a trauma focus as its primary mission. The medical professionals and Office of EMS and Trauma personnel are interested and involved. They are the right people to achieve the next steps. These steps include developing a unified statewide trauma system plan, identifying a physician leader, establishing a statewide EMS and trauma information system, using data from the information system to drive system performance improvement, and continuing efforts to maintain existing funding and to secure additional support.

## ***Advantages and Assets of the Texas Trauma System***

- Enabling legislation
- Longstanding RAC structure
- Trauma center verification criteria and process
- Multiple funding sources, including red light camera, tobacco endowment, 911 surcharge, Driving Under the Influence/Driving While Intoxicated convictions, state traffic fines, driver responsibility
- Support by lead level III trauma centers
- Trauma centers with national and international reputations
- Medical care provider expertise
- Liability protection for all health care personnel
- Strong confidentiality statute
- Early consideration of an integrated emergency care system
- Outstanding disaster planning and response capability
- EMS and trauma advisory council is governor appointed
- Dedicated injury epidemiologist
- Recognized need for a trauma data system
- Renowned academic centers
- Capable and invested State personnel and staff in the trauma service areas

## ***Challenges and Vulnerabilities of the Texas Trauma System***

- Exclusive trauma system design
- No statewide trauma registry or EMS data
- No trauma system performance improvement
- Uncertainty regarding continuation of current funding sources
- Poor communication about patient flow and care between RACs
- Inadequate system research
- Rising proportion of uninsured and undocumented persons
- EMS is not defined as a state essential service, and some counties have no EMS service

## ***Opportunities for Change***

- Timing is right for system change and to develop and implement a more inclusive and integrated trauma system throughout the state
- The concept of an inclusive and integrated trauma system could be embraced
- The legislature required a report to answer the question of adequacy in number of Level I and Level II trauma centers in Texas. GETAC and the department have asked for a report regarding the status of trauma care in Texas, and this provides an opportunity to educate the legislature and the public about trauma as a public health problem
- Health care reform may offer opportunities
- Extremely committed stakeholders at all levels

## ***Priority Recommendations Summary***

- Coordinate meetings between the state Office of EMS and Trauma Systems (OEMS/TS), the Regional Advisory Committees, and the state Division of Prevention and Preparedness injury epidemiologist to evaluate and explore existing datasets to generate trauma data and to describe the patterns of injury in the state.
- Require all Regional Advisory Committees to complete a regional assessment with a facilitator using the same set of indicators selected by the State from the Health Resources and Services Administration's *Model Trauma System Planning and Evaluation* document.
- Comply with the Texas Code 773.113 regarding the development of a statewide trauma reporting and analysis system.
- Re-establish the position and hire a full-time trauma system program manager.
- Designate a state EMS medical director through an appointment or contractual relationship. The state EMS medical director role should be to advise DSHS staff, provide strategic direction, and serve as a resource for regional and local EMS medical directors and system administrators in the state.
- Establish a state trauma medical director position or consultant and clearly define this individual's role.
- Update the *Strategic Plan for the Texas EMS/Trauma System* and formally revisit it on a scheduled basis, e.g. every 3 years.
- Develop a vision and strategy to identify and capitalize on all available revenue resources to support, enhance, and sustain the trauma system.
- Commit the necessary resources to ensure development and maintenance of a reliable statewide EMS information system.
- Collate Regional Advisory Council information to identify instances of failed or delayed interfacility transfer for all trauma patients with an emphasis on special populations (pediatric, spinal cord injury, and traumatic brain injury).
- Develop a statewide trauma system performance improvement plan and implement it.

- Establish minimum state performance improvement audit filters to adequately evaluate the trauma process and outcomes statewide, including filters for special populations (pediatric, spinal cord injury, and traumatic brain injury).
- Continue to actively pursue the purchase, installation and roll-out of a trauma registry (National Trauma Data Standard compliant) and an EMS information system (National EMS Information System compliant).

# Trauma System Assessment

## *Injury Epidemiology*

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### **Purpose and Rationale**

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Injury epidemiology is concerned with the evaluation of the frequency, rates, and pattern of injury events in a population. Injury pattern refers to the occurrence of injury-related events by time, place, and personal characteristics (for example, demographic factors such as age, race, and sex) and behavior and environmental exposures, and, thus, it provides a relatively simple form of risk-factor assessment.

The descriptive epidemiology of injury among the whole jurisdictional population (geographic area served) within a trauma system should be studied and reported. Injury epidemiology provides the data for public health action and becomes an important link between injury prevention and control and trauma system design and development. Within the trauma system, injury epidemiology has an integral role in describing the root causes of injury and identifying patterns of injury so that public health policy and programs can be implemented. Knowledge of a region's injury epidemiology enables the identification of priorities for directing better allocation of resources, the nature and distribution of injury prevention activities, financing of the system, and health policy initiatives.

The epidemiology of injury is obtained by analyzing data from multiple sources. These sources might include vital statistics, hospital administrative discharge databases, and data from emergency medical services (EMS), emergency departments (EDs), and trauma registries. Motor-vehicle crash data might also prove useful, as would data from the criminal justice system focusing on interpersonal conflict. It is important to assess the burden of injury across specific population groups (for example, children, elderly people and ethnic groups) to ensure that specific needs or risk factors are identified. It is critical to assess rates of injury appropriately and, thus, to identify the appropriate denominator (for example, admissions per 100,000 population). Without such a measure, it becomes difficult to provide valid comparisons across geographic regions and over time.

To establish injury policy and develop an injury prevention and control plan, the trauma system, in conjunction with the state or regional epidemiologist, should complete a risk assessment and gap analysis using all available data. These data allow for an assessment of the "injury health" of the population (community, state, or region) and will allow for the assessment of whether injury prevention programs are available, accessible, effective, and efficient.

An ongoing part of injury epidemiology is public health surveillance. In the case of injury surveillance, the trauma system provides routine and systematic data collection and, along with its partners in public health, uses the data to complete injury analysis, interpretation, and dissemination of the injury information. Public health officials and trauma leaders should use injury surveillance data to describe and monitor injury events and emerging injury trends in their jurisdictions; to identify emerging threats that will call for a reassessment of priorities and/or reallocation of resources; and to assist in the planning, implementation, and evaluation of public health interventions and programs.

### **OPTIMAL ELEMENTS**

I. There is a thorough description of the epidemiology of injury in the system jurisdiction using population-based data and clinical databases. **(B-101)**

- a. There is a thorough description of the epidemiology of injury mortality in the system jurisdiction using population-based data. **(I-101.1)**
- b. There is a description of injuries within the trauma system jurisdiction, including the distribution by geographic area, high-risk populations (pediatric, elderly, distinct cultural/ethnic, 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, ED data, EMS data, hospital discharge data, state police data (data from law enforcement agencies), medical examiner data, trauma registry, and other data sources. The description is updated at regular intervals. **(I-101.2)** 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).
- c. There is comparison of injury mortality using local, regional, statewide, and national data. **(I-101.3)**
- d. Collaboration exists among EMS, public health officials, and trauma system leaders to complete injury risk assessments. **(I-101.4)**
- e. The trauma system works with EMS and public health agencies to identify special at-risk populations. **(I-101.7)**

II. Collected data are used to evaluate system performance and to develop public policy. **(B-205)**

- a. Injury prevention programs use trauma management information system data to develop intervention strategies. **(I-205.4)**

III. The trauma, public health, and emergency preparedness systems are closely linked. **(B-208)**

- a. 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. **(I-208.1)**

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

- a. The lead agency, along with partner organizations, prepares annual reports on the status on injury prevention and trauma care in the state, regional, or local areas. **(I-304.1)**
- b. The trauma system management information system database is available for routine public health surveillance. There is concurrent access to the databases (ED, 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. **(I-304.2)**

#### **CURRENT STATUS**

The estimated population for Texas is 25 million, and injury is the leading cause of death in all ages under 45 years. More potential years of lives lost are related to injury than to any other health problem.

Texas has valuable personnel resources (two full-time epidemiologists and a research specialist) supporting the emergency medical services (EMS) and trauma program located in the Environmental Epidemiology and Injury Surveillance Group of the Department of State Health Services' (DSHS) Division of Prevention and Preparedness (DPP). The DPP has access to several population-based datasets that can be used to describe the patterns of injury in the state. The DPP also has state registries for spinal cord injury (SCI) and traumatic brain injury (TBI). Unfortunately, the current state EMS and trauma registry was reported to be dysfunctional, and thus it is not a reliable resource for injury morbidity data. Emergency department data are not collected

The state appears to have the injury epidemiology resources to describe the patterns of injury mortality and morbidity, and the costs of injury using these databases; as such, a report was prepared for the State and Territorial Injury Prevention Directors Association (STIPDA) assessment in 2008. However, a comprehensive description of injury patterns is not prepared on a regular basis. The State did receive a Crash Outcomes Data Evaluation System (CODES) grant in 2002 that provided resources for data linkage between some databases; however, it was reported that linkage with the Universal Billing 2004 (UB04) data

(hospital discharge data) is not permitted by statute. It was reported that data linkage can be performed between several other state data sets, but it is unclear if this occurs on a routine basis. The epidemiologists do respond to individual requests for injury data, but it is not known if the regional advisory councils (RACs) and other injury prevention advocates know about this resource.

A summary description of the five leading causes of injury mortality, hospitalizations, age, and costs was provided in the pre-review questionnaire (PRQ). A table of leading causes of injury mortality for each RAC was also provided. However, these reports do not fully describe the possible patterns of injuries throughout the state. Recent reports on the state's injury website include the injury data requested by Governor's Emergency Medical Services and Trauma Advisory Council (GETAC) in 2009 and a TBI hospitalizations report. Injury-specific data available on the website include only firework-related injury and suicide. Information about burns and many other mechanisms of injury would be valuable to stakeholders. It was reported that the DPP is initiating a focus on occupational injuries. An additional resource providing a description of injuries is the Child Fatality Review Team annual report. Links to all injury data reports are not on the injury home page, which presents a challenge to individuals interested in injury data.

## **RECOMMENDATIONS**

- **Coordinate meetings between the state Office of EMS and Trauma Systems (OEMS/TS), the Regional Advisory Councils and the state Division of Prevention and Preparedness injury epidemiologists to evaluate and explore existing datasets to generate trauma data to describe the patterns of injury in the state.**
- Prepare a comprehensive biennial state report of the epidemiology of injuries (age, sex, race, regional patterns, severity, comparison within the state and with national data, etc.) using all available population-based data resources.
- Collaborate with the Governor's Emergency Medical Services and Trauma Advisory Council (GETAC) injury prevention committee to develop a template for a standard regional injury report and provide it to each region on a biennial basis.
- Create partnerships with Texas schools of public health to obtain data consultation and practicum students to assist with data queries.
- Consider the establishment of an emergency department discharge database.
- Continue to seek authorization to link hospital discharge data with other data sets.

- Identify all injury data resources prepared by state programs (e.g. Child Fatality Review Team annual reports) or state data available from national data sets (e.g. FARS) and create a linkage to the datasets or injury reports on the state's injury website home page.

## ***Indicators as a Tool for System Assessment***

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### **Purpose and Rationale**

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In the absence of validated national benchmarks, or norms, the benchmarks, indicators and scoring (BIS) process included in the Health Resources and Services Administration's *Model Trauma System Planning and Evaluation* document provides a tool 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 tool also addresses reducing the burden of injury as a community-wide public health problem, not strictly as a trauma patient care issue.

This BIS tool provides the instrument and process for a relatively objective state and substate (regional) trauma system self-assessment. The BIS process allows for the use of state, regional, and local data and assets to drive consensus responses to the BIS. It is essential that the BIS process be completed by a multidisciplinary stakeholder group, most often the equivalent of a state trauma advisory committee. The BIS process can help focus the discussion on various system strengths and weaknesses, can be used to set goals or benchmarks, and provides the opportunity to target often limited resources and energies to the areas identified as most critical during the consensus process. The BIS process is useful to develop a snapshot of any given system at a moment in time. However, its true usefulness is in repeated assessments that reveal progress toward achieving various benchmarks identified in the previous application of the BIS. This process further permits the trauma system to refine goals to be attained before future reassessments using the tool.

#### **OPTIMAL ELEMENT**

- I. 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. **(B-300)**

#### **CURRENT STATUS**

The State of Texas has not used the Benchmark, Indicator and Scoring (BIS) process contained in the Health Resources and Services Administration (HRSA) *Model Trauma System Planning and Evaluation* (MTSPE) document in any formal or structured way. Some discussion has recently occurred about including some select number of indicators in the system-wide performance improvement process.

In 2005, 46 representatives from the Southwest Texas RAC participated in a field test of the BIS sponsored by HRSA and the American College of Surgeons (ACS). All 113 indicators from the MTSPE were scored over a two-day period. Feedback received during that field test indicated that the majority of the participants found the process and the tool useful (4.43 overall on a semantic differential scale of 1-5). Comments from participants of that field test included:

- Enjoyable, helpful process, very positive, constructive and strong exercise;
- It at last got us closer to some consensus on issues;
- Saw many areas where we need to get to work;
- Very helpful;
- Great opportunities to self-evaluate our strengths and weaknesses;
- Excellent strong basis for strategic planning and priority setting

The BIS process has not been repeated in the Southwest Texas RAC to mark progress across all or a selected number of indicators. No other RAC has chosen to undergo the process. Knowledge of the tool was limited among stakeholders at the trauma system consultation (TSC).

## RECOMMENDATIONS

- Select a reasonable number of indicators from the *Model Trauma Systems Planning and Evaluation* document from each of the three core public health functions (assessment, policy development, assurance) to develop a measurement tool that can be used consistently by all the regional advisory councils (RACs).
  - Use this tool to assist individual RACs, the State Office of EMS and Trauma, and the Governor's EMS and Trauma Advisory Council (GETAC) to establish baseline performance measures and to evaluate changes in RAC maturation over time.
- Provide training to Texas EMS Trauma and Acute Care Foundation (TETAF) representatives and/or other interested parties related to the facilitation of the BIS process.
- **Require all Regional Advisory Councils to complete a regional assessment with a facilitator using the same set of indicators selected by the State from the Health Resources and Services Administration's *Model Trauma System Planning and Evaluation* document.**
- Compile data from RAC assessments and require repeated facilitated assessments at specific intervals, e.g., every 3 years.

# Trauma System Policy Development

## *Statutory Authority and Administrative Rules*

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### **Purpose and Rationale**

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Reducing morbidity and mortality due to injury is the measure of success of a trauma system. A key element to this success is having the legal authority necessary to improve and enhance care of injured people through comprehensive legislation and through implementing regulations and administrative code, including the ability to regularly update laws, policies, procedures, and protocols. In the context of the trauma system, comprehensive legislation means the statutes, regulations, or administrative codes necessary to meet or exceed a predescribed set of standards of care. It also refers to the operating procedures necessary to continually improve the care of injured patients from injury prevention and control programs through postinjury rehabilitation. The ability to enforce laws and rules guides the care and treatment of injured patients throughout the continuum of care.

There must be sufficient legal authority to establish a lead trauma agency and to plan, develop, maintain, and evaluate the trauma system during all phases of care. In addition, it is essential that as the development of the trauma system progresses, included in the legislative mandate are provisions for collaboration, coordination, and integration with other entities also engaged in providing care, treatment, or surveillance activities related to injured people. A broad approach to policy development should include the building of system infrastructure that can ensure system oversight and future development, enforcement, and routine monitoring of system performance; the updating of laws, regulations or rules, and policies and procedures; and the establishment of best practices across all phases of intervention. The success of the system in reducing morbidity and mortality due to traumatic injury improves when all service providers and system participants consistently comply with the rules, have the ability to evaluate performance in a confidential manner, and work together to improve and enhance the trauma system through defined policies.

#### **OPTIMAL ELEMENTS**

- I. Comprehensive state statutory authority and administrative rules support trauma system leaders and maintain trauma system infrastructure, planning, oversight, and future development. **(B-201)**
  - a. The legislative authority states that all the trauma system components, emergency medical services (EMS), injury control, incident management, and planning documents work together for the effective implementation of the trauma system (infrastructure is in place). **(I-201.2)**

- b. Administrative rules and regulations direct the development of operational policies and procedures at the state, regional, and local levels. **(I-201.3)**

II. The lead agency acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to the trauma system. **(B-311)**

- a. Laws, rules, and regulations are routinely reviewed and revised to continually strengthen and improve the trauma system. **(I-311.4)**

## **CURRENT STATUS**

A significant strength of the Texas trauma and emergency care system is that it has a well written statute, (Health and Safety Code, Section 773) and administrative rule (Texas Administrative Code 157) with sufficient authority for system development and administrative and regulatory oversight. The current senior leadership within the DSHS Division for Regulatory Services/Health Care Quality Section for the EMS and trauma systems is supportive. Leadership for the continued review and improvement of the state's trauma and emergency care system is provided. The statutory authority and departmental support provides the opportunity to identify and collaborate with the numerous stakeholders for trauma and EMS system development to include the Texas Hospital Association, prehospital provider organizations, health professional organizations, and numerous governmental and non-governmental entities.

The Texas Office of EMS and Trauma Systems (OEMS/TS) is the designated lead agency for the trauma and emergency care system in the DSHS. This office has the responsibility to develop and monitor the statewide EMS and trauma care system that includes but is not limited to: trauma center designation, RAC designations, system design and operation, medical review and audit for performance improvement and quality assurance, and identification of the total annual amount of uncompensated trauma care from designated trauma centers.

In addition, the Code provides authority for the lead agency to distribute funding for designated trauma centers, RAC's, and EMS agencies. The Code does not provide funding for uncompensated care to non-designated trauma centers or physicians. Although the OEMS/TS has excellent staff, Texas Code 773 does not include the trauma system leadership positions essential to providing vision and direction for the future development and implementation of the EMS and trauma program.

Texas Code 773.114 is a significant strength for the EMS and trauma system. This code requires local or regional medical control, the development and use of triage, transport, and transfer protocols, and the categorization of hospitals according to trauma care capabilities by the lead agency.

Code 773 needs revision to include a statewide EMS system medical director and trauma system program manager to maintain system continuity for development and oversight from a clinical and operational standpoint. Additionally, the trauma registrar that resides in the DPP Environmental and Injury Epidemiology and Toxicology Unit needs a clearly defined role in Code to address how the position interacts with the trauma system and supports the state's plan to develop and manage the statewide performance improvement (PI) program and trauma registry as required in Texas Code Chapter 773.113. The GETAC is established in Code 773.012, has 15 members, and is required to meet quarterly in Austin. Only one GETAC member is a designated trauma representative. The GETAC is advisory to the DSHS and works to promote, develop, and maintain a comprehensive EMS and trauma system, which will meet the needs of all patients and raise the standards for community health care by implementing innovative techniques and systems for the delivery of emergency care for the entire population. The GETAC has a broad range of responsibility and currently has ten committees. Only one committee is representing trauma systems. The GETAC is beginning to address other system of care issues such as stroke and ST-elevated myocardial infarction (STEMI). Consideration should be given to increasing the number of trauma representatives on the GETAC to ensure that an adequate voice for the trauma system exists as these new emergency care programs develop.

The state has a clearly defined process in Texas Administrative Code 157.125 to establish criteria and methods for designating healthcare facilities that meet levels of trauma care capabilities and to identify those facilities best equipped and staffed to care for patients experiencing emergency injuries or illness. This section also authorizes the Division for Regulatory Services/Health Care Quality Section/Office of EMS and Trauma Systems to designate healthcare facilities as trauma centers.

A significant strength of the state's trauma and emergency care system is the enactment of Texas Code 773.095 and as amended in 2001. This legislation provides for the protection of peer review or quality improvement committees for EMS and trauma systems. Section (a) of the statute states "The proceedings and records of organized committees of hospitals, medical societies, emergency medical services providers, emergency medical services and trauma care systems, or first responder organizations relating to the review, evaluation, or improvement of an emergency medical services provider, a first responder organization, an emergency medical services and trauma care system, or emergency medical services personnel are confidential and not subject to disclosure by court subpoena or otherwise." It was reported that the code has been tested, and was successfully upheld.

Hospital participation in the statewide trauma system is voluntary. Liability protection and funding as provided in Code 773.095 serve as an incentive for participation in the system. To improve trauma care statewide, all hospitals

should be encouraged to participate at some level in an inclusive statewide trauma system.

## **RECOMMENDATIONS**

- Define in code the role of the state trauma registrar and how the position functions within the current organization structure of the lead agency.
- **Comply with the Texas Code 773.113 for the development of a statewide trauma reporting and analysis system.**
- Add additional trauma-focused representatives to the GETAC to better reflect trauma system development, e.g. injury prevention, rehabilitation, trauma program managers.

## ***System Leadership***

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### **Purpose and Rationale**

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In addition to lead agency staff and consultants (for example, trauma system medical director), there are other significant leadership roles essential to developing mature trauma systems. A broad constituency of trauma leaders includes trauma center medical directors and nurse coordinators, prehospital personnel, injury prevention advocates, and others. This broad group of trauma leaders works with the lead agency to inform and educate others about the trauma system, implements trauma prevention programs, and assists in trauma system evaluation and research to ensure that the right patient, right hospital, and right time goals are met. There is a strong role for the trauma system leadership in conveying trauma system messages, building communication pathways, building coalitions, and collaborating with relevant individuals and groups. The marketing communication component of trauma system development and maintenance begins with a consensus-built public information and education plan. The plan should emphasize the need for close collaboration between coalitions and constituency groups and increased public awareness of trauma as a disease. The plan should be part of the ongoing and regular assessment of the trauma system and be updated as frequently as necessary to meet the changing environment of the trauma system.

When there are challenges to providing the optimal care to trauma patients within the system, the leadership needs to effect change to produce the desired results. Broad system improvements require the ability to identify challenges and the resources and authority to make changes to improve system performance. However, system evaluation is a shared responsibility. Although the leadership will have a key role in the acquisition and analysis of system performance data, the multidisciplinary trauma oversight committee will share the responsibility of interpreting those data from a broad systems perspective to help determine the efficiency and effectiveness of the system in meeting its stated performance goals and benchmarks. All stakeholders have the responsibility of identifying opportunities for system improvement and bringing them to the attention of the multidisciplinary committee or the lead agency. Often, subtle changes in system performance are noticed by clinical care providers long before they become apparent through more formal evaluation processes.

