Trauma System Consultation

State of Indiana

Indianapolis, Indiana

December 14th-17th, 2008

American College of Surgeons

Committee on Trauma

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Methodology

The Indiana State Department of Health (ISDH), with funding support from existing Level I and II trauma centers in the state, the Indiana Farm Bureau Insurance Company, and the Indiana Hospital Association, requested this trauma system consultation, which was conducted under the auspices of the American College of Surgeons (ACS), Trauma System Consultation program (TSC). The multi-disciplinary Site Visit Team (SVT) consisted of: two trauma/general surgeons, one emergency physician, a State EMS/trauma director, a trauma program manager, a rural trauma & prehospital specialist, and a public health and injury specialist. Biographical sketches for team members are included as Appendix A of this report.

Prior to the visit, the SVT reviewed the ACS Pre-Review Questionnaire (PRQ) completed by the state's trauma program consultant with input from other sources. The format of this report correlates with the public health framework of assessment, policy development and assurance outlined in the ACS *Regional Trauma Systems Optimal Elements, Integration and Assessment: System Consultation Guide*. The SVT also reviewed a number of related supporting documents provided by the ISDH and information available on state government websites.

The SVT convened in Indianapolis, Indiana on December, 14-17, 2008, to review the State of Indiana trauma system. The meetings during the four-day visit consisted of plenary sessions during which the SVT engaged in interactive dialogue with a broad range of representative trauma system participants. There was also an opportunity for informal discussion with the participants, and time devoted to questions and answers. During the survey, the SVT also met in sequestered sessions for more detailed reviews and discussion, and for the purpose of developing a team consensus on the various issues, preparing a report of their findings, and developing recommendations for future development of the trauma system in Indiana. This report was developed independently of any other trauma system consultations or assessments.

Key Findings and Priority Recommendations

The primary objective of this ACS trauma system consultation is to guide and help promote a sustainable effort in the graduated development of an inclusive system of trauma care for the State of Indiana. Indiana is the 16th most populous state in the country with a population of approximately 6.4 million spread over a total area of roughly 36,418 square miles. Indiana has a population density of 169 per square mile and ranks 17th in highest population density in the U.S. There is a wide variability in population density among Indiana's 92 counties ranging from 2,171 per square mile in Marion County to fewer than 25 per square mile in Warren County and Benton County.

Indiana, the Hoosier State, is recognized by its motto — "The Crossroads of America." True to its motto, Indiana has more miles of interstate highway per square mile than any other state. This distinction unfortunately contributes to the incidence of high speed motor vehicle crashes resulting in injuries and the need for a statewide trauma system.

More than 95,000 Hoosiers are hospitalized, and 5,000 die annually as a consequence of injury. These deaths occur despite state-of-the-art hospital facilities, well-trained physicians, nurses, and emergency medical services providers, and laws intended to maximize citizen safety. One of the missing pieces in Indiana to reduce the injury mortality is a comprehensive statewide trauma system.

Trauma also has a monetary cost to society. Just the subset of motor vehicle crashes that are alcohol-related (24% of Indiana's crash costs) cost Hoosiers an estimated $2.4 billion in 1998. Add the remainder of the motor vehicle crashes to all of the other causes of injuries, and the cost is estimated to be in the $10's of billions. The cost of traumatic injuries, especially those associated with mortality, years of life lost, and disabilities, can be reduced through timely and effective treatment of the injuries, as well as through effective injury prevention programs.

Indiana has been called the "Brain Bank of the Midwest" for its success in education. It has the largest out-of-state college student population in the Midwest, and it is the third best state at keeping high school seniors in-state at Indiana colleges and universities. Despite this focus on education, the citizens of Indiana have not made public health a priority. Of all the states, Indiana appropriates the lowest per capita funding for public health programs. This lack of focus on public health programs is one reason Indiana lags behind many states in trauma system development.

Indiana is fortunate to have an extensive grassroots taskforce working towards statewide trauma system development. These 100+ volunteers represent the best that Indiana has to offer — commitment and dedication to a cause in which they each strongly believe. Their efforts will eventually prove to be successful in

the development of an integrated inclusive statewide trauma system based on national standards.