Perhaps the biggest challenge facing the lead agency is to synergize the diversity, complexity, and uniqueness of individuals and organizations into a finely tuned system for prevention of injury and for the provision of quality care for injured patients. To meet this challenge, leaders in all phases of trauma care must demonstrate a strong desire to work together to improve care provided to injured victims.

## OPTIMAL ELEMENTS

- I. 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 other citizen organizations. **(B-202)**
- II. Collected data are used to evaluate system performance and to develop public policy. **(B-205)**
- III. Trauma system leaders, including a trauma-specific statewide multidisciplinary, multiagency advisory committee, regularly review system performance reports. **(B-206)**
- IV. 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. **(B-207)**

## CURRENT STATUS

Texas has an established leadership role in trauma care. Many international leaders in trauma patient care call Texas home. Numerous clinical trauma care protocols used around the world originated within Texas. Designation of the state's twenty-two regions for trauma system implementation is evidence of exceptional early trauma system development work. Following those early efforts, it appears that Texas trauma system development has slowed and may even be static. The elimination of the trauma program manager position from OEMS/TS illustrates this and may have contributed to the slowed development.

Trauma system leadership is decentralized within the state. Each trauma system constituent feels some responsibility for leadership. Participants told the site visit team (SVT) that leadership begins at the scene of injury with medics wanting the best care for their patients, then is consolidated at the RAC organizational level, and finally at OEMS/TS. The vision, direction, and priority-setting for all these constituent groups are set by the GETAC, consisting of 15 statute-mandated positions which include only one trauma representative, currently a surgeon. Additionally, the 501c3 Texas EMS Trauma & Acute Care Foundation (TETAF) appears to play a supplementary but sometimes parallel role to OEMS/TS.

This approach of disseminated trauma system leadership limits the ability of OEMS/TS to identify challenges to trauma system development and optimal function. Other challenges include:

- In 2004, state offices were reorganized based on function rather than program. This organizational structure is especially challenging for leadership of the trauma program as trauma care is cross-cutting from prevention, prehospital care and transport, hospital-based care, and rehabilitation and recovery. Numerous functions need to be well coordinated for the system to be effective and evolve, such as setting standards of care, hospital and health professional licensure, facility designation, triage and transportation of injured patients, assessing the patterns of injury, and data management to evaluate system performance.
- New emergency care programs, such as stroke and STEMI, result in emerging competition for the attention and financial resources of OEMS/TS and its constituents, particularly the RACs. The RACs were formed to develop the trauma system, and now they are also tasked with implementing other emergency care programs without additional resources.
- The final and most important obstacle to leadership for further trauma system development is the absence of statewide trauma system performance data. Until a functional statewide trauma registry has been in place for several years, containing reliable data from all constituents, identification of problems and improvement in system performance will be limited.

Despite these many challenges, it is evident that the individuals representing the RACs, GETAC, TETAF, and OEMS/TS have the expertise, energy, and commitment to make future development of Texas' trauma system successful.

## **RECOMMENDATIONS**

- **Re-establish the position and hire a full-time trauma system program manager.**
  - The successful candidate will have both clinical and programmatic experience
- Expand trauma representation on the GETAC.
- Provide system-performance data to GETAC.
- Lead RACs through trauma system needs assessment, development, and quality improvement activities.

## ***Coalition Building and Community Support***

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### **Purpose and Rationale**

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Coalition building is a continuous process of cultivating and maintaining relationships with constituents (interested citizens) in a state or region who agree to collaborate on injury control and trauma system development. Key constituents include health professionals, trauma center administrators, prehospital care providers, health insurers and payers, data experts, consumers and advocates, policy makers, and media representatives. The coalition of key constituents comprises the trauma system's stakeholders. The involvement of these key constituents is important for the following:

- f* Trauma system plan development
- f* Regionalization: promoting collaboration rather than competition between trauma centers
- f* System integration
- f* State policy development: authorizing legislation and regulations
- f* Financing initiatives
- f* Disaster preparedness

The coalition should be effectively organized through the formation of multidisciplinary state and regional advisory groups to coordinate trauma system planning and implementation efforts. Constituents also communicate with elected officials and policy leaders regarding the development and sustainability of the trauma system. Information and education are needed by constituents to be effective partners in policy development for trauma system planning. Regular communication about the status of the trauma system helps these key partners to recognize needs and progress made with trauma system implementation.

One of the most effective ways to educate elected officials and the public is through an organized public information and education effort that may involve a media campaign about the burden of injury in the state and the need for trauma system development. Information and education are important to reduce the incidence of injury in all age groups and to demonstrate the value of an effective trauma system when a serious injury occurs.

#### **OPTIMAL ELEMENT**

- I. 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. **(B-207)**

## CURRENT STATUS

Coalition building and community support are primarily driven by the twenty-two RACs. The RAC functions are to develop and implement a regional EMS and trauma system plan, provide public information and education about prevention of trauma and the trauma system, provide a forum for EMS providers and hospitals to address trauma service area issues, network with other RACs, and document and report trauma system data that meets trauma service criteria.

Members of the RAC represent the components of the EMS and trauma system within their respective region to include EMS providers, first responder organizations, physicians, nurses, and other interested parties. The RAC also welcomes representatives from the general public.

In 1999, Chapter 773 of the Health and Safety Code was amended to create a Governor's EMS and Trauma Advisory Council (GETAC). The 15-member GETAC meets quarterly in Austin and has ten standing committees, including the following: Air Medical, Cardiac Care, Disaster/Emergency Preparedness, Education, EMS, Injury Prevention, Medical Directors, Pediatrics, Stroke, and Trauma Systems. GETAC has two public members.

Membership on the standing committees is voluntary, and each member serves a 3-year term. Members are selected based on credentials, experience, and geographical area of residence. All meetings are open with the planned committee agenda posted in the *Texas Register* 10 days prior to the meeting. Numerous state agencies, associations, foundations, and interested individuals were reported to regularly attend the GETAC and standing committee meetings to hear discussions and provide their input.

RAC leaders are expected, by rule, to attend each of the DSHS OEMS/TS quarterly RAC Chair meetings held in conjunction with the quarterly meetings of the GETAC.

The Texas EMS Trauma and Acute Care Foundation (TETAF) is a not-for-profit foundation that provides operational support to the OEMS/TS. TETAF schedules quarterly meetings in conjunction with GETAC meetings. The Foundation supports the state's implementation of rules and assists its RAC members to operationalize these rules by conducting surveys, facilitating networking and access to public and provider education, and focusing resources for research and advances in emergency/trauma care. Each subscribing RAC may designate a representative to attend meetings to assist in goal development and to participate in one of the eight TETAF standing committees (Acute Care, Disaster Preparedness, Education, EMS, Injury Prevention, Pediatric, RAC, and Trauma).

The RACs, GETAC, and TETAF have highly motivated and dedicated individuals who wish to provide the best trauma care to the citizens of Texas. This current

structure provides for open communication and information sharing in which the stakeholders are reported to be vocal and able to share concerns about system challenges or deficiencies with DSHS and the state legislature. Constituents of the trauma system have a history of being active when the state legislature meets and have successfully obtained several funding sources for the trauma system and trauma centers.

Some citizens of Texas who live in rural and frontier locations have limited access to health and trauma care. EMS is not an essential service by state statute, so access to EMS is determined by local rule. Numerous issues have been identified such as distance to care, recruitment of health care professionals, loss of legislative representation of rural areas due to redistricting, a state law that bans hospitals from hiring doctors, rule changes from state medical regulatory boards that are unworkable in rural clinics and hospitals, economic hardships of keeping rural and frontier hospitals and EMS provider agencies financially viable, and a large, transient, pass-through population along major interstate highways.

The strategic plan identified education of the health insurance industry as an important strategy for trauma system development and integration and as a way to reduce barriers for appropriate payment for trauma care.

#### **RECOMMENDATIONS**

- Create a rural standing committee of the Governor's EMS and Trauma Advisory Council and engage the Office of Rural Health to explore issues that cause barriers to trauma care access in rural areas.
- Enlist the Texas EMS Trauma and Acute Care Foundation to develop and provide an educational program aimed at policy makers and regulators of the Texas health insurance industry regarding the scope and financial impact of providing trauma care.

## ***Lead Agency and Human Resources Within the Lead Agency***

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### **Purpose and Rationale**

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Each trauma system (state, regional, local, as defined in state statute) should have a lead agency with a strong program manager who is responsible for leading the trauma system. The lead agency, usually a government agency, should have the authority, responsibility, and resources to lead the planning, development, operations, and evaluation of the trauma system throughout the continuum of care. The lead agency, empowered through legislation, ensures system integrity and provides for program integration with other health care and community-based entities, namely, public health, EMS, disaster preparedness, emergency management, law enforcement, social services, and other community-based organizations.

The lead agency works through a variety of groups to accomplish the goals of trauma system planning, implementation, and evaluation. The ability to bring multidisciplinary, multiagency advisory groups together to accomplish trauma system goals is essential in developing and maintaining the trauma system and is part of providing leadership to evolving and mature systems.

The lead agency's trauma system program manager coordinates trauma system design, the adoption of minimum standards (prehospital and in-hospital), and provides for overall system evaluation through performance indicator assessment and assurance. In addition to a trauma program manager, the lead agency must be sufficiently staffed to actively participate in each phase of development and in maintaining the system through a clearly defined structure for decision making (policies and procedures) and through proactive surveillance and evaluation. *Minimum* staffing usually consists of a trauma system program manager, data entry and analysis personnel, and monitoring and compliance personnel. Additional staff resources include administrative support and a part-time commitment from the public health epidemiology service to provide system evaluation and research support.

Within the leadership and governance structure of the trauma system, there is a role for strong physician leadership. This role is usually fulfilled by a full- or part-time trauma medical director within the lead agency.

### **OPTIMAL ELEMENTS**

- I. Comprehensive state statutory authority and administrative rules support trauma system leaders and maintain trauma system infrastructure, planning, oversight, and future development. **(B-201)**

- a. The legislative authority (statutes 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. **(I-201.1)**
  - b. The lead agency has adopted clearly defined trauma system standards (for example, facility standards, triage and transfer guidelines, and data collection standards) and has sufficient legal authority to ensure and enforce compliance. **(I-201.4).**
- II. Sufficient resources, including financial and infrastructure-related, support system planning, implementation, and maintenance. **(B-204)**

## **CURRENT STATUS**

The trauma system is currently managed by the OEMS/TS within the Division for Regulatory Services/Health Care Quality Section. The organizational chart reflects a non-programmatic model with 19 positions funded in the lead agency that are dedicated to the statewide EMS and trauma system.

The organizational structure is confusing and provides opportunity for significant gaps and inefficiency in the management of the EMS and trauma system. The program is managed operationally by the OEMS/TS unit director who reports directly to the Director of the Healthcare Quality Section.

The OEMS/TS unit director has three direct report groups: EMS Trauma Systems group, Stakeholder Information group, and the State EMS Director. The State EMS Director serves in a coordination and facilitator role and has no direct-report employees.

All of the licensing and compliance staff report through managers to the Director of Healthcare Quality Section. The trauma registrar reports to a manager in the DPP with limited interaction with the OEMS/TS. No dotted line relationship with the trauma registrar is reflected on the organizational chart.

The state trauma program manager position was absorbed by the division, and the individual filling the trauma program manager position was assigned contract responsibilities. The re-establishment of the EMS and Trauma System State Trauma Program Manager is essential to facilitating the coordination and integration of overall system planning and evaluation.

The organizational structure of the EMS and trauma system makes it difficult to determine if the number of staff assigned to manage the trauma program is adequate to accomplish the statutorily mandated responsibilities.

The Texas EMS and trauma systems are to be commended for the excellent collaboration taking place among the many stakeholders. However, the GETAC should have its membership expanded to include additional trauma stakeholders so that they can be more representative of trauma system components.

The SVT were informed that some best practices are occurring among individual RACs, and these practices need to be replicated statewide. A trauma system program manager should lead the efforts to effectively replicate the best practices and serve as a resource for the trauma system stakeholders.

Additionally, the EMS and trauma system should contract for the part-time services of a physician to provide the lead agency with consultation on the development of the statewide trauma system, as well as system evaluation efforts. This state trauma medical director can also be of assistance to the regional and local medical directors through collaborative efforts focused on medical oversight. It is a justifiable investment to have a state trauma medical director to assist in managing both the clinical aspects of a state trauma and emergency care system and the administrative responsibilities associated with a program that is ready to begin a new planning and development phase.

Given the existing organizational structure, the SVT believes that the EMS and trauma system lacks vision and a clear direction for future planning and system development. It is essential that qualified personnel with the appropriate clinical and administrative skill sets are available to lead the next phases of the statewide trauma system and emergency care system development and implementation. It is unclear to the SVT that the staff resources are sufficient and allocated appropriately to best manage the EMS and trauma system.

## **RECOMMENDATIONS**

- Analyze the current position functions within the lead agency to identify staffing resources needed to more effectively and efficiently manage the development and implementation of the statewide trauma system.
  - Determine if any existing positions should be realigned to needed functions.
  - Determine if any additional positions are needed.
- **Re-establish the position and hire a full-time trauma system program manager.**
- **Establish a state trauma medical director position or consultant and clearly define this individual's role.**

- Redefine the organizational structure of the trauma system program to be programmatic in nature. All components of the EMS and Trauma System should report to the director of the lead agency.
- In the interim, establish an internal agency system integration group to coordinate all trauma system administrative and operational components across divisions.

## ***Trauma System Plan***

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### **Purpose and Rationale**

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Each trauma system, as defined in statute, should have a clearly articulated trauma system planning process resulting in a written trauma system plan. The plan should be built on a completed inventory of trauma system resources identifying gaps in services or resources and the location of assets. It should also include an assessment of population demographics, topography, or other access enhancements (location of hospital and prehospital resources) or barriers to access. It is important that the plan identify special populations (for example, pediatric, elderly, in need of burn care, ethnic groups, rural) within the geographic area served and address the needs of those populations within the planning process. A needs assessment (or other method of identifying injury patterns, patient care review/preventable death study) should also be completed for initial trauma system planning and updated periodically as needed to assess system changes over time.

The trauma system plan is developed by the lead trauma agency based on the results of a needs assessment and other data resources available for review. It describes the system design, integrated and inclusive, with adopted standards of care for prehospital and hospital personnel and a process to regularly review the plan over time. The plan is built on input from trauma advisory committees (or stakeholder groups) that assist in analyzing data, identifying resources, and developing system standards of care, including system policies and procedures and overall system design. Ideally, although every stakeholder group may not be satisfied with the plan or system design, the plan, to the extent possible, should be based on consensus of the advisory committees and stakeholder groups. These advisory groups should be able to review the plan before final adoption and approve the plan before it is submitted to the lead agency with authority for plan approval.

The trauma system plan is used to guide system development, implementation, and management. Each component of the trauma system (for example, prehospital, hospital, communications, and transportation) is clearly defined and an established service level identified (baseline) with goals for enhancement (benchmark). Within the plan are incorporated other planning documents used to ensure integration of similar services and build collaboration and cooperation with those services. Service plans for emergency preparedness, EMS, injury prevention and control, public health, social services, and mental health are examples of services for which the trauma system plan should include an interface between agencies and services.

## OPTIMAL ELEMENT

I. 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. **(B-203)**

- a. 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. **(I-203.4)**

## CURRENT STATUS

The State of Texas is to be commended on its many planning efforts over the years. Specific to trauma, the development of *A Strategic Plan for the Texas EMS/Trauma System*, published in 2002 marks the most recent and specific planning process germane to trauma system development. The genesis of that report is best described in the report itself. "In 2001, the 77th Texas Legislature passed House Bill (HB) 2446 regarding emergency medical services. Section 2 of this bill mandated GETAC to 'assess the need for emergency medical services in the rural areas of the state' and to 'develop a strategic plan for refining the educational requirements for certification and maintaining certification as emergency medical services personnel and developing emergency medical services and trauma care systems'." (p.12)

Among other important features of the document are the vision and mission statements articulated for the integrated EMS/trauma system:

"Vision: A unified, comprehensive, and effective EMS/Trauma System for a healthy, safe Texas.

Mission: To promote, develop, and maintain a comprehensive EMS/Trauma System that will meet the needs of all patients and that will raise the standards for community health care by implementing innovative techniques and systems for the delivery of emergency care for the entire population." (p. 15)

The strategic plan notes some of the challenges faced by Texas in achieving the stated mission and vision. These are described in the following statements: "Unfortunately, not every emergency call in Texas evolves in an organized, integrated fashion with all the elements present and effective... The system faces significant challenges in both the regulation and system development aspects..." (p. 11). As reported to the SVT, these statements still hold true today.

Two primary challenges have hampered the achievement of many of the objectives and strategies contained in the document. First, the plan has no specific “owner”. While it was developed under the auspices of the GETAC, the OEMS/TS, the twenty-two RACs, and other agencies and individuals have stated responsibilities in completing one or more of the identified activities. No one agency or individual appears to have the ability to complete the tasks or the authority to specifically delegate the completion of those tasks to others. Because no one “owns” the plan, no one has been held accountable for its completion. While the plan notes “GETAC intends this plan to be a ‘living’ document that will be evaluated and updated on an on-going basis” (p. 13), the plan has not been revisited in a formal way since its completion nearly eight years ago. Progress has not been tracked, priorities have not been re-assigned, and new resources have not been allocated to support the identified tasks. The newly elected GETAC chairman is to be commended for recognizing the need to revisit this document within the next several months.

The second issue is the unintended consequence of an absolutely well-intentioned decision to merge, integrate, or otherwise consider the EMS and trauma systems as a single system. While they are both part of a broader emergency care system, they each have unique challenges that are deserving of their own plan and focus. The needs of each system should not be overlooked or understated because of the integration of the two systems. Separate goals, objectives, and tasks should be outlined for both systems. The challenge of the combination may be best illustrated by example. Will the emerging stroke or emergency care system, upon the completion of its plan be known as the EMS/stroke strategic plan? EMS/STEMI strategic plan? EMS/pediatric strategic plan? EMS is a unique system that crosses the entire emergency care spectrum. It needs its own focused planning effort which is clearly integrated with trauma.

The state is to be commended for requiring each of the 22 RACs to have a trauma plan, and each of the RACS are to be commended for developing a trauma plan. The variable needs of each RAC by resource and demographic and geographic challenges are evident in each plan. The SVT reviewed a select number of regional plans and found that they had a wide range of detail and specificity. Collapsing, combining, or even reporting out similarities and differences between and among the plans would be a daunting challenge.

## RECOMMENDATIONS

- **Update the *Strategic Plan for the Texas EMS/Trauma System* and formally revisit it on a scheduled basis, e.g. every 3 years.**
  - Provide for separate sections or separate documents that focus on the specific needs of both the EMS and trauma system.
  - Integrate public health principles contained in the 2006 *Model Trauma System Planning and Evaluation* document published by the federal Health Resources and Services Administration.
  - Assign accountability for the monitoring and completion of the plan to a single agency or entity.
  - Align existing resources (fiscal and human) with the priority tasks.
  - Develop all objectives, strategies, and tasks in a measurable and time referenced framework with specific agencies, entities, or individuals assigned to each process.

## ***System Integration***

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### **Purpose and Rationale**

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Trauma system integration is essential for the daily care of injured people and includes such services as mental health, social services, child protective services, and public safety. The trauma system should use the public health approach to injury prevention to contribute to reducing the entire burden of injury in a state or region. This approach enables the trauma system to address primary, secondary, and tertiary injury prevention through closer integration with community health programs and mobilizing community partnerships. The partnerships also include mental health, social services, child protection, and public safety services. Collaboration with the public health community also provides access to health data that can be used for system assessment, development of public policy, and informing and educating the community.

Integration with EMS is essential because this system is linked with the emergency response and communication infrastructure and transports severely injured patients to trauma centers. Triage protocols should exist for treatment and patient delivery decisions. Regulations and procedures should exist for online and off-line medical direction. In the event of a disaster affecting local trauma centers, EMS would have a major role in evacuating patients from trauma centers to safety or to other facilities or to make beds available for patients in greater need.

The trauma system is a significant state and regional resource for the response to mass casualty incidents (MCIs). The trauma system and its trauma centers are essential for the rapid mobilization of resources during MCIs. Preplanning and integration of the trauma system with related systems (public health, EMS, and emergency preparedness) are critical for rapid mobilization when a disaster or MCI occurs. The extensive impact of disasters and MCIs on the functioning of trauma centers and the EMS and public health systems within the affected region or state must be considered, and joint planning for optimal use of all resources must occur to enable a coordinated response to an MCI. Trauma system leaders need to be actively involved in emergency management planning to ensure that trauma centers are integrated into the local, regional, and state disaster response plans.

#### **OPTIMAL ELEMENTS**

I. 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. **(B-203)**

- a. The trauma system plan has established clearly defined methods of integrating the trauma system plan with the EMS, emergency, and public health preparedness plans. **(I-203.7)**

II. The trauma, public health, and emergency preparedness systems are closely linked. **(B-208)**

## **CURRENT STATUS**

The state trauma plan is aging and without ownership. All RAC's have developed trauma plans that are reviewed on an annual basis. Many regional plans include linkages to public safety agencies, child protection services, and mental health services.

The trauma system in Texas is maturing, and because of the state's size, integration and the necessary linkages and other operational components occur at the Trauma Service Area (TSA) or RAC level with state oversight. The RACs have developed cooperative relationships with local chapters of national voluntary organizations such as Mothers Against Drunk Driving (MADD) and Safe Kids.

Texas is fortunate to have the several schools of public health, and although some of the RACs have established linkages with these schools, an opportunity for stronger collaboration and research exists. At the state level there is coordination with the DPP Environmental and Injury Epidemiology and Toxicology Unit but this appeared to be underutilized. The director of this office stated that reports, specific to individual TSA injury data, could be provided on a regular basis or upon request. The state also enjoys a close affiliation with the Texas Department of Transportation (TXDOT), and through this relationship, the RACs are able to provide a number of educational programs such as "Safe Routes to School", "Click it or Ticket", and many other public service announcements.

The pediatric trauma components seem especially active, with a GETAC pediatric committee, the development of pediatric standards, interfacility transfer guidelines, and specific performance measures.

Some duplication of effort is occurring with some state system integration efforts being performed by the GETAC, TETAF, and the RACs.