Advantages and Assets of the Indiana Trauma System

- The evolution of trauma care, in the absence of a coordinated and funded effort, has occurred through the efforts of individual trauma centers.
- Several existing trauma centers, particularly some Level II's, have initiated significant outreach efforts to create a regional network of injury care.
- The Trauma System Advisory Task Force has made an exemplary multidisciplinary effort to address several key issues impeding the development of a comprehensive and inclusive trauma system in Indiana.
- Members of the Indiana Trauma Network are to be commended for their significant accomplishments in the area of trauma registry definitions and collegial information exchange.
- The consistency of health district alignment between the Indiana State Department of Health (ISDH) and the Indiana Department of Homeland Security (IDHS) provides a good foundation for the development of regional trauma systems.
- Injury prevention programs are a significant focus across Indiana.
- Seven Level I and Level II trauma centers are already verified by the ACS process. The three Level I trauma centers are centrally located and available to all seriously injured Indiana trauma patients.
- Large cities in neighboring states (Chicago, Louisville, and Cincinnati) enhance trauma patient care capacity for Indiana residents.
- No specialty physician shortages were noted.

Challenges and Vulnerabilities of the Indiana Trauma System

- In the absence of a state trauma system plan, the State lacks a clear vision regarding its trauma system goals and how to achieve those goals.
- The EMS division and the trauma program are in different departments of state government.
- The State lacks a clear and comprehensive injury prevention and control plan and associated leadership to implement and evaluate the plan.

- The trauma care resources available in neighboring states (e.g. Illinois, Ohio, and Kentucky) have not been formally included within the trauma system development activities of Indiana.

- Reimbursement of trauma care provided to residents of Indiana who are treated in out-of-state facilities has not been adequately addressed.

Priority Recommendations Summary

This report contains more than eighty recommendations. The site visit team identified the following twelve as the most important for the trauma system's short and long-term success.

Statutory Authority and Administrative Rules

- **Amend PL 155-2006, the trauma system law, to include the establishment of a Governor-appointed, multi-disciplinary, state trauma advisory board to advise the Indiana State Department of Health in developing, implementing and sustaining a comprehensive statewide trauma system.**

System Leadership

- **Develop an Office of Emergency Care within the Indiana State Department of Health that includes both the trauma program and emergency medical services (EMS).**

Lead Agency and Human Resources Within the Lead Agency

- **Hire sufficient staff based on the recommendations identified in the trauma system plan.**

Trauma System Plan

- **Develop a plan for statewide trauma system implementation using the broad authority of the 2006 trauma system legislation.**

Financing

- **Develop a detailed budget proposal for support of the state trauma system infrastructure within the trauma system plan.**

Emergency Medical Services

- **Recruit and hire a qualified State Trauma/EMS Medical Director who will provide clinical expertise, oversight, and leadership for the state's Trauma and EMS systems.**

Definitive Care

- **Perform a needs assessment to determine the number and level of trauma hospitals needed within the state.**

System Coordination and Patient Flow

- **Develop, approve, and implement prehospital trauma triage guidelines as well as inter-facility transfer criteria.**

Disaster Preparedness

- **Involve the State Trauma/EMS Medical Director in statewide disaster planning initiatives.**

System-wide Evaluation and Quality Assurance

- **Create a performance improvement (PI) subcommittee of the Trauma System Advisory Task Force (TSATF) to develop a trauma system performance improvement plan**
    - **Develop a PI process template as a resource tool for all trauma centers and participating hospitals**
    - **Standardize a subset of trauma PI activities for each trauma center and participating hospital**
    - **Implement regional PI processes that feed into the statewide trauma PI processes**

Trauma Management Information Systems

- **Amend or create a statute with specific language to ensure the confidentiality of the trauma registry and of trauma system performance improvement activities and to protect both from discoverability.**

- **Create and implement a Trauma System Information Management Plan.**

Trauma System Assessment

Injury Epidemiology

Purpose and Rationale

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 through 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)**
Note: Injury severity should be determined through the consistent and system-wide application of one of the existing injury scoring methods, for example, Injury Severity Score (ISS).

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

Indiana utilizes mortality data as well as several other population-based data sets to report mortality-related injury mechanisms and risk factors associated with mortality. A contract epidemiologist is available (0.3 FTE) to assist with data analysis for the Indiana State Department of Health (ISDH). The epidemiologist is university-based, and it is not clear who provides direction for the work she performs since the ISDH does not have an injury prevention program. The epidemiologist has access to injury databases within the ISDH and other state agencies. Updated information on injury mortality has not been posted to the ISDH injury website.

Other injury epidemiology is conducted in the Indiana Criminal Justice Institute (ICJI) where the traffic safety databases are maintained. Resources for data analysis and reporting are housed within this agency, and reports of traffic-related injuries are current on that agency's website.