The state has experienced severe hurricanes leading to the closure of trauma facilities and the subsequent disruption of usual trauma patient flow. The SVT was not surprised to find a strong relationship at all levels with emergency preparedness. The trauma and emergency preparedness systems appear to function well and should be noted as an example of "best practice."

## **RECOMMENDATIONS**

- Encourage Regional Advisory Councils to establish more formal linkages with schools of public health for collaborative efforts in injury prevention and research.
- Recognize and continue support for the excellent collaboration - at all levels - between the trauma and emergency preparedness communities.
- Increase opportunities for Regional Advisory Councils to share best practices.

## ***Financing***

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### **Purpose and Rationale**

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Trauma systems need sufficient funding to plan, implement, and evaluate a statewide or regional system of care. All components of the trauma system need funding, including prehospital, acute care facilities, rehabilitation, and prevention programs. Lead agency trauma system management requires adequate funding for daily operations and other important activities such as advisory committee meetings, development of regulations, data collection, performance improvement, and public awareness and education. Adequate funding to support the operation of trauma centers and their state of readiness to care for seriously injured patients within the state or region is essential. The financial health of the trauma system is essential for ensuring its integrity and its improvement over time.

The trauma system lead agency needs a process for assessing its own financial health, as well as that of the trauma system. A trauma system budget should be prepared, and costs should be reported by each component, if possible. Routine collection of financial data from all participating health care facilities is encouraged to fully identify the costs and revenues of the trauma system, including costs and revenues pertaining to patient care, administrative, and trauma center operations. When possible, the lead agency financial planning should integrate with the budgets and costs of the EMS system and disaster, rehabilitation, and prevention programs to enable development of a comprehensive financial health report.

Trauma system financial planning should be related to the trauma plan outcome measures (for example, patient outcome measures such as mortality rates, length of stay, and quality-of-life indicators). Such information may demonstrate the value added by having a trauma system in place.

#### **OPTIMAL ELEMENTS**

- I. Sufficient resources, including financial and infrastructure-related, support system planning, implementation, and maintenance. **(B-204)**
  - a. Financial resources exist that support the planning, implementation, and ongoing management of the administrative and clinical care components of the trauma system. **(I 204.2)**
  - b. Designated funding for trauma system infrastructure support (lead agency) is legislatively appropriated. **(I-204.3)**

- c. Operational budgets (system administration and operations, facilities administration and operations, and EMS administration and operations) are aligned with the trauma system plan and priorities. **(I-204.4)**

II. The financial aspects of the trauma systems are integrated into the overall performance improvement system to ensure ongoing fine tuning and cost-effectiveness. **(B-309)**

- a. 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. **(I-309.2)**

## **CURRENT STATUS**

Texas is very fortunate to have state appropriations to support the trauma system infrastructure and provide reimbursement for uncompensated care to the state designated trauma centers. State trauma funding is generated from a percentage of the following six sources:

- Photographic Traffic Signal Enforcement System (Red Light Cameras).
- Interest from the EMS and Trauma Care Tobacco Endowment.
- The 911 Equalization Surcharge funds.
- \$100.00 Driving Under the Influence (DUI)/Driving While Intoxicated (DWI) Conviction Surcharge.
- \$ 30.00 Traffic Fine
- Driver Responsibility Program

State funding also allows opportunities for a more structured system planning and development effort. The budget submitted for SVT review was for a total of \$84 million, with a requirement that 97% of the funds be distributed to designated trauma centers, EMS agencies, and the RACs. Funds are distributed in accordance with an established distribution formula outlined in Texas Code.

Designated trauma centers can also apply annually for a portion of their uncompensated care costs and are eligible for Medicaid Disproportionate Share Funding. Additional funding is also being received and distributed to hospitals from various federal grant programs.

One such program is the hospital preparedness funds from the Assistant Secretary of Preparedness and Response (ASPR). The funds allocated for Texas total \$28,404,362 for year 2010-2011. At least 80% of the funds are distributed to the hospitals and RACs for hospital preparedness in accordance with the grant pass-through requirements. Although not administered by the OMES/TS, these funds do have an impact on the state trauma system as the RACs are being charged with disaster planning and enhancing the state's medical surge capacity. Better coordination between the trauma and disaster

planning programs may lead to creative strategies that could support trauma system efforts while simultaneously supporting the disaster preparedness program.

Funding to support the EMS and trauma systems is primarily based on two year appropriations by the Texas Legislature. No statewide plan or strategy to seek continued funding necessary to sustain the trauma and emergency care system was described to the SVT. This will become an important issue as development and implementation of other time critical conditions are being added to the work of the OEMS/TS and the RACs.

Under the existing lead agency organizational structure, it is difficult for the SVT to determine the total amount of funding and dedicated staff currently supporting the EMS and trauma system. The state needs to be aggressive in seeking any available funding, especially federal funding from agencies such as the Office of Rural Health, Centers for Disease Control, and the Department of Transportation. Private foundations and Personal Injury Protection insurance riders are other potential sources of funding.

The OEMS/TS should maximize all available financial resources to support the reduction of morbidity and mortality statewide. The new trauma registry should include a mechanism to collect hospital financial data relating to trauma patients. If all acute care hospitals participate in the trauma system with submission of at least a minimal dataset to the state trauma registry, this will enhance the ability of the state to obtain actual costs and the distribution of uncompensated care and to have better data for system financial planning.

## **RECOMMENDATIONS**

- **Develop a vision and strategy to identify and capitalize on all available revenue resources to support, enhance, and sustain the trauma system.**
- Conduct an assessment of the total costs associated with the operation of the trauma and emergency care system, including the infrastructure management.
- Combine additional revenue sources where possible that support the trauma program to include the Assistant Secretary for Preparedness and Response Hospital Preparedness funding, Department of Transportation Highway Safety funding, and others identified in the assessment.
- Continue to collaborate with other agencies and private foundations to identify additional funding sources, e.g., the Rural Hospital Flexibility Grant for critical access hospitals and rural EMS agencies.

# Trauma System Assurance

## *Prevention and Outreach*

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### **Purpose and Rationale**

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Trauma systems must develop prevention strategies that help control injury as part of an integrated, coordinated, and inclusive trauma system. The lead agency and providers throughout the system should be working with business organizations, community groups, and the public to enact prevention programs and prevention strategies that are based on epidemiologic data gleaned from the system.

Efforts at prevention must be targeted for the intended audience, well defined, and structured, so that the impact of prevention efforts is systemwide. The implementation of injury control and prevention requires the same priority as other aspects of the trauma system, including adequate staffing, partnering with the community, and taking advantage of outreach opportunities. Many systems focus information, education, and prevention efforts directly to the general public (for example, restraint use, driving while intoxicated). However, a portion of these efforts should be directed toward emergency medical services (EMS) and trauma care personnel safety (for example, securing the scene, infection control). Collaboration with public service agencies, such as the department of health is essential to successful prevention program implementation. Such partnerships can serve to synergize and increase the efficiency of individual efforts. Alliances with multiple agencies within the system, hospitals, and professional associations, working toward the formation of an injury control network, are beneficial.

Activities that are essential to the development and implementation of injury control and prevention programs include the following:

- A needs assessment focusing on the public information needed for media relations, public officials, general public, and third-party payers, thus ensuring a better understanding of injury control and prevention
- A needs assessment for the general medical community, including physicians, nurses, prehospital care providers, and others concerning trauma system and injury control information
- Preparation of annual reports on the status of injury prevention and trauma care in the system
- Trauma system databases that are available and usable for routine public health surveillance

## **OPTIMAL ELEMENTS**

I. 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. **(B-207)**

- a. The trauma system leaders (lead agency, advisory committees, and others) inform and educate constituencies and policy makers through community development activities, targeted media messaging, and active collaborations aimed at injury prevention and trauma system development. **(I-207.2)**

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

- a. 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. **(I-304.1)**

III. The lead agency ensures that the trauma system demonstrates prevention and medical outreach activities within its defined service area. **(B-306)**

- a. The trauma system is active within its jurisdiction in the evaluation of community based activities and injury prevention and response programs. **(I-306.2)**
- b. The effect or impact of outreach programs (medical and community training and support and prevention activities) is evaluated as part of a system performance improvement process. **(I-306.3)**

## **CURRENT STATUS**

Injury prevention efforts across the state are fragmented with programs in many different state agencies. An effort to rebuild the state's injury prevention program is occurring with the Tier 1 priority project to bring injury and violence prevention programs together. This Tier 1 priority emerged as a result of recommendations received in the STIPDA assessment conducted in 2008. Elements of this project will involve building the infrastructure for coordination and collaboration across all divisions within DSHS involved in injury data and prevention programs, developing an agency-wide injury and violence prevention plan, and a mechanism for communication and dissemination of information. The Tier 1 initiative is being coordinated by personnel in the Center for Program Coordination, Policy and Innovation and the DPP.

Injury prevention is an important focus within the OEMS/TS. The GETAC has an injury prevention committee, and this committee produced an injury prevention

plan in 2003. However, the plan contains no Texas-specific injury mechanism priorities for intervention; rather 65 objectives from HealthyPeople 2010 are listed for potential injury prevention activity focus. The SVT did not receive information about any planned revision of the injury prevention strategic plan.

Annually, each RAC is required by contract to implement a regional injury prevention program. Many RACs participate with the Texas Department of Transportation in its Safe Travel programs. According to the desk audit tool, RACs are expected to track program effectiveness by maintenance of data or records, and/or other evidence related to the impact of injury prevention programs on regional patterns of injury. The RACs work with their members (facilities, EMS agencies, and others) to plan and conduct the program. In many cases the selected injury prevention program addresses region-specific injury problems identified from trauma center registries or regional trauma registries. Some notable injury prevention programs involve car safety seat distribution and inspection programs, bicycle helmet distribution and safe riding programs, and gun lock programs. Injury prevention advocates were successful in the 2009 state legislative session with passage of child safety booster seat legislation. One RAC reported that a recent injury prevention program is conducting an evaluation of effectiveness.

TETAF recently convened an injury prevention committee to identify methods to support injury prevention activities in the RACs. An educational program was offered in 2010, to educate RAC stakeholders about the planning, implementation, and evaluation of injury prevention programs. In addition, 10 evidence-based injury prevention strategies were identified and participants were encouraged to implement evidence-based injury prevention strategies in their future regional programs. Resources for these injury prevention strategies were provided to educational program participants, but this information is not currently available on the TETAF website.

The state has an excellent mechanism for outreach to stakeholders through the *Texas EMS* magazine that is published bimonthly. A subscription fee is charged to support the costs of the publication.

## **RECOMMENDATIONS**

- Identify a representative from the Office of EMS and Trauma Systems to actively participate and assume a leadership role on the Department of State Health Services Tier 1 priority injury and violence initiative.
- Revise the Governor's EMS and Trauma Advisory Council's injury prevention plan to identify Texas-specific injury mechanism priorities and evidence-based intervention strategies that should be the future focus for Regional Advisory Council injury prevention program implementation.

- Encourage the Regional Advisory Councils to select from the priority injury mechanisms and recommended interventions for their annual injury prevention programs.
- Encourage Regional Advisory Councils to integrate a plan for evaluation into their annual injury prevention program and to report outcomes based on that evaluation plan.
- Widely disseminate information to the Regional Advisory Committees and injury prevention stakeholders about the ten evidence-based injury prevention strategies compiled by the Texas EMS Trauma and Acute Care Foundation injury prevention committee.
- Continue the implementation of the State and Territorial Injury Prevention Directors Association assessment recommendations.

## ***Emergency Medical Services***

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### **Purpose and Rationale**

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The trauma system includes, and/or interacts with, many different agencies, institutions, and systems. The EMS system is one of the most important of these relationships. EMS is often the critical link between the injury-producing event and definitive care at a trauma center. Even though at its inception the EMS system was a very broad system concept, over time, EMS has come to be recognized as the prehospital care component of the larger emergency health care system. It is a complex system that not only transports patients, but also includes public access, communications, personnel, triage, data collection, and quality improvement activities.

The EMS system medical director must have statutory authority to develop protocols, oversee practice, and establish a means of ongoing quality assessment to ensure the optimal provision of prehospital care. If not the same individual, the EMS system medical director must work closely with the trauma system medical director to ensure that protocols and goals are mutually aligned. The EMS system medical director must also have ongoing interaction with EMS agency medical directors at local levels, as well as the state EMS for Children program, to ensure that there is understanding of and compliance with trauma triage and destination protocols.

Ideally, a system should have some means of ensuring whether resources meet the needs of the population. To achieve this end, a resource and needs assessment evaluating the availability and geographic distribution of EMS personnel and physical resources is important to ensure a rapid and appropriate response. This assessment includes a detailed description of the distribution of ground ambulance and aeromedical locations across the region. Resource allocations must be assessed on a periodic basis as needs dictate a redistribution of resources. In communities with full-time paid EMS agencies, ambulances should be positioned according to predictable geographic or temporal demands to optimize response efficiencies. Such positioning schemes require strong prehospital data collection systems that can track the location of occurrences over time. Periodic assessment of dispatch and transport times will also provide insight into whether resources are consistent with needs. Each region should have objective criteria dictating the level of response (advanced life support [ALS], basic life support [BLS]), the mode of transport, and the disposition of the patient based on the location of the incident and the severity of injury. A mechanism for case-based review of trauma patients that involves prehospital and hospital providers allows bidirectional information sharing and continuing education, ensuring that expectations are met at both ends. Ongoing review of triage and treatment decisions allows for continuing quality

improvement of the triage and prehospital care protocols. A more detailed discussion of in-field (primary) triage criteria is provided in the section titled: System Coordination and Patient Flow.

### ***Human Resources***

Periodic workforce assessments of EMS should be conducted to ensure adequate numbers and distribution of personnel. EMS, not unlike other health care professions, experiences shortages and maldistribution of personnel. Some means of addressing recruitment, retention, and engagement of qualified personnel should be a priority. It is critical that trauma system leaders work to ensure that prehospital care providers at all levels attain and maintain competence in trauma care. Maintenance of competence should be ensured by requiring standards for credentialing and certification and specifying continuing educational requirements for all prehospital personnel involved in trauma care. The core curricula for First Responder, Emergency Medical Technician (EMT) Basic, EMT-Intermediate, EMT Paramedic, and other levels of prehospital personnel have an essential orientation to trauma care for all ages. However, trauma care knowledge and skills need to be continuously updated, refined, and expanded through targeted trauma care training such as Prehospital Trauma Life Support®, Basic Trauma Life Support®, and age-specific courses. Mechanisms for the periodic assessment of competence, educational needs, and education availability within the system should be incorporated into the trauma system plan.

Systems of excellence also encourage EMS providers to go beyond meeting state standards for agency licensure and to seek national accreditation. National accreditation standards exist for ground-based and air medical agencies, as well as for EMS educational programs. In some states, agency licensure requirements are waived or substantially simplified if the EMS agency maintains national accreditation.

EMS is the only component of the emergency health care and trauma system that depends on a large cadre of volunteers. In some states, substantially more than half of all EMS agencies are staffed by volunteers. These agencies typically serve rural areas and are essential to the provision of immediate care to trauma patients, in addition to provision of efficient transportation to the appropriate facility. In some smaller facilities, EMS personnel also become part of the emergency resuscitation team, augmenting hospital personnel. The trauma care system program should reach out to these volunteer agencies to help them achieve their vital role in the outcome of care of trauma patients. However, it must be noted that there is a delicate balance between expecting quality performance in these agencies and placing unrealistic demands on their response capacity. In many cases, it is better to ensure that there is an optimal BLS response available at all times rather than a sporadic or less timely response involving ALS personnel. Support to volunteer EMS systems may be in the form of quality improvement activities, training, clinical opportunities, and support to the system medical director.

Owing to the multidisciplinary nature of trauma system response to injury, conferences that include all levels of providers (for example, prehospital personnel, nurses, and physicians) need to occur regularly with each level of personnel respected for its role in the care and outcome of trauma patients. Communication with and respect for prehospital providers is particularly important, especially in rural areas where exposure to major trauma patients might be relatively rare.

### ***Integration of EMS Within the Trauma System***

In addition to its critical role in the prehospital treatment and transportation of injured patients, EMS must also be engaged in assessment and integration functions that include the trauma system and also public health and other public safety agencies. EMS agencies should have a critical role in ensuring that communication systems are available and have sufficient redundancy so that trauma system stakeholders will be able to assess and act to limit death and disability at the single patient level and at the population level in the case of mass casualty incidents (MCIs). Enhanced 911 services and 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 are important for integrating a system's response. Wireless communications capabilities, including automatic crash notification, hold great promise for quickly identifying trauma-producing events, thereby reducing delays in discovery and decreasing prehospital response intervals.

Further integration might be accomplished through the use of EMS data to help define high-risk geographic and demographic characteristics of injuries within a response area. EMS should assist with the identification of injury prevention program needs and in the delivery of prevention messages. EMS also serves a critical role in the development of all-hazards response plans and in the implementation of those plans during a crisis. This integration should be provided by the state and regional trauma plan and overseen by the lead agency. EMS should participate through its leadership in all aspects of trauma system design, evaluation, and operation, including policy development, public education, and strategic planning.

### **OPTIMAL ELEMENTS**

I. 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.

#### **(B-302)**

- a. 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. **(I-302.1)**

- b. There is a clearly defined, cooperative, and ongoing relationship between the trauma specialty physician leaders (for example, trauma medical director within each trauma center) and the EMS system medical director. **(I-302.2)**
- c. 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. **(I-302.3)**
- d. 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, ALS versus BLS, airground coordination, early notification of the trauma care facility, prearrival instructions, and other procedures necessary to ensure that resources dispatched are consistent with the needs of injured patients. **(I-302.4)**
- e. 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. **(I-302.5)**
- f. 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. **(I-302.7)**
- g. There are sufficient and well-coordinated transportation resources to ensure that EMS providers arrive at the scene promptly and expeditiously transport the patient to the correct hospital by the correct transportation mode. **(I-302.8)**

II. The lead trauma authority ensures a competent workforce. **(B-310)**

- a. 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 courses that are readily available throughout the state. **(I-310.1)**
- b. 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,

Prehospital Trauma Life Support or Basic Trauma Life Support and others, or that trauma training needs are driven by the performance improvement process. **(I-310.2)**

- c. Conduct at least 1 multidisciplinary trauma conference annually that encourages system and team approaches to trauma care. **(I-310.9)**

III. The lead agency acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to the trauma system. **(B-311)**

- a. 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 for prehospital agencies, Council on Allied Health Education Accreditation for training programs, and American College of Surgeons (ACS) verification for trauma facilities. **(I-311.6)**

#### **CURRENT STATUS**

The Texas EMS system is challenged by extensive diversity of geography and demography. Serving some of Texas' metropolitan areas are EMS systems widely appreciated for their innovation, performance goals, and overall quality. Yet, EMS in Texas has been described as a patchwork quilt. As EMS is not a statewide essential service, no imperative exists for EMS to be available to all residents, in any form, throughout the state. Thus, the quilt has holes, and in a handful of counties EMS is not uniformly available at any level. In other counties, basic life support (BLS) services exist at least 50% of the time, but the services available at other times may be very limited and not predictably reliable.

The OEMS/TS within the DSHS is responsible for statewide efforts to improve the quality of emergency medical care to the people of Texas. The OEMS/TS pursues its missions principally through Texas Administrative Code Title 25, Chapter 157 which includes rules and regulations relevant to EMS provider agencies and personnel. The OEMS/TS has benefited from considerable input from the GETAC and its constituent committees.

The 22 RACs that correspond to the state's TSAs ostensibly serve as regional EMS councils. In addition to trauma-specific issues, they are, for example, being tasked to develop systems of care for stroke. Other similar initiatives are sure to follow.

Every EMS provider agency is required to have a medical director if functioning above the level of first responder. Local EMS medical directors vary considerably in terms of their backgrounds and level of engagement with the EMS providers they oversee. They have responsibility for ensuring adequacy of protocols and on-line medical control. They also enjoy a great deal of authority with regard to

the content of protocols and delegation of medical acts. Each local EMS medical director is seemingly autonomous and able to determine the parameters of clinical care provided by his/her EMS agency.

Texas has no state or regional EMS medical directors. Therefore, potential opportunities to achieve improved coordination or a more uniform strategic direction may be lost. Currently, the local EMS medical directors have no one to whom they are accountable. A list of all local EMS medical directors does not exist at the state level. Within some RACs, concern was expressed about undesirable variations in the manner in which local EMS medical directors fulfill their responsibilities through protocol implementation and delegated medical practices.

The State currently licenses approximately 1145 EMS provider agencies. However, as many as half of these may be transporting services not engaged in 911 emergency response. Providers and their vehicles may be licensed at more than one level (e.g., basic life support [BLS] and mobile intensive care unit [MICU]) so that the service they deliver can flex as the qualifications of available staff varies throughout the day or week.

More than 4,000 EMS vehicles are currently licensed, including 72 rotor wing aircraft. Air medical services are based predominantly in the more populated parts of Texas, including metropolitan areas where the EMS service level is traditionally higher. Efforts have evolved to improve communications among air medical services, including tools to enhance awareness of resource availability among potential users. However, little has been done to facilitate a systems approach to deploying assets. Instead, similar to some ground EMS circumstances, market forces, pursuit of potential financial gain, and proprietary interests are allowed to play out. The results may include maldistribution of resources that limits opportunities to achieve system optimization.

Texas has more than 57,000 certified EMS personnel, of which 34% are paramedics. National education and certification standards are integral to their preparation and credentialing. A progressive approach to recertification employs either continuing education or testing to ensure maintenance of a contemporary fund of knowledge. However, information about the geographic distribution of the EMS manpower pool and its ability to deliver EMS services throughout the state was not available to the SVT. As a result, initiatives are underdeveloped that might otherwise effect human resource changes leading to overall EMS system improvements.

Currently, Texas has no functional central EMS information system. Thus, it is impossible for system leaders or stakeholders to make an informed assessment about the results of their efforts to deliver EMS to people throughout the state. Pockets of excellence exist in terms of evaluation and performance improvement based on sophisticated collection and analysis of regional data. However,

regional EMS evaluation efforts are quite variable, and statewide efforts are non-existent.