The fragmentation of injury data and resources for injury epidemiology between agencies reduces the overall effectiveness of the state in identifying the leading causes of injury for state residents. Making injury data more accessible could lead to a cohesive strategy for statewide injury prevention planning. A limited number of injury mechanisms have epidemiology resources, and other significant injury mechanisms such as falls in the elderly, burns, intentional injury, and occupational injury are not analyzed.

Indiana does not publish a description of injury morbidity. A definition of injury by ICD 9 codes for inclusion in the trauma registry has been established. Individual trauma centers collect trauma registry data and submit data annually to the American College of Surgeons (ACS) National Trauma Data Bank (NTDB). However, the compiled state trauma data are not shared for injury prevention or other planning purposes. Therefore, it is not known how many injuries are treated by the state's trauma centers with specific injury mechanisms or by injury severity. No effort has been made to pool information from individual trauma centers to develop a preliminary injury profile while waiting for the statewide trauma registry to be operational.

The true picture of injury morbidity for the state is not known as e-coding is not required on the Universal Billing form (UB92/04). Hospitals that do choose to report e-coding do not have a designated field for entry of the e-code, making it difficult to capture the e-codes, even if they are submitted. The participants were unable to explain what would be required to have e-coding required by hospitals on the UB92/04. Until e-coding is a requirement for submission of the UB 92/04, a population-based picture of injury morbidity among hospitalized patients will not be possible. This limits the trauma system's ability to identify whether severely injured patients are appropriately transported to facilities with the resources to optimally treat their injuries.

Chief complaint surveillance is conducted for identification of emerging infectious diseases. However, chief complaints pertaining to injuries were reported to be inadequately described and not useful for injury surveillance.

RECOMMENDATIONS

- Contact the NTDB to request a compiled report of all trauma center data submitted for the most current year to obtain an injury profile for patients treated in trauma centers.
    - Engage the injury epidemiologist in the analysis of data and development of an injury profile.

- Develop a strategy for ensuring that e-coding is submitted on Hospital Discharge and Emergency Department Universal Billing forms.
    - Designate the location on the data forms for documentation of the e-codes.
    - Advocate for the voluntary inclusion of e-codes by all hospital medical records departments.

- Develop a consensus on the definitions of injury for surveillance and injury control (e.g., all injuries, single system injuries, major trauma or multi-system injuries, special populations, and hospital admissions or treated and released)

- Consider developing an injury surveillance and injury control data consortium – an entity that facilitates data sharing and data management between state agencies.
    - Provide adequate epidemiology support (state or contract employees).
    - Include data resources such as the trauma registry, vital statistics, medical examiners' reports, UB 92/04, Indiana Criminal Justice Institute data, EMS database, Crash Outcomes Data Evaluation System (CODES) project, and others.

- Seek consultation from the National EMS Data Analysis Resource Center to enhance the training of the epidemiologist in injury surveillance and injury control reporting systems.

- Engage the epidemiology consultant in identifying and using existing data resources (including NTDB data) to develop a template for an annual statewide injury report.
    - Prepare the report on an annual basis.

Indicators as a Tool for System Assessment

Purpose and Rationale

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 sub-state (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

When asked how many of the participants were familiar with the Health Resources and Services Administration (HRSA) *Model Trauma System Planning and Evaluation* (MTSPE) document that includes the Benchmarks, Indicators and Scoring (BIS) tool, fewer than a dozen persons raised their hands, indicating a significant opportunity for information sharing. In 2006, shortly after the publication of the HRSA MTSPE document, each state's trauma program

manager and trauma medical director received the document, and they were asked to complete the BIS process in their states.

A total of six persons, representing the ISDH, the Indiana Hospital Association and four trauma centers completed the process independently. Results were returned to ISDH where they were tabulated. No consensus process was conducted and, as a result, a wide disparity of responses was found. This finding could indicate one of the following: unclear directions for scoring might have been provided (such as scoring for the local trauma center's region rather than the state system); some individuals had substantially more information on certain topical areas than others (silo effect); or a true difference of opinion existed. Without such a consensus building process the mean and median scores could have been artificially lowered. Additionally, without a consensus building process, a significant information-sharing opportunity about the state's trauma system assets and deficiencies was missed.

The results of the BIS were, reportedly, used to assist with the development of the draft administrative rules for the designation of hospitals as trauma centers. However, they have not been used to set benchmarks or to measure progress toward the attainment of trauma system objectives. The individuals who participated in completing the BIS noted that it is their intention to use the initial BIS scores as a baseline against which future scoring could be compared. No plans for re-measurement of the state trauma system using the BIS were described.