Clearly, in a state as vast and diverse as Texas, EMS system variation is expected, but it is not known if all these variations are desirable or not. Assessments regarding existing variations are dependent on knowledge of systemwide goals and to what extent structures, processes, and outcomes meet those goals. On a statewide basis, and in many regions, a lack of awareness about EMS structure exists, and this is generally easy to evaluate. Process issues, such as response times, are sometimes anecdotal instead of data-driven. Except in pockets of excellence, which recognizably serve large portions of the population, the state has no awareness of whether or not the most appropriate or ideal resource is available or deployed for patients' benefits. Except in the most sophisticated areas, information regarding outcomes is elusive or non-existent.

The Texas EMS system was reviewed by a National Highway Traffic Safety Administration (NHTSA) Technical Assessment Team in 1990. Subsequent evaluations of progress reveal that some recommendations were later thought to be unrealistic or not applicable to Texas. Thus, regional and statewide plans have been only partially implemented.

## RECOMMENDATIONS

- **Commit the necessary resources to ensure development and maintenance of a reliable statewide EMS information system.**
  - Ensure that the information system provides meaningful information back to users and facilitates system-wide evaluations.
- **Designate a state EMS medical director through an appointment or contractual relationship.**
  - **The state EMS medical director role should be to advise DSHS staff, provide strategic direction, and serve as a resource for regional and local EMS medical directors and system administrators in the state.**
- Require each regional advisory council to designate a regional EMS medical director to provide coordination, serve as a resource, support regional performance improvement, and maintain an accurate roster of all local EMS medical directors in the trauma service area.
- Establish the minimum standard for EMS service that shall be available for each resident throughout all areas of Texas.
- Conduct community assessments to identify gaps in access to EMS and implement plans to close gaps.

- Conduct a workforce assessment to determine the geographic distribution of EMS personnel, identify opportunities for human resource development, and facilitate implementation of plans to expand the availability of EMS.
- Commit to a National Highway Traffic Safety Administration led EMS re-assessment within the next 24 months.

## ***Definitive Care Facilities***

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### **Purpose and Rationale**

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Inclusive trauma systems are the systems that include all acute health care facilities, to the extent that their resources and capabilities allow and in which the patient's needs are matched to hospital resources and capabilities. Thus, as the core of a regional trauma system, acute care facilities operating within an inclusive trauma system provide definitive care to the entire spectrum of patients with traumatic injuries. Acute care facilities must be well integrated into the continuum of care, including prevention and rehabilitation, and operate as part of a network of trauma-receiving hospitals within the public health framework. All acute care facilities should participate in the essential activities of a trauma system, including performance improvement, data submission to state or regional registries, representation on regional trauma advisory committees, and mutual operational agreements with other regional hospitals to address interfacility transfer, educational support, and outreach. The roles of all definitive care facilities, including specialty hospitals (for example, pediatric, burn, severe traumatic brain injury [TBI], spinal cord injury [SCI]) within the system should be clearly outlined in the regional trauma plan and monitored by the lead agency. Facilities providing the highest level of trauma care are expected to provide leadership in education, outreach, patient care, and research and to participate in the design, development, evaluation, and operation of the regional trauma system.

In an inclusive system, patients should be triaged to the appropriate facility based on their needs and facility resources. Patients with the least severe injuries might be cared for at appropriately designated facilities within their community, whereas the most severe should be triaged to a level I or II trauma center. In rural and frontier systems, smaller facilities must be ready to resuscitate and initiate treatment of the major injuries and have a system in place that will allow for the fastest, safest transfer to a higher level of care.

Trauma receiving facilities providing definitive care to patients with other than minor injuries must be specifically designated by the state or regional lead agency and equipped and qualified to do so at a level commensurate with injury severity. To assess and ensure that injury type and severity are matched to the qualifications of the facilities and personnel providing definitive care, the lead agency should have a process in place that reviews and verifies the qualifications of a particular facility according to a specific set of resource and quality standards. This criteria-based process for review and verification should be consistent with national standards and be conducted on a periodic cycle as determined by the lead agency. When centers do not meet set standards, there should be a process for suspension, probation, revocation, or dedesignation.

Designation by the lead agency should be restricted to facilities meeting criteria or statewide resource and quality standards and based on patient care needs of the regional trauma system. There should be a well-defined regulatory relationship between the lead agency and designated trauma facilities in the form of a contract, guidelines, or memorandum of understanding. This legally binding document should define the relationships, roles, and responsibilities between the lead agency and the medical leadership from each designated trauma facility. The number of trauma centers by level of designation and location of acute care facilities must be periodically assessed by the lead agency with respect to patient care needs and timely access to definitive trauma care. There should be a process in place for augmenting and restricting, if necessary, the number and/or level of acute care facilities based on these periodic assessments. The trauma system plan should address means for improving acute care facility participation in the trauma system, particularly in systems in which there has been difficulty addressing needs.

### ***Human Resources***

The ability to deliver high-quality trauma care is highly dependent on the availability of skilled human resources. Therefore, it is critical to assess the availability and educational needs of providers on a periodic basis. Because availability, particularly of subspecialty resources, is often limited, some means of addressing recruitment, retention, and engagement of qualified personnel should be a priority. Periodic workforce assessments should be conducted. Maintenance of competence should be ensured by requiring standards for credentialing and certification and specifying continuing educational requirements for physicians and nurses providing care to trauma patients. Mechanisms for the periodic assessment of ancillary and subspecialty competence, educational needs, and availability within the system for all designated facilities should be incorporated into the trauma system plan. The lead trauma centers in rural areas will need to consider teleconferencing and telemedicine to assist smaller facilities in providing education on regionally identified needs. In addition, lead trauma centers within the region should assist in meeting educational needs while fostering a team approach to care through annual educational multidisciplinary trauma conferences. These activities will do much to foster a sense of teamwork and a functionally inclusive system.

### ***Integration of Designated Trauma Facilities Within the Trauma System***

Designated trauma facilities must be well integrated into all other facets of an organized system of trauma care, including public health systems and injury surveillance, prevention, EMS and prehospital care, disaster preparedness, rehabilitation, and system performance improvement. This integration should be provided by the state and/or regional trauma plan and overseen by the lead agency.

Each designated acute care facility should participate, through its trauma program leadership, in all aspects of trauma system design, evaluation, and

operation. This participation should include policy and legislative development, legislative and public education, and strategic planning. In addition, the trauma program and subspecialty leaders should provide direction and oversight to the development, implementation, and monitoring of integrated protocols for patient care used throughout the system (for example, TBI guidelines used by prehospital providers and nondesignated transferring centers), including region specific primary (field) and secondary (early transfer) triage protocols. The highest level trauma facilities should provide leadership of the regional trauma committees through their trauma program medical leadership. These medical leaders, through their activities on these committees, can assist the lead agency and help ensure that deficiencies in the quality of care within the system, relative to national standards, are recognized and corrected. Educational outreach by these higher level centers should be used when appropriate to help achieve this goal.

### **OPTIMAL ELEMENTS**

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

- a. 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 (for example, burn, pediatric, SCI, and others). **(I-303.1)**

II. To maintain its state, regional, or local designation, each hospital will continually work to improve the trauma care as measured by patient outcomes. **(B-307)**

- a. The trauma system engages in regular evaluation of all licensed acute care facilities that provide trauma care to trauma patients and of designated trauma hospitals. Such evaluation involves independent external reviews. **(I-307.1)**

III. The lead trauma authority ensures a competent workforce. **(B-310)**

- a. 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. **(I-310.3)**
- b. Ensure that appropriate, approved trauma training courses are provided for nursing personnel on a regular basis. **(I-310.4)**
- c. In cooperation with the nursing licensure authority, ensure that all nursing personnel who routinely provide care to trauma patients have a trauma training certificate (for example, Advanced Trauma Care for Nurses,

- Trauma Nursing Core Course, 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. **(I-310.5)**
- d. 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. As an alternative, physicians may maintain trauma competence through continuing medical education programs after initial ATLS completion. **(I-310.8)**
  - e. Conduct at least 1 multidisciplinary trauma conference annually that encourages system and team approaches to trauma care. **(I-310.9)**
  - f. As new protocols and treatment approaches are instituted within the system, structured mechanisms are in place to inform all personnel about the changes in a timely manner. **(I-310-10)**

#### **CURRENT STATUS**

Texas has several high-performing trauma centers. The majority of the population and the trauma centers are in the eastern half of the state, and large areas of the western half are rural and frontier. The size of each of the 22 TSAs and the population in each is variable.

Texas has 583 acute care hospitals. Of these, 256 are designated trauma centers, and an additional 18 are pursuing designation. Currently, Texas has 16 level I and 8 level II trauma centers, all verified by the ACS Committee on Trauma (COT). Additionally 45 level III and 187 level IV centers are designated by the lead agency. Three level I pediatric trauma centers are verified by the ACS COT, and a fourth is pursuing verification. The state lead agency does not differentiate between adult and pediatric centers. Designated burn centers exist primarily in the eastern half of the state. Transfer agreements facilitate expeditious flow through the trauma system for pediatric and burn patients. The integration of military facilities into the Texas trauma system within the San Antonio region has proven effective.

To achieve trauma center designation, support from RAC leadership is essential. A facility must be actively engaged in the respective RAC activities, including performance improvement efforts. The facility must also submit data to the state EMS and trauma registry. Following application to the OEMS/TS, level I and II verification is obtained through the ACS COT, and level III and IV designation is achieved following an OEMS/TS directed survey. The lead agency has the authority to grant waivers to centers struggling to meet certain requirements if it is in the “best interests of the persons served in the affected local system”. Currently, no active waivers are in force for any level I or II facilities.

All trauma centers must be re-designated every three years, consistent with ACS COT standards. The lead agency also has the authority to de-designate trauma centers, and has exercised this authority in the past. The undesignated acute care facilities (300+) also receive trauma patients, and are encouraged to participate in RAC activities. However, no trauma data are collected from these facilities and quality of care cannot be monitored.

The RACs in the eastern half of the state commonly have level I and/or level II trauma centers as the regional resource centers. Of the 16 level I trauma centers, 13 are near or east of the Interstate-35 corridor, which incorporates the Dallas, Fort Worth, Austin, and San Antonio and the Houston-Galveston metropolitan areas. The majority of the level II trauma centers are also clustered in the eastern half of the state. Only two level I and one level II trauma centers provide service to the western half of the state. Thus, many of the RACs in this area have only level III trauma centers that serve as the regional resource centers. These lead facilities are high functioning level III trauma centers and, in some instances, may be close to meeting criteria for level II trauma centers.

The emerging collaboration with the state Office of Rural Health and other funding sources to support trauma center development in the rural/frontier regions is promising. Of the 77 critical access hospitals, 54 have achieved level IV designation, and an additional two or three are actively pursuing designation. The lead level III trauma centers in the rural regions are high functioning and successfully serve as regional resource centers.

The trauma system extends beyond state boundaries as the trauma centers at the western edge of the state provide care for injured patients in New Mexico. No information was reported about Texas residents who receive care in other states.

The trauma system in Texas has several areas needing improvement. More than 300 acute care hospitals are not participating in the trauma system, and their participation in RAC activities is variable. The quality of care provided to injured patients, the likelihood that individuals with moderate and severe injuries are transferred appropriately, and patient outcomes in these facilities are unknown.

The lead agency does not have the authority to match trauma center resources with need in a particular area. No certificate of need process exists in the state, so the lead agency does not have the authority to limit the number of level I and II trauma centers based on population or need. This could result in an unnecessary proliferation of trauma centers in one region that could dilute the number of patients needed for trauma center professionals to maintain specialty skills competence. This also does not address the ongoing lack of trauma center resources in other regions.

The lead agency does not differentiate between adult and pediatric trauma patients when designating level III trauma centers. It is conceivable that a state

designated level III trauma center could admit a large number of pediatric patients, and then not be subject to the same scrutiny for pediatric trauma care as is given for adult care.

The state lead agency currently has no oversight of free-standing emergency care facilities that may see injured patients. Some consideration for requiring such emergency care facilities to seek trauma center designation, perhaps at a newly created level V was reported. However, this would require a statute change.

The SVT believes that the Houston-Galveston metropolitan area and their trauma service areas have inadequate trauma center resources. See the focus question 1 for additional information.

### **RECOMMENDATIONS**

- Identify a strategy for development of an inclusive and integrated trauma system involving all acute care facilities and begin its implementation.
- Collaborate with Office of Rural Health, as well as other sources of funding, to support trauma center designation of Critical Access Hospitals (CAH).
- Consider seeking legislation to authorize the introduction of level V trauma center status for emergency care free-standing facilities.
- Develop a plan to match trauma center availability with patient needs in both underserved and potentially oversaturated areas.
- Encourage designated trauma centers to participate in the trauma system at the highest level commensurate with their resources and local trauma patient needs.
- Develop a process to evaluate the pediatric capabilities of level III and level IV trauma centers that provide care for children.
- Establish additional trauma center resources in the Houston-Galveston area ensuring adequate patient volume to maintain quality of trauma care and financial viability of each designated trauma center.

## ***System Coordination and Patient Flow***

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### **Purpose and Rationale**

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To achieve the best possible outcomes, the system must be designed so that the right patient is transported to the right facility at the right time. Although on the surface this objective seems relatively straightforward, patients, geography, and transportation systems often conspire to present significant challenges. The most critically injured trauma patient is often easy to identify at the scene by virtue of the presence of coma or hypotension. However, in some circumstances, the patients requiring the resources of a Level I or II center may not be immediately apparent to prehospital providers. Primary or field triage criteria aid providers in identifying which patients have the greatest likelihood of adverse outcomes and might benefit from the resources of a designated trauma center. Even if the need is identified, regional geography or limited air medical (or land) transport services might not allow for direct transport to an appropriate facility.

Primary triage of a patient from the field to a center capable of providing definitive care is the goal of the trauma system. However, there are circumstances (for example, airway management, rural environments, inclement weather) when triaging a patient to a closer facility for stabilization and transfer is the best option for accessing definitive care. Patients sustaining severe injuries in rural environments might need immediate assessment and stabilization before a long-distance transport to a trauma center. In addition, evaluation of the patient might bring to light severe injuries for which needed care exceeds the resources of the initial receiving facility. Some patients might have specific needs that can be addressed at relatively few centers within a region (for example, pediatric trauma, burns, severe TBI, SCI, and reimplantation). Finally, temporary resource limitations might necessitate the transfer of patients between acute care facilities.

Secondary triage at the initial receiving facility has several advantages in systems with a large rural or suburban component. The ability to assess patients at nondesignated or level III to V centers provides an opportunity to limit the transfer of only the most severely injured patients to level I or II facilities, thus preserving a limited resource for patients most in need. It also provides patients with lesser injuries the possibility of being cared for within their community.

The decision to transfer a trauma patient should be based on objective, prospectively agreed-on criteria. Established transfer criteria and transfer agreements will minimize discussions about individual patient transfers, expedite the process, and ensure optimal patient care. Delays in transfer might increase mortality, complications, and length of stay. A system with an excess of transferred patients might tax the resources of the regional trauma facility. Conversely, inappropriate retention of patients at centers without adequate

facilities or expertise might increase the risk of adverse outcomes. Given the importance of timely, appropriate interfacility transfers, the time to transfer, as well as the rates of primary and secondary overtriage and undertriage, should be evaluated on a regular basis, and corrective actions should be instituted when problems are identified. Data derived from tracking and monitoring the timeliness of access to a level of trauma care commensurate with injury type and severity should be used to help define optimal system configuration.

A central communications center with real-time access to information on system resources greatly facilitates the transfer process. Ideally, this center identifies a receiving facility, facilitates dialogue between the transferring and receiving centers, and coordinates interfacility transport.

To ensure that the system operates at the greatest efficiency, it is important that patients are repatriated back to community hospitals once the acute phase of trauma care is complete. The process of repatriation opens up the limited resources available to care for severely injured patients. In addition, it provides an opportunity to bring patients back into their local environment where their social network might help reintegrate patients into their community.

#### **OPTIMAL ELEMENTS**

I. 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.

##### **(B-302)**

- a. There are mandatory systemwide 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 a major trauma patient. **(I-302.6)**
- b. There is a universal access number for citizens to access the EMS/trauma system, with dispatch of appropriate medical resources. There is a central communications system for the EMS/trauma system to ensure field-to-facility bidirectional communications, interfacility dialogue, and all-hazards response communications among all system participants. **(I-302.7)**
- c. There is a procedure for communications among medical facilities when arranging for interfacility transfers, including contingencies for radio or telephone system failure. **(I-302.9)**

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

- a. 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 that the patients are expeditiously transferred to the appropriate system-defined trauma facility. **(I-303.4)**

## **CURRENT STATUS**

The State has a voluntary designation process for level I, II, III, and IV trauma centers. More than 300 acute care facilities have decided to "opt out" and remain undesignated.

Prehospital trauma triage criteria are consistent at the TSA level. The trauma triage criteria reviewed by the SVT appear to be consistent with the 2006 Centers Disease Control and Prevention (CDC)/ACS trauma triage guidelines, even though they are modified slightly to meet local (TSA) needs. Texas has multiple providers of air transport in the most densely populated areas of the state while other areas are underserved.

Some areas of the state serve populations in adjacent states, such as New Mexico. It was reported that no formal agreements are in place for reimbursement for care provided to these patients. Likewise, some TSA's utilize trauma centers that are out of state, and while the number of patients transferred out of state for acute care was reported to be low, the number is unknown.

In the more densely populated urban and suburban areas, trauma patients are transferred directly to the level I and II trauma centers by ground or by rotor wing. In the more rural areas of the state, patients are taken to level III and IV trauma centers, and if indicated, secondary transfer is performed after resuscitation and assessment. Secondary transfer is reported to occur relatively rapidly; the goal is to transfer the most severely injured patients out within two hours of arrival. Secondary transfer time is an audit filter reviewed only at the time of reverification of all level III and IV trauma centers every three years. This should be an audit filter reviewed more frequently by the RACs and the state. While transfers were reported to function well for the majority of severely injured patients, some trauma patients are taken to undesignated hospitals after their injury, and the number and ultimate outcomes for this patient subset are unknown.

Communications between trauma centers are coordinated at the RAC level, and some communication strategies are innovative. For example, one RAC has a 1-800 number to assist local facilities in finding an appropriate available trauma bed.

Many of the level III trauma centers appear to function at a higher level than designated. These facilities are able to manage many complex injured patients that in a different system would be transferred to a higher level of care. The patient outcomes are reported to be excellent, although no outcome data were

presented. Patients transferred out of these high functioning level III trauma centers usually require special neurosurgery or orthopedic intervention.

Specific inquiry was made regarding injury care to special populations. Severe burns were reported to be transferred readily to the excellent burn centers in the state. The Shriners' pediatric burn center in Galveston was damaged and closed following Hurricane Ike, but it has reopened and is accepting patients. Adequate burn beds were reported to be available, but occasionally the occupancy rate is high. Management of spinal cord injuries is often at the local level, and transfer is made after the acute phase of patient management is completed.

Access to trauma centers capable of managing the injured child was reported to be adequate; however, it was reported that many injured children are managed in local facilities. Special comments were made regarding the needs of the adolescent patients. Participants reported some ambivalence about whether injured teenagers who may be almost six feet tall and weigh almost 200 pounds should be managed in adult trauma center or by pediatric facilities.

The availability of the highest level of care (level I and II trauma centers) is believed by the SVT to be adequate for the majority of situations, although the system is occasionally stressed. Special mention was made of the situation in Houston when both level I trauma centers were unable to accept transferred trauma patients (after Hurricane Ike damaged and closed the level I trauma center in Galveston). Special destination decisions were created so that some trauma patients were transferred to a level III facility. In other cases trauma patients were delivered in rotation to the level I trauma centers that had already stated that they did not have the resources to appropriately manage additional trauma volume.

## **RECOMMENDATIONS**

- **Collate Regional Advisory Council information to identify instances of failed or delayed interfacility transfer for all trauma patients with an emphasis on special populations (pediatric, spinal cord injury, and traumatic brain injury).**
- Conduct a survey utilizing the Regional Advisory Councils to determine if trauma bed availability is adequate to meet system needs with emphasis on pediatric and special populations.
- Consider changing state regulations to ensure that ALL hospitals participate at some level within the Texas trauma system.
  - This may involve designation at an appropriate level or participating by providing initial resuscitation and stabilization to moderately and severely

injured patients followed by transfer, as well as submitting a minimal set of data to the state trauma registry.

- Conduct discussion among appropriate stakeholders in each RAC to determine the appropriate destination for the injured adolescent.
- Develop an appropriate forum for discussion and management of issues related to trauma patients that are transferred across state lines, including monitoring quality of care, reimbursement, and repatriation.

## ***Rehabilitation***

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### **Purpose and Rationale**

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As an integral component of the trauma system, rehabilitation services in acute care and rehabilitation centers provide coordinated care for trauma patients who have sustained severe or catastrophic injuries, resulting in long-standing or permanent impairments. Patients with less severe injuries may also benefit from rehabilitative programs that enhance recovery and speed return to function and productivity. The goal of rehabilitative interventions is to allow the patient to return to the highest level of function, reducing disability and avoiding handicap whenever possible. The rehabilitation process should begin in the acute care facility as soon as possible, ideally within the first 24 hours. Inpatient and outpatient rehabilitation services should be available. Rehabilitation centers should have CARF (Commission of Accreditation of Rehabilitation Facilities) accreditation for comprehensive inpatient rehabilitation programs, and accreditation of specialty centers (SCI and TBI) should be strongly encouraged.

The trauma system should conduct a rehabilitation needs assessment (including specialized programs in SCI, TBI, and for children) to identify the number of beds needed and available for rehabilitation in the geographic region. Rehabilitation specialists should be integrated into the multidisciplinary advisory committee to ensure that rehabilitation issues are integrated into the trauma system plan. The trauma system should demonstrate strong linkages and transfer agreements between designated trauma centers and rehabilitation facilities located in its geographic region (in or out of state). Plans for repatriation of patients, especially when rehabilitation centers across state lines are used, should be part of rehabilitation system planning. Feedback on functional outcomes after rehabilitation should be made available to the trauma centers.

#### **OPTIMAL ELEMENTS**

- I. 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. **(B-308)**
  - a. 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. **(I-308.1)**
  - b. Rehabilitation centers and outpatient 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. **(I-308.2)**
- II. A resource assessment for the trauma system has been completed and is regularly updated. **(B-103)**
- a. The trauma system has completed a comprehensive system status inventory that identifies the availability and distribution of current capabilities and resources. **(I-103.1)**

## **CURRENT STATUS**

Rehabilitation is not a priority focus of the GETAC. No member represents rehabilitation on GETAC, and a rehabilitation committee does not exist.

Data provided in the PRQ identified 4,469 rehabilitation beds within Texas, but the breakdown by the types of service was not provided. It is uncertain if the number of available beds is sufficient to meet the needs of the trauma population in the state. Participants reported that not all rehabilitation facilities were capable of serving specialized populations such as SCI and TBI patients. Only four centers are available for injured children, and beds are needed in West Texas.

Participants reported that patients could be transferred to rehabilitation facilities with minimal delay if insured. Uninsured patients often experienced a delay in transfer. One trauma center representative stated that an uninsured patient was transferred to a rehabilitation facility and when insufficient improvement was made to go home after two weeks, the patient was transferred back to the acute care facility to occupy an acute care bed. Participants also reported that smooth integration of acute care with rehabilitative care was a challenge in the management of injured undocumented persons. For example, trauma centers experience difficulties when attempting to repatriate uninsured and undocumented patients from neighboring states to out-of-state rehabilitation facilities.

Participants were asked if a significant number of trauma patients that qualified medically for transfer to rehabilitation facilities were being held in acute care beds because of the lack of health care insurance and if this contributed to trauma center diversion. No data were available for the trauma centers in Houston, but this may be a significant issue in San Antonio trauma centers.

Participants commented that access to rehabilitation beds did not appear to be such a significant issue for patients who had sustained strokes or myocardial infarction because they were more likely to be eligible for Medicare payment. Patients with projected short lengths of stay in rehabilitation centers, such as those with only orthopedic injuries, were reported to be less of a problem than patients with SCI or TBI.

Currently, rehabilitation facilities are not eligible for any cost reimbursement through the trauma uncompensated care fund as occurs for the trauma centers.

#### **RECOMMENDATIONS**

- Develop a rehabilitation committee of Governor's EMS and Trauma Advisory Council.
- Determine if a significant delay in transfer of patients to rehabilitation facilities exists and if this contributes to trauma center diversion statewide.
- Determine if the number of rehabilitation beds available is sufficient to meet needs of the trauma patients with special attention given to pediatric, spinal cord injury, traumatic brain injury, and ventilator-dependent patients.
- Consider the inclusion of designated rehabilitation centers for uncompensated care reimbursement eligibility under the trauma fund if delay in appropriate transfer to rehabilitation is confirmed for uninsured trauma patients.

## ***Disaster Preparedness***

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### **Purpose and Rationale**

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As critically important resources for state, regional, and local responses to MCIs, the trauma system and its trauma centers are central to disaster preparedness. Trauma system leaders need to be actively involved in public health preparedness planning to ensure that trauma system resources are integrated into the state, regional, and local disaster response plans. Acute care facilities (sometimes including one or more trauma centers) within an affected community are the first line of response to an MCI. However, an MCI may result in more casualties than the local acute care facilities can handle, requiring the activation of a larger emergency response plan with support provided by state and regional assets.

For this reason, the trauma system and its trauma centers must conduct a resource assessment of its surge capacity to respond to MCIs. The resource assessment should build on and be coupled to a hazard vulnerability analysis. An assessment of the trauma system's response to simulated incident or tabletop drills must be conducted to determine the trauma system's ability to respond to MCIs. Following these assessments, a gap analysis should be conducted to develop statewide MCI response resource standards. This information is essential for the development of an emergency management plan that includes the trauma system.

Planning and integration of the trauma system with plans of related systems (public health, EMS, and emergency management) are important because of the extensive impact disasters have on the trauma system and the value of the trauma system in providing care. Relationships and working cooperation between the trauma system and public health, EMS, and emergency management agencies support the provision of assets that enable a more rapid and organized disaster response when an event occurs. For example, the EMS emergency preparedness plan needs to include the distribution of severely injured patients to trauma centers, when possible, to make optimal use of trauma center resources. This plan could optimize triage through directing less severely injured patients to lower level trauma centers or nondesignated facilities, thus allowing resources in trauma centers to be spared for patients with the most severe injuries. In addition, the trauma system and its trauma centers will be targeted to receive additional resources (personnel, equipment, and supplies) during major MCIs.

Mass casualty events and disasters are chaotic, and only with planning and drills will a more organized response be possible. Simulation or tabletop drills provide an opportunity to test the emergency preparedness response plans for the trauma system and other systems and to train the teams that will respond.

Exercises must be jointly conducted with other agencies to ensure that all aspects of the response plan have the trauma system integrated.

### **OPTIMAL ELEMENTS**

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

- a. There is a resource assessment of the trauma system's ability to expand its capacity to respond to MCIs in an all-hazards approach. **(I-104.1)**
- b. 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 MCIs. **(I-104.2)**
- c. The trauma system has completed a gap analysis based on the resource assessment for trauma emergency preparedness. **(I-104.3)**

II. The lead agency ensures that its trauma system plan is integrated with, and complementary to, the comprehensive mass casualty plan for natural and manmade incidents, including an all-hazards approach to planning and operations. **(B-305)**

- a. 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 for all-hazards events. **(I-305.1)**
- b. All-hazards events routinely include situations involving natural (for example, earthquake), unintentional (for example, school bus crash), and intentional (for example, terrorist explosion) trauma-producing events that test the expanded response capabilities and surge capacity of the trauma system. **(I-305-2)**
- c. The trauma system, through the lead agency, has access to additional equipment, materials, and personnel for large-scale traumatic events. **(I-305.3)**

### **CURRENT STATUS**

The Texas disaster responses to major hurricanes such as Ike, Katrina, and Rita have provided much real world experience for managing injured patients and evacuees. The state has developed numerous disaster response plans which have been exercised regularly. Use of the incident command system is strongly encouraged or required statewide. From lessons learned and detailed *After Action Reports*, Texas has established a robust infrastructure to manage patient

flow, including various tools for incident management, coordination, and communications.

One of these tools, EMSystems (an electronic dashboard), provides real time information on bed availability and other assets to hospitals and EMS agencies. HavBED reporting data in EMSystems can be imported into WebEOC allowing each RAC to know the status of bed availability. DSHS is to be commended for the statewide use, implementation, and integration of these disaster management tools. However, lessons learned from recent exercises indicate that additional training may be needed for personnel on how to use these incident management tools. This topic has also been an item of discussion at RAC Chair meetings. Other states have identified issues with the timeliness of data entered into the EMSystems. With more than 600 hospitals in the state, it might be valuable to assess whether this is an issue for Texas as well.

Additional capabilities of the EMSystems allow the RACs and state to manage medical assets through the EMResource. However, not all RACs are fully utilizing this system. The state is currently working on a comprehensive list to include all statewide medical assets. The completion of this list and full utilization and comprehensive access to EMResource will further enhance medical asset monitoring and coordination.

EMSystems also provides a patient tracking capability, EMTrac, which is not yet consistently available throughout the state. However, additional patient tracking systems are available and utilized, such as wrist banding and WebEOC. Each RAC is unique in the way mass casualty incidents (MCIs) are managed. All hospitals are required to have an MCI plan and most regions have MCI plans. The state has no statewide guidelines for a standardized disaster triage system; however, RACs reported using the START and JumpSTART systems.

In addition to EMSystems, the RACs and state agencies utilize WebEOC to further facilitate incident management and communications. Since the state does not have a statewide license for WebEOC, the Texas WebEOC Interoperability project (TWIRP) can provide additional capabilities for the RACs to monitor various medical status boards. These boards enhance the region's abilities to monitor bed availability, patients tracking, and EMS resources.

Comprehensive and integrated disaster planning has occurred at all levels of Texas disaster medical response. Each RAC is encouraged to develop a disaster plan either as part of the regional trauma plan or as a separate document, however, this plan is not a required deliverable of the RAC contract with OEMS/TS. The state has comprehensive and integrated disaster plans which include medical evacuation, sheltering, response, ambulance utilization, and fatality management. The state also has a pandemic flu plan, but has not incorporated guidelines for EMS within the plan.

Through the Hospital Preparedness Program, communications appears to be an area of strength, especially for hospitals participating in the program. Hospitals are required to have interoperable communications with their local Emergency Operations Center. Approximately 528 of the 600 hospitals meet this requirement, and the majority can demonstrate sustained 2-way communications during an event. Redundancy has been built into the system to include VHF radios, 800 MHz radios, HAM radios, satellite radios and phones, and a wireless wide area network for WebEOC usage. One communications issue remains - establishing a statewide standard radio frequency.

Management for a disaster occurs at the local level, with support and coordination through regional medical operations centers (MOCs). Additional coordination can be provided by DSHS through their multi-agency coordination center (MACC). To support disaster response at the local and regional levels, the state has amassed medical assets available upon request to the RACs. These assets include: rapid response task force, EMS task force, ambulance strike teams, and registered nurse (RN) strike teams. Additional healthcare personnel are available at the local level from the 30-40 Medical Reserve Corps and integration of the Emergency System for the Advance Registration of Volunteer Health Professionals (ESAR-VHP) program.

## **RECOMMENDATIONS**

- Ensure that Regional Advisory Councils integrate a mass casualty incident disaster plan within their regional trauma plans through the state contracts and desktop audit tool.
- Continue efforts to provide training for full utilization of the WebEOC capabilities.
- Seek opportunities to utilize incident management software on a daily basis to increase personnel familiarization with system capabilities.
- With Regional Advisory Council input, establish a statewide guideline for mass casualty disaster triage, and provide education and materials to support implementation.
- Complete the development of a statewide inventory of medical assets.
- Continue to implement a consistent and statewide system to track patients (e.g., radio-frequency identification bands for inter-facility transfers).
- Further integrate and clarify roles within Emergency Support Function (ESF) 8 for health service districts and Regional Advisory Councils.
- Assess the timeliness and accuracy of the data entered in to the EMS systems.

## ***Systemwide Evaluation and Quality Assurance***

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### **Purpose and Rationale**

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The trauma lead agency has responsibility for instituting processes to evaluate the performance of all aspects of the trauma system. Key aspects of systemwide effectiveness include the outcomes of population based injury prevention initiatives, access to care, as well as the availability of services, the quality of services provided within the trauma care continuum from prehospital and acute care management phases through rehabilitation and community reintegration, and financial impact or cost. Intrinsic to this function is the delineation of valid, objective metrics for the ongoing quality audit of system performance and patient outcomes based on sound benchmarks and available clinical evidence. Trauma management information systems (MISs) must be available to support data collection and analysis.

The lead agency should establish forums that promote inclusive multidisciplinary and multiagency review of cases, events, concerns, regulatory issues, policies, procedures, and standards that pertain to the trauma system. The evaluation of system effectiveness must take into account the integration of these various components of the trauma care continuum and review how well personnel, agencies, and facilities perform together to achieve the desired goals and objectives. Results of customer satisfaction (patient, provider, and facility) appraisals and data indicative of community and population needs should be considered in strategic planning for system development. System improvements derived through evaluation and quality assurance activities may encompass enhancements in technology, legislative or regulatory infrastructure, clinical care, and critical resource availability.

To promote participation and sustainability, the lead agency should associate accountability for achieving defined goals and trauma system performance indicators with meaningful incentives that will act to cement the support of key constituents in the health care community and general population. For example, the costs and benefits of the trauma system as they relate to reducing mortality or decreasing years of productive life lost may make the value of promoting trauma system development more tangible. A facility that achieves trauma center verification/designation may be rewarded with monetary compensation (for example, ability to bill for trauma activation fees) and the ability to serve as a receiving center for trauma patients. The trauma lead agency should promote ongoing dialog with key stakeholders to ensure that incentives remain aligned with system needs.

## **OPTIMAL ELEMENTS**

I. The trauma 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. **(B-301)**

- a. 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. **(I-301.1)**

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

III. The financial aspects of the trauma system are integrated into the overall performance improvement system to ensure ongoing fine tuning and cost-effectiveness. **(B-309)**

- a. Financial data are combined with other cost, outcome, or surrogate measures, for example, years of potential life lost, quality-adjusted life years, and disability adjusted life years; length of stay; length of intensive care unit stay; number of ventilator days; and others, to estimate and track true system costs and cost- benefits. **(I-309.4)**

## **CURRENT STATUS**

The majority of systemwide evaluation and quality assurance activities, regarding trauma care, are conducted throughout Texas by the 22 RACs. The implementation of a state PI process has been gravely hampered by the inadequacy of the current trauma registry system and ability to access hospital discharge data. However, the RACs are required to meet on a regular basis to conduct PI and must establish a procedure that maintains the confidentiality of the data, as well as, the PI process itself.

The OEMS/TS is to be commended for its numerous tools in place to evaluate the operational functions of the RACs and compliance to the PI requirements. In addition to the contracts and annual reports, the office utilizes the RAC desktop review tool. Each RAC must complete the review tool on an annual basis which allows the state to monitor compliance of the PI activities. The list of PI requirements include: assessing system impact, developing standard audit filters, ensuring confidentiality, and case review for trauma patients. The RACS are required to conduct regional PI regularly, monitor system indicators, and “close the loop” on identified issues. Even though RACs have PI processes in place, they are not consistent between RACs. This inconsistency creates challenges for

the PI process to accurately assess if the right patient is getting to the right facility at the right time when patients cross RAC boundaries.

The state has sufficient statutory protection for the PI process at both the RAC and state levels. Additionally, statutory authority is sufficient for the state to develop and monitor a statewide trauma system PI process and indicators. Even though each RAC is required to have a PI plan and process, the OEMS/TS does not have comprehensive guidelines or a plan in place for evaluating the effectiveness of a statewide trauma system and patient outcomes.

The state has an excellent base from which to work from on the development of a state PI program. Since each RAC is required to have a plan and PI process, these can be collated and assessed with the best practices incorporated into the state PI process. From a review of the RAC plans, it was identified that various models of evaluation are utilized. One RAC used a FOCUS model, another the traditional peer review medical model, and yet another RAC utilized a model similar to the patient safety model with trending, root cause analysis, and monitoring sentinel events. All RAC PI models should be considered when developing the statewide PI plan, in addition to models developed by other states like Washington, Maryland, Minnesota, Iowa, and North Carolina.

Texas may want to explore the patient safety model and incorporate some of the principals and indicators within the state PI process. The American College of Surgeons, Trauma Quality Improvement and Patient Safety Committee is embarking on a new path to integrate a patient safety model into PI processes for trauma centers. Other patient safety standards and models are available through Joint Commission, National Quality Forum for Emergency Care, and the Agency for Healthcare Research and Quality' (AHRQ) TeamSTEPPS program.

The state and stakeholders recognize their duty and responsibility to inform consumers about trauma care within their communities and to develop prevention strategies to reduce the incidence of injuries. Some states are fortunate to have access to epidemiologists who can support data analysis in ways that are appropriate and topically relevant to the trauma system. The OEMS/TS has access to epidemiologists through a separate division within DSHS. This will enhance the state's ability to perform analysis, establish standardized reports for EMS and hospitals, and eventually may allow them to compare data with the National Trauma Data Bank (NTDB) annual reports, resulting in further evaluative efforts for system improvements from a national perspective.

A state PI process can ensure that RACs are not looking at their data in isolation. Continuing without a statewide PI process could falsely make it appear that care is appropriate and timely transfers exist for patients crossing TSAs. Initially, some RACs and trauma centers may be fearful of a state process because a statewide comparison may demonstrate regional opportunities for improvement when all

seemed well within the region. Data used in isolation do not provide a complete picture. Management of the statewide data and reporting results should be implemented in a manner that builds confidence in the statewide system. The state should also ensure that all data sources are accessed and linked to assess the continuum of care, from dispatch through rehabilitation.

State and regional PI programs have a tendency to focus on mortality outcomes as these data are more readily available and less complicated; the patient either lived or died. However, an accurate evaluation of the trauma system is not complete without looking at morbidity outcomes. Every effort should be made to include rehabilitation experts at the advisory committee, to define rehabilitation measures relevant to trauma system care, and to include those measures in the state and regional PI plans.

Once the state engages in the implementation of a PI process, it is essential to provide constituents with output for everyone's review. Data are and must be collected and optimally linked for system evaluation for a big picture perspective on trauma system effectiveness and care. Reports must be generated routinely, representing the particular interests of those who submit the data. If the data are used to assess the system and are of value to the users, data submission compliance may increase. If this effort is not successful, comprehensive data collection from all EMS providers and all hospitals may need to be mandated and compliance fully enforced with incentives, as well as, consequences.

The state PI process is extremely beneficial in evaluating the effectiveness of cost, quality, and access of trauma care statewide. The evaluative process should not only include standard indicators that address structure, process, and outcomes, but it should also evaluate the financial impact of trauma care. Such analyses can result in cost reductions related to triage, length of stay, and duplicative diagnostic testing.

As stated in the *HRSA Model Trauma System Planning and Evaluation* document, financial data should be combined with other cost, outcome, or surrogate measures. Years of potential life lost, quality-adjusted life years, and disability adjusted life years; length of stay; length of intensive care unit stay; number of ventilator days; and others should be used to estimate and track true system costs and cost-benefit. Several states have chosen to contract with a consulting firm for this extensive financial analysis. The results of these studies have been very beneficial in educating the public and the legislature about the need for sustained funding for trauma system development.

## RECOMMENDATIONS

- **Develop a statewide trauma system performance improvement plan and implement it.**
  - Engage as many stakeholders as possible in the development and implementation of the performance improvement plan.
- **Establish minimum state performance improvement audit filters to adequately evaluate the trauma process and outcomes statewide, including filters for special populations (pediatric, spinal cord injury, traumatic brain injury).**
- Identify staffing and funding resources at the state level to provide leadership and sustainability for the implementation of the state trauma system evaluation and performance improvement process.
- Establish a performance improvement committee of the Governor's EMS and Trauma Advisory Council.
- Identify staffing and funding resources at the state level to provide leadership and sustainability for the implementation of the trauma performance improvement process.
- Ensure that the state trauma system performance improvement process, as well as the performance measures, are inclusive of the continuum of care provided by dispatch, emergency medical services, acute care facilities, trauma centers, and specialty care facilities including rehabilitation.
- Encourage Regional Advisory Councils (RACs) to collaborate with other RACs based upon referral patterns to support state trauma performance improvement implementation.

## ***Trauma Management Information Systems***

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### **Purpose and Rationale**

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Hospital-based trauma registries developed from the idea that aggregating data from similar cases may reveal variations in care and ultimately result in a better understanding of the underlying injury and its treatment. Hospital-based registries have proven very effective in improving trauma care within an institution but provide limited information regarding how interactions with other phases of health care influence the outcome of an injured patient. To address this limitation, data from hospital-based registries should be collated into a regional registry and linked such that data from all phases of care (prehospital, hospital, and rehabilitation) are accessible in 1 data set. When possible, these data should be further linked to law enforcement, crash incident reports, ED records, administrative discharge data, medical examiner records, vital statistics data (death certificates), and financial data. The information system should be designed to provide systemwide data that allow and facilitate evaluation of the structure, process, and outcomes of the entire system; all phases of care; and their interactions. This information should be used to develop, implement, and influence public policy.

The lead agency should maintain oversight of the information system. In doing so, it must define the roles and responsibilities for agencies and institutions regarding data collection and outline processes to evaluate the quality, timeliness, and completeness of data. There must be some means to ensure patient and provider confidentiality is in keeping with federal regulations. The agency must also develop policies and procedures to facilitate and encourage injury surveillance and trauma care research using data derived from the trauma MIS. There are key features of regional trauma MISs that enhance their usefulness as a means to evaluate the quality of care provided within a system. Patient information collected within the management system must be standardized to ensure that noted variations in care can be characterized in a similar manner across differing geographic regions, facilities, and EMS agencies. The composition of patients and injuries included in local registries (inclusion criteria) should be consistent across centers, allowing for the evaluation of processes and outcomes among similar patient groups. Many regions limit their information systems to trauma centers. However, the optimal approach is to collect data from all acute care facilities within the region. Limiting required data submission to hospitals designated as trauma centers allows one to evaluate systems issues only among patients transported to appropriate facilities. It is also important to have protocols in place to ensure a uniform approach to data abstraction and collection. Research suggests that if the process of case abstraction is not routinely calibrated, practices used by abstractors begin to drift.

Finally, every effort should be made to conform to national standards defining processes for case acquisition, case definition (that is, inclusion criteria), and registry coding conventions. Two such national standards include the National Highway Traffic Safety Administration's National Emergency Medical Services Information System (NEMSIS), which standardizes EMS data collection, and the American College of Surgeons National Trauma Data Standard, which addresses the standardization of hospital registry data collection. Strictly adhering to national standards markedly increases the value of state trauma MISs by providing national benchmarks and allowing for the use of software solutions that link data sets to enable a review of the entire injury and health care event for an injured patient.

To derive value from the tremendous amount of effort that goes into data collection, it is important that a similar focus address the process of data reporting. Dedicated staff and resources should be available to ensure rapid and consistent reporting of information to vested parties with the authority and vision to prevent injuries and improve the care of patients with injuries. An optimal information reporting process will include standardized reporting tools that allow for the assessment of temporal and/or system changes and a dynamic reporting tool, permitting anyone to tailor specific "views" of the information.

#### **OPTIMAL ELEMENTS**

I. There is an established trauma MIS for ongoing injury surveillance and system performance assessment. **(B-102)**

- a. There is an established injury surveillance process that can, in part, be used as an MIS performance measure. **(I-102.1)**
- b. Injury surveillance is coordinated with statewide and local community health surveillance. **(I-102.2)**
- c. There is a process to evaluate the quality, timeliness, completeness, and confidentiality of data. **(I-102.4)**
- d. There is an established method of collecting trauma financial data from all health care facilities and trauma agencies, including patient charges and administrative and system costs. **(I-102.5)**

II. The trauma 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. **(B-301)**

- a. 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. **(I-301.1)**

- b. Prehospital care providers collect patient care and administrative data for each episode of care and not only provide these data to the hospital, but also have a mechanism to evaluate the data within their own agency, including monitoring trends and identifying outliers. **(I-301.2)**
- c. Trauma registry, ED, prehospital, rehabilitation, and other databases are linked or combined to create a trauma system registry. **(I-301.3)**
- d. The lead agency has available for use the latest in computer/technology advances and analytic 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. **(I-301.4)**

## **CURRENT STATUS**

The need for statewide data systems to collect, aggregate, and report both EMS and trauma data has been recognized for at least 20 years. In 1990, the National Highway Traffic Safety Administration conducted an EMS Technical Assistance Team Assessment of the Texas EMS system. Two priority recommendations related specifically to the need for data collection:

1. Develop and implement a statewide system to achieve data collection sufficient to define the level and impact of prehospital and hospital care.
2. Develop a comprehensive trauma registry. (p.17)

In 2001, the Texas Bureau of Emergency Management reviewed the 1990 NHTSA recommendations and provided the following documentation of progress regarding EMS and trauma data collection recommendations:

“Submission of a minimum data set has been mandated as a requirement for hospitals, including designated trauma facilities, and EMS Provider Licensing. However, it has not been strictly enforced to date for hospitals or EMS because the free CDC and TEXEMS software and the state registry, which resides in the Bureau of Epidemiology (EPI), are outdated. Currently, these issues are being addressed through a statewide EMS/trauma data project called TRAC-IT. A number of RACs have implemented regional registries”. (p.6).

TRAC-IT refers to a locally developed registry product that was designed to capture both EMS and trauma data within the DSHS. TRAC-IT converted to a web-based product in 2001. The product was being housed and supported within the DPP. In recent years significant challenges have been associated with TRAC-IT, in terms of data capture, analysis, and reporting. A very clear, consistent, and emphatic message was heard from all participants throughout the TSC confirming that TRAC-IT is irreparably broken and must be abandoned if statewide data collection is to become a reality. An additional problem is that TRAC-IT does not have data elements that are consistent with the National

Trauma Data Standard (NTDS) or the National EMS Information System (NEMIS).

In 2009, a plan to replace the TRAC-IT trauma and EMS registry was undertaken by the DSHS. MTG Management Consultants, “an independent management consulting firm addressing the strategy and technology challenges facing government organizations across the U.S....” was engaged to study the issue. Although their primary focus is in the area of law enforcement information technology, this firm undertook the challenge of preparing a plan for the replacement of TRAC-IT. Through a robust process that included multiple meetings with Texas hospital and EMS stakeholders, surveys and visits of “best practice” states in the area of trauma and EMS data collection, information was gathered pertaining to the attributes and features that any new system should include. The report and its associated recommendations were presented to DSHS on September 30, 2009.

Since receiving the consultant report, a Registry Solutions Work Group, comprised of stakeholder and DSHS representatives, has met several times to consider the recommendations and to develop a plan for the requisition and implementation of new EMS and trauma registries. As a result of that additional input, a request for offer (RFO) was prepared and, at the time of the TSC, was being circulated among potential vendors. The focus of the RFO is a single vendor solution, meaning that those responding would have to provide registry solutions for both EMS and trauma information systems that are fully compatible and capable of seamless integration. Responses to the RFO are due in June. The purchase of a commercial off-the-shelf solution has resolved issues of data system functionality in many states.

An additional underlying issue must be concurrently addressed. Due to the long history of persistent failure of TRAC-IT, the DPP has lost significant credibility regarding its ability to manage and maintain either the trauma or EMS registry. With the re-organization of DSHS into functional areas, the capacity of the OEMS/TS to manage and maintain such a system is unclear. As a result of ongoing frustrations, several alternative solutions to the management and maintenance of the registry are being simultaneously pursued. Among these are, housing the registries at the DPP, OEMS/TS, within TETAF, at individual RACs or groupings of RACs, and at the ACS NTDB. Each of these options has some merit. Likewise each is fraught with its own challenges.

However, this issue **MUST** be resolved in the best Texas traditions of collaboration and consensus of trauma and EMS stakeholders **PRIOR** to the purchase of any software solutions. Key stakeholders, supporting each of the various options must come together to develop a data plan that addresses this specific issue. Without such a plan the trauma registry effort will become even more fragmented, and significant personnel and fiscal resources will be wasted. The need for such a plan cannot be overstated.

Additional supporting information can be found under focus question number 4.

## **RECOMMENDATIONS**

- **Continue to actively pursue the purchase, installation, and roll-out of a trauma registry (National Trauma Data Standard compliant) and an EMS information system (National EMS Information System compliant).**
  - Convene a work group to develop a plan for the management and maintenance of new software solutions that focus on long-term stability of the new system.
  - Field test and roll-out the software solutions as soon as possible.
- Concurrent with data submission, create a structured and standardized reporting schedule, recognizing that there may be an early period of questionable data validity as the new data system is implemented.

## **Research**

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### **Purpose and Rationale**

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#### ***Overview of Research Activity***

Trauma systems are remarkably diverse. This diversity is simply a reflection of authorities tailoring the system to meet the needs of the region based on the unique combination of geographic, economic, and population characteristics within their jurisdiction. In addition, trauma systems are not fixed in their organization or operation. The system evolves over years in response to lessons learned, critical review, and changes in population demographics. Given the diversity of organization and the dynamic nature of any particular system, it is valuable when research can be conducted that evaluates the effectiveness of the regional or statewide system. Research drives the system and will provide the foundation for system development and performance improvement. Research findings provide value in defining best practices and might alter system development. Thus, the system should facilitate and encourage trauma-related research through processes designed to make data available to investigators. Competitive grants or contracts made available through lead authorities or constituencies should provide funds to support research activities. All system components should contribute to the research agenda. The extent to which research activities are required should be clearly outlined in the trauma system plan and/or the criteria for trauma center designation.

The sources of data used for research might be institutional and regional trauma registries. As an alternative, population-based research might provide a broader view of trauma care within the region. Primary data collection, although desirable, is expensive but might provide insights into system performance that might not be otherwise available.

#### ***Trauma Registry–based Research***

Investigators examining trauma systems can use the information recorded in trauma registries to great advantage to determine the prevalence and annual incidence rate of injuries, patterns of care that occur to injured patients in the system's region, and outcomes for the patients. These data can be compared with standards available from other trauma registries, such as the NTDB. Such comparisons can then enable investigators to determine if care within their region is within standards and can allow for benchmarking. Initiating and sustaining injury prevention initiatives is a vital goal in mature trauma systems. Investigators can take a leadership role in performing research using trauma registry data that identify emerging threats and instituting public health measures to mitigate the threats. For example, a recent surge in death and disability related to off -road

vehicles can be identified and the scope of the problem defined in terms of who, where, and how riders are injured, and then, through presentations and publications, the public can be informed of a new threat.

Trauma system administrators have a responsibility to control investigators' access to the registry. The integrity and reliability of data in a trauma systems registry are essential if accurate research and valid conclusions are to be reached using the data. Trauma system administrators should have a process that screens data entered into the system's composite registry from individual institutions. There should be a mechanism that ensures that the information is stored in a secure manner. Investigators who seek access to the trauma registry must follow a written policy and procedure that includes approval by an authorized institutional review board. Trauma registry data may include unique identifiers, and system administrators must ensure that patient confidentiality is respected, consistent with state and federal regulations.

### ***Population-based Trauma System Research***

A major disadvantage of using only trauma registry data to conduct research that evaluates injured patients in a region is the bias resulting from missing data on patients not treated at trauma centers. Specifically, most registry data are restricted to information from hospitals that participate in the trauma system. Although ideally all facilities participate in the form of an inclusive system, many systems do not attain this goal. Thus, a population-based data set provides investigators with the full spectrum of patients, irrespective of whether they have been treated in trauma centers or nondesignated centers or were never admitted to the hospital owing to death at the scene of incident or because their injuries were insufficiently severe to require admission. The state and national hospital discharge databases are examples of population-based data. These discharge databases contain information that was abstracted from medical records for billing purposes by hospital employees who enter these data into an electronic database. For investigators seeking a wider perspective on the care of injured patients in their region, these more inclusive data sets, compared with registries, are essential tools. Other population based data that may be of help include mortality vital statistics data recorded in death certificates. Selected regions might have outpatient data to capture patients who are assessed in the ED and then released.

Investigators can use these population-based data to study the influence of a regional trauma system on the entire spectrum of patients within its catchment area.

### ***Participation in Research Projects and Primary Data Collection***

Multi-institutional research projects are important mechanisms for learning new knowledge that can guide the care of injured patients. Investigators within trauma

systems can participate as coinvestigators in these projects. Investigators can participate by recruiting patients into prospective studies, being leaders in the design and administration of grants, and preparing manuscripts and reports. Evidence of this collaboration is that investigators within a trauma system are recognized in announcements of grants or awards. Lead agency personnel should identify and reach out to resources within the system with research expertise. These include academic centers and public health agencies.

### ***Measures of Research Activity***

Research can be broadly defined as hypothesis-driven data analysis. This analysis leads the investigators to a conclusion, which might become a recommendation for system change. Full manuscripts published in peer reviewed research journals are an exemplary form of research activity. Research reported in annual reviews or in public information formats intended to inform the trauma system's constituency can also be considered legitimate research activity.

#### **OPTIMAL ELEMENTS**

I. The trauma 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. **(B-301)**

- a. The lead agency has available for use the latest in computer/technology advances and analytic 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. **(I-301.4)**

II. The lead agency ensures that the trauma system demonstrates prevention and medical outreach activities within its defined service area. **(B-306)**

- a. The trauma system has developed mechanisms to engage the general medical community and other system participants in their research findings and performance improvement efforts. **(I-306.1)**
- b. The effect or impact of outreach programs (medical community training/support and prevention activities) is evaluated as part of a system performance improvement process. **(I-306.3)**

III. To maintain its state, regional, or local designation, each hospital will continually work to improve the trauma care as measured by patient outcomes. **(B-307)**

- a. The trauma system implements and regularly reviews a standardized report on patient care outcomes as measured against national norms. **(I-307.2)**

## **CURRENT STATUS**

Texas is home to some of the world's pre-eminent trauma care and academic institutions. Level I trauma centers, medical schools, schools of public health, and others are all motivated to develop new knowledge, disseminate it, and apply it. They are poised to conduct research and report their findings. Thus, a significant body of work regarding the care of trauma patients has emanated from Texas trauma system stakeholders.

Some published work regarding the effects of trauma systems has resulted from efforts within regional advisory councils (RACs), at select academic centers, and at the DSHS. However, the state has no central focus toward implementing or facilitating trauma systems-related research. While DSHS might be responsive to requests for assistance, the state has no stated agenda, sustained effort, or sense of purpose to pursue trauma systems-related research. As noted in previous sections, a serious impediment is the lack of a reliable registry or information system that is complete with requisite data elements.

## **RECOMMENDATIONS**

- Develop a trauma systems research collaborative, including the state's academic institutions and trauma system stakeholders.
- Develop and pursue a trauma systems research agenda.
- Support, on a continual basis, at least one large-scale trauma systems research initiative.

## Focus Questions

### Focus Question 1:

**Given the size of Texas, what is the recommended number and distribution of Level I and II trauma centers in the State? Particular consideration should be given to the Houston-Galveston area and to the role that lead level III trauma facilities play in Texas.**

The first portion of this question was thought by many participants at the TSC to be the primary genesis of requesting a Trauma System Consultation from the ACS. In fact, it is a legislatively generated question resulting from concerns of trauma center capacity following recent hurricanes in the Houston-Galveston area. A separate freestanding report on this issue will be generated by the SVT and submitted in addition to this more global assessment.

### Current Status - Houston-Galveston

Texas faces challenges that are similar to other states as regards number and distribution of trauma centers. The difference with Texas is that these challenges are exacerbated by the state's geography and population distribution. Houston has had significant problems with trauma center capacity – partly attributed to the closure of University of Texas Medical Branch at Galveston (UTMB) following Hurricane Ike.

Several factors must be considered when determining the appropriate number and distribution of trauma centers in the Houston-Galveston area. First, Houston is the fourth most populous city in the United States. This fact alone presents serious challenges to maintaining adequate trauma bed capacity within the geographic area. Houston also has the second largest number of highway lane miles per capita in the United States which creates challenges of transport time, as well as the risk for motor vehicle crash related injuries. Texas also has a high percentage of individuals with personal handguns, and the suburbs of Houston have half of the state's 20 most legally armed ZIP codes.

States designate trauma centers through many different mechanisms. Some, like Texas, have used voluntary designation, meaning that any hospital can be designated at any level for which they can meet the state specified criteria. Other states have performed a needs assessment and made determinations of location, level and number of trauma centers through a public process to determine "ideal" distribution within each geopolitical area (e.g., Washington state). Oregon used a combination of these two methods with the addition of legislative language that eliminates the possibility of competing level II trauma centers in Portland (where two level I trauma centers already exist). The trauma center verification process also varies state-by-state.

The data for determining an adequate number of level I trauma centers depends on the venue. Variation in population/trauma center capacity ratios is significant across the United States. One frequently mentioned estimate is to have one level I trauma center per one million population served. The Houston city population is estimated to be 2.2 million and is served by two level I adult trauma centers (Ben Taub and Memorial Hermann), as well as two pediatric level I trauma centers; however, this ratio maybe misleading. Additionally, the Houston trauma service area has no level II trauma centers to function in a supporting role. It was reported that UTMB is back in service as a trauma center, but it has not been operational long enough to seek verification as a level I trauma center by the American College of Surgeons.

The population served by these two adult level I trauma centers is clearly much greater than just the city of Houston, more than 5 million in its trauma service area. An additional 2 million people reside in the other trauma service areas for which the Houston trauma centers are the referral center. See Table 3. Based on population estimates of the Houston's trauma service area and neighboring trauma service areas, it appears that two or three level I large trauma centers is inadequate.

During 2003, both of Houston's level I trauma centers were reported to be on diversion more than half of the available total open time. Approximately half of these diversion hours were secondary to emergency department (ED) saturation, but trauma saturation was also frequently a factor. These diversion problems existed before Hurricane Ike closed UTMB, a nearby level I trauma center serving the Galveston/Houston area. This is another indicator that the capacity of the three trauma centers has been exceeded.

The threat of natural disasters should, of course, be of concern to those responsible for trauma patient care. However, manmade threats (such as industrial incidents and terrorism events) must also be considered in when planning for an adequate number of trauma centers. The close physical proximity of the two Houston trauma centers to each other could place them at simultaneous risk for closure by a single natural or manmade event. Thus, geographic distribution of level I trauma centers has the potential to become as significant an issue as total capacity. If both Houston level I trauma centers were incapacitated, no other adult Level I (or level II) trauma center closer than UTMB exists. UTMB, when once again verified and operational as a level I trauma center, would clearly be unable to handle the entire region's trauma volume should Houston's level I trauma centers both close, however briefly.

One potential argument against increasing the number of level I or level II trauma centers within Houston or its suburbs is that it could dilute the clinical trauma experience of Ben Taub and Memorial Hermann. The health professionals in level I trauma centers need a high volume of critically injured patients to maintain their skills in this specialty care. However, the number of critically injured trauma

patients that must be treated in a level I trauma center for that facility to remain at the highest levels of efficiency and clinical expertise is not known. The two level I Houston trauma centers are extremely busy trauma centers and are at the apex of volume in the United States. Many level I trauma centers appear to provide equivalent care with roughly half the annual trauma volume seen in either of Houston's level I trauma centers.

As the population of Houston is expected to grow, additional trauma care capacity will be required. The threat of natural and manmade disasters is likely to remain unchanged or even increase. After reviewing the population estimates, the impact of the loss of the UTMB trauma center in Galveston on diversion rates for the Houston level I trauma centers, and the historical diversion rates at the Houston trauma centers, it is the opinion of the American College of Surgeons site visit team that the trauma capacity of Houston hospitals is insufficient to meet daily and surge demands.

## **RECOMMENDATIONS**

- The State Office of EMS and Trauma Services, in conjunction with the appropriate regional advisory committees, should conduct a needs analysis in the Houston metropolitan area and the Houston/Galveston corridor, taking into account anticipated population growth, shifts in population distribution, and utilization of current resources. Using this data, the lead agency should:
  - Identify one or more hospitals with appropriate resources and geographic location as candidates for designation as level 1 or level 2 trauma centers.
  - Encourage and assist the candidate hospital or hospitals to become designated trauma centers at the level appropriate to their resources and commitment.

## **CURRENT STATUS - LEAD LEVEL III FACILITIES**

In an ideal trauma system, each geographic region would have at least one level I or level II trauma center at its center and within a thirty-minute transport time. These higher level trauma centers should be supported by well-distributed level III and/or level IV facilities that serve to care for the larger volume of less severely injured patients. This arrangement conserves resources at the level I and II trauma centers for the patients with the most severe injuries.

This concept of the ideal trauma system described above is rarely achieved for many reasons. Hospitals and populations are rarely evenly distributed. Hospitals may or may not choose to participate in a regional or statewide trauma system. When hospitals volunteer to participate, it is at whatever level they choose to be designated – assuming they can meet the criteria for that level. The question of the optimal level of participation of any given facility is quite complex and beyond the scope of this brief discussion. However, what is clear is that, regardless of designation level, trauma centers should be held to a set standard of performance commensurate with that level of designation. Additionally, they should be able to guarantee that level of performance 24 hours a day, 365 days a year.

The lead level III trauma facilities play a critical role in the Texas trauma system. Often referred to as “Super Level III” facilities, these facilities are where the spirit of the Texas medical community shines most brightly. Many of these level III trauma centers function at a higher level than they are designated, meaning they have some physician specialists, e.g. a neurosurgeon, that make it possible to care for some injuries usually referred to level II facilities.

Since these level III centers are not bound to level II standards or criteria pertaining to staff and resource availability, care can be potentially variable by time of day, day of week and other factors. For example, usually the lead level III trauma center does not have enough neurosurgeons or other specialty surgeons to guarantee care coverage 24 hours a day, 365 days a year. When the neurosurgeon is not available, the severely injured patient must be transferred to a level I or level II trauma center in another trauma service area.

Hospitals sometimes elect to seek designation at a level lower than they might be capable, perhaps because of the financial commitment the higher level designation requires or willingness of specialty physicians and surgeons to be available for emergency care. Thus the optimal designation of a trauma center is a delicate balance between patient need and hospital capacity and commitment.

The reality is that the population of Texas exists in many different patterns and densities. The hospitals serving these populations are different in size, focus, financial viability, age, and commitment. It is unreasonable to expect that each of 22 trauma service areas will be able to support a level I or II trauma center,

especially since many of these trauma service areas cover large rural areas with relatively small populations. It is in these trauma service areas that the lead Level III facilities are so valuable.

What is not known is whether changing the designation of a lead level III trauma center to a level II designation would improve the trauma care provided. If such a facility were to add capability or coverage by certain critical surgical specialties, then the change in designation would be expected to improve trauma patient care. If this is a low-volume level III trauma center with all necessary committed surgical specialties, and the only obstacle to achieving level II verification is the presence of a formal second call schedule for surgeons, the change to level II status would not be expected to result in better care. The need for back-up response at these low volume facilities would be a rare occurrence.

While the role of these lead level III facilities is critical to the continued success of the Texas trauma system, it is also true that much of trauma care is time-sensitive. If a level III trauma center is not able to provide emergency neurosurgical care for an epidural hematoma, the time required for fixed-wing transport to a higher level of care may prove lethal. These issues and questions require continuous data collection and analysis to identify the issues that need to be addressed to promote the provision of optimal care for all injured patients.

Generally speaking it is better for a facility to consistently operate above the expectations of its designation level than to sporadically operate at levels below its designated expectations. It is essential to referring hospitals, surrounding EMS agencies, and the public to know and understand the baseline level of service that can be counted on 24 hours a day, 365 days a year. On those days when they are operating above that baseline, it is a bonus in the patient's interest. However, if facilities are operating below their baseline capabilities, variability could result in delays in care and errors associated with a transfer to a second trauma center.

## **RECOMMENDATIONS**

- The Governor's EMS and Trauma Advisory Council and the State Office of EMS and Trauma Services should evaluate processes and care at the "super level III trauma centers" in all trauma service areas that do not have level I or level II trauma centers.
- Determine if a need for a "level III plus" exists with designation criteria that falls between level II and level III trauma center criteria. If such a designation is needed, develop criteria and a designation process for implementation.
- Hold each of these lead level III trauma centers accountable to the same uniform standards and a baseline level of response care 24 hours a day, 365 days a year.

## **Focus Question 2:**

**We understand this assessment will be a high level view of our system. Given the size of the state and the heterogeneous nature of the state's Regional Advisory Councils:**

**Focus Question 2 a) What strategy could the trauma system use to strengthen the system in relation to trauma care for special populations (i.e., children and the elderly)?**

Texas has already made some important progress in addressing the trauma care needs of special populations, especially children. In some respects this can be attributed to the active Emergency Medical Services for Children (EMSC) state partnership grant that is addressing ways to improve trauma care for children (eg. EMSC partnership grant project to develop model pediatric triage and destination guidelines and to identify best practices for pediatric care). The GETAC has an official pediatric member who chairs the GETAC pediatric committee. One activity of the pediatric committee was the development of required pediatric equipment to be carried on ambulances. The continuing work of the GETAC pediatric committee and integration with EMSC project efforts are important for improving the care of injured children in Texas.

The pediatric trauma care capability is well known in level I and II trauma centers that are verified by the ACS as pediatric trauma centers. No state criteria or guidelines exist that identify the resources needed to care for injured children in level III trauma centers, particularly the lead level III trauma centers in a RAC. According to the PRQ, a level III trauma facility is expected to present its pediatric capabilities to the RAC so that both EMS providers and other hospitals can determine which facility is most appropriate for the transport or transfer of critically injured pediatric patients. Lead level III trauma centers generally will accept and provide a large array of trauma tertiary services to most of the critical trauma patients that they receive, but this may not always include pediatric critical care. While information may be known about pediatric capability within a RAC, communication between RACs may need to be facilitated regarding the pediatric capabilities of level III facilities in neighboring RACs, as many injured children do not need the resources of a level I or II trauma center.

One issue that participants expressed was the destination determination of adolescents. No specific definition of a pediatric patient was heard by the SVT. Some considerations regarding care of adolescents are needed by the trauma centers, such as the importance of ensuring the availability of intensive care beds for critically injured children, the availability of blood in the trauma center, and the developmental and emotional development of the child or adolescent. Many states have selected a specific age to define the pediatric patient, such as birth to 14 years. This does not necessarily limit pediatric trauma centers from accepting adolescents older than the determined age, but such an age range may help when developing triage and destination protocols.

The PRQ also indicated that no pediatric data elements are captured in the EMS and Trauma registry; however, age, vital signs, and a description of injuries are captured for all patients. These are important data elements that can provide initial information about children and their injury severity. Some reports could potentially be run that could be reviewed by the RACs and the pediatric committee to begin the process of evaluating pediatric trauma care.

No specific information was provided about the needs of the elderly population in the PRQ or during the site visit. However, as with pediatric care, there are potential opportunities to address the special needs of the elderly, such as focused injury prevention programs that might reduce the number of injuries.

Many of the following recommendations are based upon information and recommendations provided in the trauma system consultation report.

## **RECOMMENDATIONS**

- Ensure that the biennial injury report contains the detailed pattern of injuries for children and the elderly. These special populations have different injury risk factors and mechanisms of injury.
- Ensure that when the injury prevention plan is revised it integrates priorities for children and the elderly. Identify evidence-based injury prevention strategies to recommend for RAC implementation.
- Determine if the needs of the elderly for trauma care are adequately addressed within the current GETAC standing committee structure.
- Identify opportunities to focus on priorities for the pediatric and geriatric populations during the revision of the state's strategic EMS and trauma plan.
  - Review RAC programs and accomplishments, looking for strategies that have benefitted the pediatric and geriatric populations. Ensure that these best practices are shared with all RACs.
- Explore opportunities to enhance the recognition of the special needs of children and the elderly within disaster preparedness programs.
- Once the new EMS and trauma information systems are operational, develop templates of special reports focused on care to children and the elderly. Run these reports on a regular basis to identify trauma system issues for each population and to monitor progress in system change.
  - Provide an opportunity for the GETAC Pediatric Committee to review RAC performance improvement reports to gain a sense of statewide pediatric

issues, become aware of sentinel events, and identify emerging themes or trend areas.

- Collate RAC information to identify instances of failed or delayed interfacility transfer for injured children and the elderly.
- Continue the development of model pediatric triage and destination guidelines. Ensure that they are disseminated to the RACs and to local medical directors.
  - Offer a session at the Texas EMS conference targeted to local medical directors to encourage discussion of the model pediatric triage and destination guidelines and challenges with their implementation in the RACs.
- Conduct discussion among appropriate stakeholders to determine the appropriate destinations for the injured adolescent and develop a standardized age-based protocol.
- Determine if adequate rehabilitation beds exist for injured children.
- Establish minimum state pediatric and geriatric PI audit filters to adequately evaluate process and outcomes statewide for children and the elderly. Identify specific audit filters for use by each of the RACs.

**Focus Question 2b: What strategies could the trauma system use to strengthen incorporation of rehabilitation entities/principles into the system?**

Rehabilitation is an integral component of trauma care and the trauma system. Ideally, the acute rehabilitative care needs of the patient should be considered within 24 hours of injury. Many severely injured patients may require a longer course of rehabilitation than their period of acute hospitalization can provide. For these patients, the availability of inpatient or outpatient services, depending on patients' specific needs, is crucial.

A first step to incorporating rehabilitation into the trauma system is to assess and understand the current situation. For example, do barriers exist in terms of the acute care provider practice patterns with regard to inviting rehabilitation specialists to join treatment teams? Are rehabilitation specialists responsive when asked to join treatment teams? What are the limitations of available rehabilitation services and facilities? Conducting this assessment will require a review of beliefs and an evaluation of practice patterns.

When barriers exist with regard to the inability to access needed rehabilitation services, the nature of the barriers must be categorized. Are needed services

available but too far from where the patient is? Are they available if no financial considerations exist? Does the state simply have no capacity in the system to care for a patient with a specific need(s) at the specific time?

All points listed above are important considerations. If services are routinely unavailable, difficult to access, or the response is sub-optimal, whether in the acute setting or afterward, the tendency might be to bypass them and accept an outcome without rehabilitation. This would be a disservice to the individual who would benefit from rehabilitation and have an improved outcome.

It is also vital that a multi-disciplined approach be taken to analyze the findings of the rehabilitation assessment. Stakeholders from both the acute care and rehabilitation perspectives must be engaged if workable solutions are to be determined for the identified issues. Rehabilitation specialists may have important data regarding patient outcomes. Thus, it will be important to identify rehabilitation leaders in the state and to engage them in constructive ways that will benefit their discipline and patient population. With sufficient data that may be both qualitative and quantitative, an opportunity for one or a series of summits may ensure that all stakeholders share similar goals. From these summit meetings, action plans can be developed. Current trauma system structures, including the GETAC and regional advisory councils, should play integral roles in advancing the cause of rehabilitation for trauma patients.

## **RECOMMENDATIONS**

- Conduct a study to determine if the number of rehabilitation beds available is sufficient to meet the rehabilitation needs of trauma patients in Texas, with special attention to the needs of pediatric, spinal cord injury, and traumatic brain injury patients.
- Conduct a survey targeting all of the trauma centers to determine if a significant delay in the transfer of injured patients to rehabilitation facilities exists and if this contributes to trauma center diversion statewide.
  - If a delay in appropriate transfer of injured patients to rehabilitation centers is confirmed for uninsured patients, investigate the possibility of designating selected rehabilitation centers for cost reimbursement eligibility under the trauma fund.
- Develop an action plan to improve rehabilitation services to trauma patients. The action plan should encourage and support the following:
  - Early notification to the rehabilitation team of its need to engage each trauma patient's care.
  - Expedient and qualified response of the rehabilitation team.
  - Quality rehabilitation interventions during acute hospitalization.

- Early identification of patients for whom rehabilitation will be appropriate beyond their acute hospitalizations.
- Mechanisms to match patient needs with available post-acute hospitalization rehabilitation resources.
- Adequacy (types and numbers) of rehabilitation services in the communities where they are needed.
- Monitoring and reporting of long-term outcomes.
- Consideration of adding rehabilitation data to the trauma registry, e.g., cost and outcome data. Subsequent data analysis should indicate a measure of the cost effectiveness of rehabilitation services for trauma patients.

**Focus question 2c: What strategies could the trauma system use to assure appropriate, data driven injury prevention activities are integrated into the system.**

Texas has many of the resources needed to ensure the integration of appropriate, data-driven injury prevention activities into the trauma system. The injury epidemiologist in the DPP assigned to the trauma system can support the program by identifying important databases and analyses to describe the pattern of injury for Texas residents, including special populations. The description of injuries prepared for the STIPDA technical assessment is a good initial model from which to identify a template of injury information to include in the recommended biennial injury report. RAC-specific information should be included, as well as injury cost data and comparisons with national injury data.

Using the information in the injury report the GETAC, with the advice of the Injury Prevention Committee, can establish priority injury mechanisms to be addressed by RAC prevention programs. For example, it is likely that several injury mechanisms will become priorities, such as motor vehicle crashes, bicycle-related injuries, falls, gun safety, etc. The provision of the RAC contracts that focuses on injury prevention could specify that the annual injury prevention activity address one of the priority mechanisms.

The TETAF injury prevention committee is also a valuable resource and has taken the initial steps to help the state and RACs to integrate data-driven injury prevention activities. The TETAF Injury Prevention Symposium was an excellent introduction to data-driven injury prevention activities, and additional sessions should be offered to increase the number of RAC members who can participate. The identification of 10 evidence-based injury prevention strategies is an asset for this effort. Information about these evidence-based injury prevention strategies and guidelines for their implementation and evaluation should be widely disseminated. Links to these programs should be easily found on the OEMS/TS and TETAF websites. TETAF may need to continue its efforts to

identify evidence-based injury prevention programs to have at least one recommended program for each of the priority injury mechanisms.

Once the injury mechanism priorities are identified by GETAC, and evidence-based injury prevention programs are widely disseminated, RACs should be encouraged to implement one of them each year. The RACs should also be required to perform an evaluation of the injury prevention effort and report it as required in their contract. TETAF may need to provide some consultation to the RACs regarding appropriate evaluation strategies.

## **RECOMMENDATIONS**

- Revise the GETAC injury prevention plan to identify injury mechanism priorities and recommended evidence-based prevention programs.
- Encourage the RACs to select among the priority injury mechanisms and recommended interventions for their annual injury prevention programs.
- Widely disseminate information about the 10 evidence-based injury prevention strategies developed by the TETAF injury prevention committee to the RACs and injury prevention stakeholders.
- Monitor the data submitted by the RACs regarding the effectiveness or evidence of impact of the selected injury prevention programs. Encourage RACs to share best practices regarding injury prevention program evaluation.

**Focus Question 2d: What strategies should the trauma system use to further evaluate ourselves, including recommendations as to how we best proceed (i.e, individual RAC evaluations or groups of RAC evaluations) in the future?**

Further utilization of the HRSA *Model Trauma System Planning and Evaluation* document is recommended to assess the state and regional trauma systems. The tool was developed as a guide to provide EMS and trauma care professionals, public officials, and policymakers, with a public health approach for the development and implementation of regionalized systems of care.

In 2005, the Southwest RAC participated in a pilot project under the direction of HRSA, utilizing the assessment tool. It was stated by participants that the tool and process were effective in assessing their system. However, no other RAC or the state lead agency has subsequently made use of this valuable tool.

This assessment process can be used to assist the RACs and state to take a more consistent and standardized approach to the next phases of trauma system development. The assessment can help identify areas of weakness, strengths,

and gaps in the overall operations and structure of the trauma system. Even though the quality of patient care is an essential focus for a state trauma system evaluation, an assessment of other structural components should not be neglected.

Many states have utilized the results of the HRSA BIS process in the MTSPE to design their strategic plans. The BIS process itself helps to engage stakeholders in a complex and comprehensive review of trauma system core functions and central services. Participants in the process have found it valuable by gaining a better understanding of component areas with which they generally are not familiar. The assessment helps to eliminate silos of activity and information, and encourages integration within systemwide healthcare services.

The state should strongly consider requiring each RAC to conduct a BIS assessment through its contractual process. The process works best if all participants initially complete the assessment tool, with guidance on how the tool is structured and scored and then come together with a facilitator in a consensus process to review each of the indicators. Once consensus on the scoring of each indicator has been accomplished, the group can prioritize indicators which can then be incorporated into the RAC trauma plan.

Once these RAC assessments have been completed, the state should collate the findings from each RAC for a comprehensive state analysis. Priorities can be established and incorporated into the state trauma system plan. The GETAC Trauma Systems Committee could take the lead in providing recommendations to GETAC for state trauma system development priorities. Some states have created a task force of trauma system constituents statewide, in a retreat setting, to conduct a comprehensive assessment from an overall state perspective. All of these activities can lead to a more complete assessment and provide direction for further enhancements and targeted implementation strategies for trauma system development.

## **RECOMMENDATIONS**

- Select a reasonable number of indicators from the *Model Trauma Systems Planning and Evaluation* document from each of the three core public health functions (assessment, policy development, assurance) to develop a measurement tool that can be used consistently by all the regional advisory councils (RACs).
  - Use this tool to assist individual RACs, the State Office of EMS and Trauma, and the Governor's EMS and Trauma Advisory Council (GETAC) to establish baseline performance measures and to evaluate changes in RAC maturation over time.

- Provide training to Texas EMS Trauma and Acute Care Foundation (TETAF) representatives and/or other interested parties related to the facilitation of a BIS process.
- Require all RACs to complete a regional assessment with a facilitator using the same set of indicators selected by the state from the *HRSA Model Trauma System Planning and Evaluation* document.
- Collate findings from all RAC assessments to identify priorities for enhancement of the statewide trauma system.

### **Focus Question 3:**

#### **How can we strengthen our regional and statewide performance improvement activities?**

Consolidation of the RACS into larger regions for PI purposes might enhance the PI process across the state. Consideration of patient referral patterns should be considered when asking RACs to collaborate for PI activities. Several regions demonstrated sophisticated PI programs with comprehensive audit filters that include the full continuum of care.

Even though each RAC is required to conduct PI as outlined in statute, the processes and audit filters vary greatly by region. The formation of larger regions may assist the RACs to share resources, best practices, and models. Having both consistent audit filters and standardized guidelines for triage and transfer statewide will help to assess if the right patient is getting to the right facility at the right time. In order to better assess deviations in the standards of care statewide and across the 22 RACs, the filters and guidelines need to be consistent.

The essential component for a statewide trauma PI program is a comprehensive data collection system and access to additional sources of data, some of which are population-based. Since acquisition of a new trauma registry is a recognized priority by both the OEMS/TS and stakeholders, it might be advantageous to work in parallel with this effort to secure a registry and also focus on the development a statewide trauma system PI plan.

The plan should be inclusive of all emergency healthcare providers including dispatch, EMS, hospitals, and rehabilitation. The goals, structure, responsibilities, data sources, scope of review, evaluation corrective action, and reporting should all be carefully crafted and clearly defined in the document. The plan should be structured in a way that supports both regional and state PI. The plan should also serve as a resource with various appendices that outline standardized process and outcome measures, forms for tracking and review, examples of registry reports needed for review, and guidelines for corrective actions.

Regarding the development of the standardized audit filters for a state PI program, one place to start is to identify the answers to the questions that need to be addressed from a state perspective. This effort will drive the data elements that need to be collected, the data sources, and more clearly define the outcomes for the state PI process.

Additional suggestions relating to this focus question can be found in the following sections: Systemwide Evaluation and Quality, Trauma Management Information Systems, and Research.

## RECOMMENDATIONS

- Encourage Regional Advisory Councils (RACs) to collaborate with other RACs based upon referral patterns to support state performance improvement implementation.
- Develop a trauma system performance improvement plan and implement it.
- Establish minimum state performance improvement audit filters to adequately evaluate the trauma process and outcomes statewide, including filters for special populations (pediatrics, spinal cord injury, traumatic brain injury).
- Establish a performance improvement committee of the Governor's EMS and Trauma Advisory Council
- Identify staffing and funding resources at the state level to provide leadership and sustainability for the implementation of the trauma performance improvement process.
- Ensure the state performance improvement process, as well as the performance measures, are inclusive of the continuum of care provided by dispatch, emergency medical services, acute care facilities, trauma centers, and specialty care facilities including rehabilitation.

#### **Focus Question 4:**

**Our state trauma registry has been problematic and we are currently working to replace it. Given the diversity and size of the State, we are interested in your assessment of how we could:**

- **proceed with the rebuilding of the registry that the stakeholders can support.**
- **utilize our trauma registry and other databases more effectively, with an emphasis on obtaining outcome data.**

Unfortunately, the absence of fully functioning trauma and EMS registries that meet the needs of RACs, individual facilities and agencies has resulted in a loss of trust and confidence in the Texas DSHS DPP to manage, maintain, and oversee the EMS and trauma registries. For your consideration, two general approaches are suggested to move this project forward with two or more permutations to each approach. The approaches are to rebuild trust in DSHS DPP or to acknowledge the absence of that trust and contract for the registries to be maintained by another entity.

#### Option 1: DSHS Management

##### Within the DPP Environmental Epidemiology and Injury Group

The Environmental Epidemiology and Injury Group has become the focus of frustration emanating from end-users of the TRAC-IT trauma registry and EMS information system. Compounding this problem is that this group has no direct or indirect reporting relationship with OEMS/TS. It is unclear how much of that frustration is legitimately focused on any of the following:

- staff inattention or the inability to generate meaningful reports and to support the system
- poor software,
- inconsistent data entry
- or other issues beyond the control of this office.

Regardless of the root cause of the frustration, it is clear that the majority of trauma stakeholders are not confident that this office can, or will, devote the time and attention necessary to ensure that the system is meeting the needs of the end-users (local and regional leaders and policy makers), even as a new software solution comes on-line.

In some states, the ACS TSC has recommended that the trauma registry be moved from the agency overseeing trauma to an agency with experience in maintaining registries, and in data analysis and reporting. Presumably, the Environmental Epidemiology and Injury Group have professionals with these skills. However, in this case having this group house and manage the trauma registry and EMS information system without direct, daily oversight and collaboration with the OEMS/TS appears unlikely to succeed in the short term.

## Within the Office of EMS/TS

Several stakeholders equate the ineffectiveness of the current TRAC-IT trauma registry and EMS information system with the transfer of the function from the OEMS/TS to the DPP Environmental Epidemiology and Injury Group. Conversely, stakeholders reported their belief that if the new system were housed in the OEMS/TS that more time and attention would be devoted to its operations than if it is housed in the DPP. Unfortunately, with the reorganization of the DSHS and realignment of all programs into a functional organizational structure, the expertise and acumen necessary to manage a complex data platform and to analyze, interpret, and report the findings no longer resides in OEMS/TS, and would have to be rebuilt.

From a programmatic perspective, at least four positions would be necessary in the OEMS/TS to successfully oversee the trauma registry and EMS information system: a trauma medical director, a trauma program manager, and at a minimum, two data managers. The number of data managers will depend, at least partially, on the ability of the trauma registry to accept uploaded data from the data systems in use at local and RAC levels. It is unclear whether a common platform across all facilities would be accepted or can be afforded. Therefore, even if each of the local or regional registries in use is NTDS compliant, there will be challenges in data transfer and translation to the central registry. Additional information technology and analytical support would also be necessary either from within the OEMS/TS or from other areas of the DSHS.

Additional resources would be necessary to manage the EMS information system, even in light of a single vendor solution. Issues of data collection, quality of data, and other operational aspects of this system will require substantially greater resources than the trauma registry. While close collaboration will be necessary between whoever is managing the trauma registry and the management of the EMS information system, the challenges will be substantially greater for the EMS information system. Among these challenges will be varying software platforms at local agencies, issues of training in proper completion of the electronic medical record (particularly in volunteer systems with low volumes and high turnover), and portability into the central EMS information system.

If it is determined that DSHS should manage the trauma registry, then a minimum of two trauma registry FTE;s will be required.

### Option 2: Outside Management

It is unclear to the SVT if, under current Texas statute, the trauma registry can be housed and managed outside of the DSHS. An attorney general opinion may be necessary to clarify this statute. Assurances concerning the continued protection against discoverability must also be considered with this option. However, some

of the stakeholders believe that this might be a viable option and it is, therefore, discussed below.

### Within TEFAF

TETAF is a relatively young non-profit organization with limited staffing and fiscal resources. While there are models of non-profits managing statewide trauma registries, they are not common. In areas where such models exist, confusion and conflict about who “owns” the data often occurs. While TEFAF has the interest, and has gained some level of trust, an undertaking such as EMS information and/or trauma registry management would require a significant increase in resources (human and fiscal).

A pro forma plan that details the projected financial and programmatic capacity of TEFAF to manage the trauma registry would be essential to any decision-making process surrounding this option. It is likely, but not certain, that any such projections would involve the transfer of resources from DSHS to TEFAF to accomplish this task. Resources for TETAF to manage the EMS information system and trauma registry would have to be assured long term.

### Within One or More RAC

Since several RACs are currently managing regional data sets, some involving both trauma registry and EMS information systems, an option may be to have the highest performing (related to the management of data systems) of these RACs increase their effort to become the statewide resource for the trauma registry and EMS information system.

Similar concerns about the RAC capacity and long term commitment of resources and support from DSHS that were discussed under the TEFAF option are also relevant for this option. It would be important to assure that the expansion of responsibilities to a single RAC would not divert their focus from the essential processes necessary to support optimal trauma care within their own TSA.

Another permutation of this option would be to have each individual RAC be responsible for the collection, aggregation, and reporting of their own data to their constituents and to the state. This option, while consistent with the decentralized model of trauma care in Texas would make ongoing monitoring and performance improvement across the state more challenging. It would further isolate the RACs and reduce the opportunity for broad system oversight.

### Vendor

Some political and programmatic jurisdictions have chosen to contract with the software vendor to do virtually all management, maintenance, and reporting of

data. Authorized individuals can request particular reports either be generated routinely or an ad hoc basis.

Where the relationship between the vendor and the data stakeholders is positive and the vendor is responsive, this option works very well. Conversely, if the vendor is nonresponsive, this option results in frustration. The absence of someone within the state who “lives” with the data on a daily basis can reduce the understanding of what data are available, how they might be analyzed, and whether issues of data quality and consistency are being addressed.

### NTDB

The American College of Surgeons maintains a large data set known as the National Trauma Data Bank. All ACS verified level I and II trauma centers contribute to this data set. Level III and IV trauma centers can contribute on a voluntary basis. Since data from every state and multiple levels of institutions are contained in the NTDB, high level benchmarking is possible.

Some system reporting and PI could be accomplished if all verified trauma centers in Texas agreed to and routinely submitted data to the NTDB. Several challenges are associated with this approach:

- the dataset is more limited
- the trauma centers maintain ownership of the data, and
- the NTDB would have to receive permission from all of the Texas hospitals for inclusion within a Texas data set.

### **RECOMMENDATIONS**

- Reconvene the Registry Solutions Work Group (RSWG), ensuring broad participation of stakeholders, and charge them with making a recommendation to the Department of State Health Services (DSHS) regarding a singular home for the statewide trauma and EMS registries.
  - Once DSHS has made the decision, have the RSWG continue to meet in an effort to promote buy-in among all stakeholders.
- The RSWG, along with responsible staff from the data repository and reporting entity, must work aggressively to troubleshoot and correct all deficiencies or challenges in the software, reporting, or other use issues as they arise.
  - The primary goal for the first two years of the new system should be to rebuild trust among stakeholders so that they will agree to participate with the new system.

## **ACRONYMS USED IN THE REPORT**

ACS – American College of Surgeons  
AHRQ – Agency for Healthcare Research and Quality  
ASPR – Assistant Secretary of Preparedness and Response

BIS – Benchmarks, Indicators, and Scoring  
BLS – basic life support

CDC – Centers for Disease Control and Prevention  
CODES – Crash Outcomes Data Evaluation System  
COT – Committee on Trauma

DPP – Division of Prevention and Preparedness  
DSHS – Department of State Health Services  
DUI – Driving Under the Influence  
DWI – Driving While Intoxicated

ED – emergency department  
EMS – emergency medical services  
EMSC – Emergency Medical Services for Children  
ESAR-VHP – Emergency System for the Advance Registration of Volunteer Health Professionals  
ESF – emergency support functions

GETAC – Governor’s Emergency Medical Services and Trauma Advisory Council

HRSA – Health Resources and Services Administration

MACC – multi-agency coordination center  
MADD – Mothers Against Drunk Driving  
MCI – mass casualty incident  
MICU – mobile intensive care unit  
MOC – medical operations center  
MTSPE – Model Trauma Systems Planning and Evaluation

NEMESIS – National EMS Information System  
NHTSA – National Highway Traffic Safety Administration  
NTDB – National Trauma Data Bank  
NTDS – National Trauma Data Standard

OEMS/TS – Office of EMS and Trauma Systems

PI – performance improvement  
RN – registered nurse

PRQ – pre-review questionnaire

RACs – regional advisory councils

RSWG – Registry Solutions Work Group

RFO – request for offer

SCI – spinal cord injury

STIPDA – State and Territorial Injury Prevention Directors Association

SVT – site visit team

TBI – traumatic brain injury

TETAF – Texas EMS Trauma & Acute Care Foundation

TSA – trauma service area

TSC – trauma system consultation

TXDOT – Texas Department of Transportation

UTMB – University of Texas Medical Branch, Galveston

## Appendix A: Site Visit Team Biographical Sketches

**CHRISTOPH R. KAUFMANN, MD, MPH, FACS -TEAM LEADER**

Dr. Christoph Kaufmann is Professor of Surgery at East Tennessee State University and Medical Director, Trauma and Acute Care Surgery Services for Mountain States Health Alliance, a 15-hospital system in East Tennessee and Southwest Virginia. Previously, he was Associate Medical Director, Trauma Services at Legacy Emanuel Hospital in Portland, Oregon for seven years. He attended medical school at the Uniformed Services University of the Health Sciences (USUHS) in Bethesda and completed his general surgery residency at Tripler Army Medical Center, Honolulu, Hawaii. He then completed the Trauma/Critical Care Fellowship at UW/Harborview Medical Center in Seattle. He is board certified in both general surgery and surgical critical care.

In 1990, while on the teaching faculty of Madigan Army Medical Center in Tacoma, Dr. Kaufmann was deployed with the 47<sup>th</sup> Combat Support Hospital to Saudi Arabia and Iraq and was awarded the Bronze Star for casualty planning. In 1993, Dr. Kaufmann was assigned as trauma consultant to the U.S. Public Health Service and served as Director, Division of Trauma and Emergency Medical Systems, Health Resources and Services Administration, where he administered the federal grant program to develop trauma care systems across the United States. He also participated as an author of the Model Trauma Care System Plan. In 1996, he returned to USUHS as Principal Investigator of the Demonstration Project for Telepresence Surgery and Chief, Division of Trauma and Combat Surgery. He also served as Region Chief, American College of Surgeons Military Committee on Trauma. Colonel Kaufmann was the Surgical Director of the National Capital Area Medical Simulation Center and Professor of Surgery at USUHS at the time of his retirement from the U.S. Army in 2002. He served as Chair, Advanced Trauma Life Support (ATLS) Subcommittee for the ACS Committee on Trauma from 2003-2006 and then as International Chair.

Dr. Kaufmann is an author of the 2006 HRSA Model Trauma System Planning and Evaluation document. He has given over 150 presentations in 20 different countries. He has been a member of numerous local, state, national and international organizations, both military and civilian, relating to trauma systems and trauma care, including:

- Member, Trauma Systems Consultation Committee, ACS COT
- Site Surveyor, NHTSA State EMS Assessment Team
- Site Surveyor and Member, Verification Review Committee, ACS COT
- State Trauma Center Site Surveyor for VA, PA, IL, WA, and OR
- Member, Institute of Medicine Committee on Creating a Vision for Space Medicine During Travel Beyond Earth Orbit
- Editorial Board, NATO Emergency War Surgery Handbook, 3<sup>rd</sup> U.S. Revision
- President, Ambroise Paré International Military Surgical Forum of ISS-SIC
- Examiner, Society of Apothecaries of London, Diploma in the Medical Care of Catastrophes

**JANE W. BALL, RN, DRPH**

Dr. Jane W. Ball served as the Director of the National Resource Center (NRC) at the Children's National Medical Center in Washington, D.C. from 1991 through 2006. The NRC provided support to two Federal Programs in the U. S. Department of Health and Human Services' Health Services and Resources Administration (HRSA): the Emergency Medical Services for Children (EMSC) Program and the Trauma-Emergency Medical Services Systems Program. As director of the NRC, she coordinated the support provided to the Federal Program Directors as well as the provision of technical assistance to state grantees. Support to the Federal Program Directors often included meeting facilitation, preparation of special reports (such as the Model Trauma Systems Evaluation and Planning document), and consultation on Program issues. Technical assistance often included strategic planning, providing guidance in securing funding, developing and implementing grants, developing injury prevention plans and programs, building coalitions, shaping public policy, conducting training, and producing educational resource materials.

Dr. Ball has authored numerous articles and publications as well as several health care textbooks, including Mosby's Guide to Physical Examination (6 editions), Child Health Nursing (first edition), Pediatric Nursing: Caring for Children (4 editions), Maternal and Child Nursing (2 editions), and Pediatric Emergencies: A Manual for Prehospital Care Providers (2 editions). One of these texts, Pediatric Nursing: Caring for Children, received the 1999 and 2001 Robert Wood Johnson Foundation Last Acts Coalition Outstanding Specialty Book Award. As an expert in the emergency care of children, Dr. Ball has frequently been invited to join committees and professional groups that address the unique needs of children.

Dr. Ball recently completed her term as the President of the National Academies of Practice, an organization composed of distinguished health care practitioners from 10 disciplines that promote education, research, and public policy related to improving the quality of health care for all through interdisciplinary care. She currently serves as the organization's Immediate Past President.

Dr. Ball graduated from the Johns Hopkins Hospital School of Nursing. She obtained her master's degree and doctorate in Public Health from John Hopkins University School of Hygiene and Public Health. She is a Certified Pediatric Nurse Practitioner.

**ALASDAIR K. T. CONN, MD, FACS**

Alasdair Conn is Chief of Emergency Services at the Massachusetts General Hospital in Boston. After receiving his medical degree in Edinburgh, Scotland and his surgical training in Toronto, Canada, Dr. Conn became a staff surgeon at

the Maryland Institute of Emergency Medical Services Systems (MIEMSS) in Baltimore. In addition, he was the EMS Director for the state of Maryland and the Medical Director of the Maryland State Police aviation program. In 1985, he transitioned to Boston where he initially worked at Boston Medical Center as a trauma and general surgeon, as well as Medical Director of a newly initiated consortium hospital based helicopter program (Boston MedFlight). In 1988, Dr. Conn moved to his present position and has been taking trauma call at the MGH since that time. He is still actively involved in prehospital issues; he continues to work with Boston MedFlight; and has worked with the Commonwealth of Massachusetts as Trauma Director, helping to draft the initial trauma legislation that was signed into law in the year 2000. He is an active participant in the drafting of regulations for the Massachusetts Trauma System. Dr. Conn has also served as Chairman of the American College of Surgeons Massachusetts Committee on Trauma and Chief of Region I (New England) ACS Committee on Trauma.

**THEODORE R. DELBRIDGE, MD, MPH, FACEP**

Dr. Theodore Delbridge is Professor and Chair of the Department of Emergency Medicine at the Brody School of Medicine at East Carolina University and Chief of Emergency Services at Pitt County Memorial Hospital in Greenville, North Carolina. Dr. Delbridge earned his medical degree at Eastern Virginia Medical School in Norfolk, Virginia. He completed residency in Emergency Medicine at the University of Pittsburgh, where he was also a Society for Academic Emergency Medicine / Physio-Control Fellow in Emergency Medical Services. Dr. Delbridge is board-certified in Emergency Medicine.

In his current roles, Dr. Delbridge serves on the medical center's Trauma Executive Committee and he is chair of the Quality Executive and Emergency Services Committees. Prior to arriving at East Carolina University, Dr. Delbridge was Director of Emergency Services at the University of Pittsburgh Medical Center – Presbyterian. He served as a member of the Trauma Medical Advisory Committee. He was also the medical director of STAT MedEvac, the region's principal air medical service.

Dr. Delbridge was the principal author of the *EMS Agenda for the Future*, supported by the National Highway Traffic Safety Administration (NHTSA) and the Maternal and Child Health Bureau of the Health Resources and Services Administration. In addition to work with numerous local and regional emergency medical services systems, he has subsequently served on several NHTSA statewide EMS technical assessment teams, including Colorado, Delaware, Mississippi, Montana, South Carolina, and Wisconsin.

Dr. Delbridge has authored dozens of scientific articles and book chapters, and he has delivered more than a hundred presentations across the country. He remains active in several professional organizations, including the National

Association of EMS Physicians as President-Elect, the American College of Emergency Physicians, the Society for Academic Emergency Medicine, and the Emergency Cardiovascular Care Committee of the American Heart Association.

**DREXDAL PRATT**

Chief Drexdal Pratt heads the Office of Emergency Medical Services in the Division of Health Service Regulation of the North Carolina Department of Health and Human Services. His agency manages Emergency Medical Services and Trauma and the Assistant Secretary for Preparedness and Response (ASPR) Hospital Preparedness Cooperative Agreement.

Mr. Pratt is a graduate of the Institute of Government at the University of North Carolina at Chapel Hill, the EMS Management Institute at the University of North Carolina at Charlotte, and Forsyth Technical Community College. He is also a Certified Emergency Manager (CEM) and a Certified Public Manager (CPM).

Mr. Pratt joined the North Carolina Office of Emergency Medical Services in 1987 as a Regional Coordinator. He was promoted through the ranks, first to Regional Supervisor, and then to Chief of the agency in 1999.

Mr. Pratt served two terms as Chair of the Region I EMS Advisory Council. He received the National Association of County Commissioner's Achievement Award for coordinating the development of the Stokes County NC computer-aided dispatch program.

Currently, Chief Pratt serves as a Commissioner on the Governor's State Emergency Response Commission and serves as Chairman of the Commission's Homeland Security Medical Committee. In addition, Mr. Pratt serves as Chairman of the NC Hospital Preparedness Committee.

**NELS D. SANDDAL, MS, REMT-B**

Mr. Sanddal is currently the president of the Critical Illness and Trauma Foundation (CIT), in Bozeman, Montana. CIT is a non-profit organization dedicated to improving the outcomes of people who are injured in rural America through programs of prevention, training, and research. He recently completed a detachment as the Director of the Rural EMS and Trauma Technical Assistance Center which was funded by the Department of Health and Human Services, Health Resources and Services Administration. Mr. Sanddal worked as the training coordinator for the EMS and Injury Prevention Section of the Montana Department of Public Health and Human Services in the late 1970's. He has served as the Chairperson of the National Council of State EMS Training Coordinators and as the lead staff member for that organization, as well as the National Association of EMT.

Mr. Sanddal has been a co-investigator for six state or regional rural preventable trauma mortality studies and has conducted research in the area of training for prehospital and nursing personnel as well as in rural injury prevention and control. He is a core faculty member for the NHTSA Development of Trauma Systems course and has conducted several statewide EMS assessments for NHTSA. Mr. Sanddal served on the IOM Committee on the Future of Emergency Care in the U.S.

He received his EMT training in Boulder, Montana, in 1973 and has been an active EMT with numerous volunteer ambulance services since that time. He currently responds with the Gallatin River Ranch Volunteer Fire Department where he serves as the Medical Officer and Assistant Chief.

He completed his undergraduate work at Carroll College, received his Master's degree in psychology from Montana State University and is currently completing his doctorate in Health and Human Behavior from Walden University.

**JOLENE R. WHITNEY, MPA**

Jolene R. Whitney has worked with the Bureau of Emergency Medical Services, Utah Department of Health for 28 years. She spent the first 6 years of her career as a regional EMS consultant. She became Assistant Training Coordinator in 1986. She has been a program manager for EMS systems and trauma system development since 1991. She is currently the Deputy Director for the Bureau of EMS and Preparedness, which includes Trauma System Development, Chemical Stockpile Emergency Preparedness, Hospital Surge Capacity Planning, ED, Trauma and Pre-hospital databases, EMS Licensing and Operations, and EMS for Children.

She spent 250 hours in the Olympic Command Center, serving as an EMS liaison for the 2002 Winter Olympics in Salt Lake City, Utah. She has been involved with all aspects of EMS including ambulance licensure, EMS councils, certification and training, computer testing, and curricula development. She has experience in statute and rule development, grant writing, system plan development, coalition building, and disaster preparedness.

She has served on several national committees and teams, which involved conducting a state EMS system assessment for NHTSA, reviewing rural trauma grant applications, and developing the HRSA model trauma system plan, the NASMESO trauma system planning guide, and the NHTSA curriculum for an EMT refresher course.

Jolene has a Masters in Public Administration from Brigham Young University and a B.S. in Health Sciences, with an emphasis in Community Health Education from the University of Utah. She was certified as an EMT-Basic in 1979. She also obtained certification as an EMT instructor and became certified as an EMT

III (Intermediate) in 1983. She has attended numerous conferences, courses, and workshops on EMS, trauma, and disaster planning and response. She also completed a course for investigator training from CLEAR. Jolene is a co-author of three publications on domestic violence and surge capacity planning.

She is the current Chair for the National Council of State Trauma System Managers/NASEMSO and served as Vice- Chair for the previous two years. She is a member of the American Trauma Society, and previous member of the National Association of State EMS Training Coordinators.

In 2005, she was nominated by her staff and received a Utah Manager of the Year Nominee Award from the Governor. She also received recognition from the Utah Association of Emergency Medical Technicians in 2006.

### **Observers**

#### **RAJAN GUPTA, MD, FACS, FCCP**

Dr. Rajan Gupta is an Associate Professor of Surgery at Dartmouth Medical School and Chief of the Division of Trauma and Acute Surgical Care at Dartmouth Hitchcock Medical Center. He earned his medical degree at Boston University, and did his general surgical residency at Dartmouth Hitchcock Medical Center. He subsequently did a fellowship in traumatology and surgical critical care at University of Pennsylvania. He is board-certified in Surgery with added qualifications in Surgical Critical Care.

Dr. Gupta is the Director of Trauma at Dartmouth, an ACS verified Level I trauma center. He is a member of the NH Trauma Medical Review Committee, and was actively involved with a major revision of the NH State Trauma System Plan. He is the State Chair for NH for the American College of Surgeons Committee on Trauma, and serves on the Rural Trauma Committee as well as the Trauma Systems Evaluation and Planning Committee for this organization. He is also Chair of the Rural Trauma Committee of the Eastern Association for the Surgery of Trauma. Additionally, he serves on the Trauma Systems Committee for the American Association for the Surgery of Trauma.

Dr. Gupta has presented at national as well as international forums on various topics in traumatology, and has authored numerous manuscripts and chapters on trauma, critical care, and acute care surgery.

#### **GERALDINE L. PRATSCH, RN, MPH**

Gerry Pratsch, RN, MPH has most recently served as the Program Manager of the Trauma & Burn Service at the Children's National Medical Center (CNMC), Washington, DC. She was administratively responsible for ensuring that CNMC met the American College of Surgeons criteria as a Pediatric Level I Trauma Center with the most recent verification in 2008.

During her tenure at CNMC from 1982-2010, she facilitated the development of a curriculum for pre-hospital personnel in pediatric emergency care. This project was awarded federal funding and developed into an instructor level training program that trained EMS instructors from all 50 US states and its territories.

Ms. Pratsch contributed in securing the initial federal funding for the Emergency Medical Services for Children (EMSC) that assists states in the development of programs targeted to pediatric emergency care. She participated in the development of Safe Kids Worldwide, an injury prevention initiative originating at CNMC.

Ms. Pratsch participated in writing several grants and has authored textbooks and articles as well as trauma research resulting in publications of pediatric injury and burn care.

Ms. Pratsch is a graduate of the University of Maryland School of Nursing. She has a master's degree in Public Health from the Johns Hopkins School of Hygiene and Public Health.

## Appendix B: List of Participants

<b>Last Name</b>	<b>First Name</b>	<b>Organization</b>
Parisi	Jim	Memorial Hermann Texas Medical Center
Alford	Rick	St. Joseph Regional
Alls	Lavon	Central Texas RAC- TSA L
Antonisse	Rick	North Central Texas RAC/TSA-E
Argo	Jeanie	Wise Regional Health System
Baker	Earvin	LBJ General Hospital
Bales	Ken	Professional Ambulance
Berry	Mathew	Shannon Medical Center and TSA K/Concho Valley RAC
Betts	Jacky	URHCS
Boyett	Lori	Hillcrest Baptist Medical Center and Heart of Texas RAC/ TSA-M
Braden	Jackie	J RAC
Brown, MD	Carlos	University Medical Center Brackenridge
Buchanan	Bobby	Heart of Texas RAC/ TSA-M
Capricion	Josephine	MRMC
Christopher	Scott	Nacogdoches Memorial and Deep East Texas RAC/TSA-H
Christy	Terri	Harlingen Medical Center
Click	Mike	Brownfield Regional Medical Center
Cloud	Marvin	Texas Health Cleburne
Coffey	Sheryl	Piney Woods RAC/TSA- G
Cole	Lisa	Methodist Healthcare
Coleman	Stewart	Martin County EMS
Corbell	Bert	Del Sol Medical Center and Border RAC/ TSA-I
Cotner-Pouncy	Tracy Michelle	Brooke Army Medical Center
Craig Blanco	Phyllis	Medical Center Hospital and RAC J
Daniel, MD	Craig	Medical Center Hospital Odessa
Dise	Helen	East Texas Medical Center
Dodwell	Brett	Conroe Regional Medical Center
Dunn	Jimmy	PHI Air Medical Group
Dykes	Cheryl	Memorial Hermann Texas Medical Center
Edwards	Courtney	Parkland Hospital and North Central Texas RAC/TSA E
Espinoza, MD	Jose	Valley Baptist Medical Center- Brownsville
Evans	Bertha	Good Shepherd Medical Center-Linden and Northeast Texas RAC/TSA-F
Farmer	Cathy	AC EMS and Coastal Bend RAC/TSA-U
Fillingim	H.T.	Big Country RAC/TSA-D
Flanagan	Tom	Memorial Hermann Texas Medical Center

Foster	Julie	STHS
Gage	Robin	Titus Regional Medical Center
Gandhi	Raj	JPS
Garza	Robin	Ben Taub General Hospital and Southeast Texas RAC/TSA-Q
Gilcrest	Tony	EMSC
Goettl	Brad	Dell Children's
Gondeck	Jackie	Capital Area Trauma RAC/TSA-O
Gordy	Wynn	San Antonio College
Greenberg, MD	Robert	Scott & White Healthcare
Grimm-Mapp	Diana	University of Texas Medical Branch
Harbert	Jodie	Collin College
Hushen	Tom	Rio Grande Valley Trauma RAC
Haugen	Todd	Border RAC/TSA-I
Hecht	Carrie	John Peter Smith Hospital Network
Helgesen	Wanda	Border RAC/TSA-I
Hughes	Pat	PHI Air Medical
Hutton	Deborah	University Health System
Janda	Steve	
Jaquith	Charles	Waco Police Department
Jennings	Sherry	St. Joseph Regional
Johnson	Allen	Southwest Texas RAC/TSA-Q
Jones	Tammy	Covenant Medical Center RAC B
Kerr	Barbara	Department of State Health Services
Klein	Jorie	Parkland Hospital
Knox	Carolyn	Citizens Medical Center
Kozar	Rosemary	Memorial Hermann Hospital
Loflin, MD	James R.	El Paso Fire Department
Lissberger	Danielle	Central Texas RAC/TSC- L
Lutrick	Sarah	Knapp Medical Center and RAC V
Macias, MD	Charles	EMSC
Majorie	Lygas	St. Joseph Medical Center- Houston
Martin	Eddie	Concho Valley RAC/TSA K
Matthews	Ryan	North Texas RAC
McClare-Williams	Kristy	Brownfield Regional Medical Center
McCreight	Tami	East Texas Medical Center
McFarland	Marilyn	University Health System and Southwest Texas RAC/TSA-P
McNabb	Wendi	University Medical Center Health System
Miller	Cindy	Texas Department of Rural Affairs
Mills	Kimberley	Christus Spohn Hospital
Mitchell	Scott	Flower Mound Fire Department
Moore	Rick	St. David's Round Rock Medical Centerf
Moore, MD, FACS	Fred	The Methodist Hospital

Overstreet	Amanda	Medical Student
Pendaris	Jerri	Good Shepherd Medical Center
Perez	Ram	Lower Rio Grande Valley RAC/TSA-V
Phillips, DO	Donald	Graham Regional Medical Center
Pickard	Gina	Brooke Army Medical Center
Price	Lisa	DeTar Healthcare System
Putz	Brenda	TETAF
Reeves	Jake	Shannon Medical Center
Richolson	Melissa	Brownfield Regional Medical Center
Riley	Vance	Victoria Fire Department/GETAC
Rives	David	Southeast Texas RAC /TSA-P
Rodgers	Kathy	Christus St. Elizabeth
Rubin		DRMC
Scholz	Shirley	Aerocare
Schultz	Judi	Piney Woods RAC/TSA-G
Smith	Lawan	Texas Health Harris Methodist Hospital Fort Worth and North Central Texas RAC/TSA-E
Smith	Paul	Lifecare EMS
Snow	Sally K.	Texas ENA/Cook Children's Health Care System
Steinkuehler	Mona	Cleveland Regional Medical Center
Stevenson	Guy	Methodist Healthcare Systems
Stewart, MD, FACS	Ronald	Southwest Texas RAC/TSA-P
Stowell	Kelly	Scott and White Healthcare
Tamayo	Roy	Valley Baptist Medical Center- Harlingen
Taylor	Jeremy	Parkland Health and Hospital System
Taylor	Tina	Grimes St. Joseph Health Center- Brazos Valley RAC/TSA-N
Tello	Carlos	Seven Flags RAC/ TSA T
Thompson	Connie	RAC J
Tips	Gaylen	University Medical Center Brackenridge
Updike	Danny	Concho Valley RAC/TSA-K
Valentino	Terry	Scott and White Hospital
VanBibber	Russell	Northeast Texas RAC/TSA- F
Villanacci	John	Department of State Health Services
Walker	Olivia	Department of State Health Services
Waters	Jim	TSA-B
Watson	Michaela	Texas Health Plano
Welch	Beverly	St. Joseph Regional Health Center
Wiktorik	Wanda	Trinity Medical Center
Willocks	Sherri	San Angelo Community Medical Center
Woods	Dawn	Rio Grande Regional Hospital