RECOMMENDATIONS

- Convene a larger group (20-40) of stakeholders in approximately five years from the initial BIS scoring to, once again, complete the BIS.
    - Use a facilitated, consensus-based process.

- Compare the second BIS scores to the baseline scores from 2006.
    - Note and publicize areas of improvement.
    - Identify those areas that have been resistant to change.

- Select specific indicators and scoring targets, and create strategies to attain those targets.

- Re-measure routinely to document change.

Trauma System Policy Development

Statutory Authority and Administrative Rules

Purpose and Rationale

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 post injury 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

In 2006, Indiana passed legislation providing broad authority to initiate a trauma system. This legislation names the ISDH as the lead agency for trauma system development, implementation and oversight. It provides specific authority for the ISDH to adopt rules for trauma center designation and the trauma registry. Draft rules for each were provided in the pre-review questionnaire (PRQ) prior to the on-site consultation visit. However, the draft rules have not yet gone through committee and stakeholder review and input.

The EMS statutes provide authority to the Indiana EMS Commission to oversee the statewide EMS system. Clear and strong authority to regulate EMS services and providers is outlined. The EMS Commission resides in the Department of Homeland Security (IDHS). The EMS Commission has adopted detailed rules regarding the operation of ambulance services, non-transporting vehicles, advanced life support services, and advanced life support rotorcraft. The EMS Commission has also adopted rules defining requirements for training and certification of EMS personnel. The EMS Commission may deny, rescind and apply a variety of sanctions, including revocation, suspension, censure and issuance of letters of reprimand to certified individuals through the IDHS. Regulation and discipline is the primary function of the EMS Commission.

In recent years, the EMS Commission was given the authority to certify emergency medical dispatch agencies, medical directors and dispatchers. These are an important aspect of trauma system implementation.

In 2008, legislation was passed giving the EMS Commission responsibility to adopt rules for trauma patient triage and transport protocols. This rule making process provides an important opportunity to appropriately direct trauma patients to the acute care facility providing the right care in the right timeline during the development of the statewide trauma system.

In addition to these existing laws, a draft bill is in development by a state legislator to create a trauma fund supported by a vehicle registration fee of $1.00

per vehicle. If passed as currently proposed, these funds would be made available to support hospitals designated to provide trauma care.

These recent legislative efforts and the involvement of members of the state legislature on the Trauma System Advisory Task Force (TSATF) demonstrate strong legislative support for trauma system implementation.

While the trauma system statute provides broad authority to develop a statewide trauma system, authority is not adequate in some important areas of system implementation such as:

- establishment of a formal multidisciplinary trauma system advisory board,
- clear statutory protection of the trauma registry, and
- clear statutory protection of system performance improvement activities.

The broad authorizing legislation appears to allow the ISDH to develop a plan for trauma system implementation and maintenance for the state, but this work has not yet been initiated. A planning retreat was conducted during the summer of 2008; however, the focus of the retreat was reportedly on the development of specific criteria for trauma center designation rather than overall systems planning. The focus on rules for trauma center designation seems to be premature without first having developed a trauma system plan. Another concern is that neither the EMS statutes nor the trauma statute provide liability protection for EMS medical directors.

Finally, the statutory authority for EMS and Trauma system implementation and management are split in Indiana between separate state agencies. This creates a challenge in system planning and coordination.

RECOMMENDATIONS

- **Amend PL 155-2006, the trauma system law, to include the establishment of a Governor-appointed, multi-disciplinary, state trauma advisory board (STAB) to advise the Indiana State Department of Health in developing, implementing and sustaining a comprehensive statewide trauma system.**
    - Include at a minimum the following representation on the board: trauma surgeon, emergency physician, trauma program manager, trauma registrar, physiatrist, emergency nurse, EMS Commission, hospital administration, public member, and a legislator.

- Amend Indiana Code (IC) 16-31 to provide liability protection for EMS medical directors.

- Develop rules for trauma center designation and the trauma registry based on the Indiana trauma system plan.

    - Ensure a process for review and input by the trauma system advisory task force (TSATF) and public comment.

- Request that all proposed legislation for trauma system funding provide support for the initiation and maintenance of the state trauma system program infrastructure within the Indiana State Department of Health.

System Leadership

Purpose and Rationale

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, multi-agency 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

Indiana currently has no comprehensive trauma system, and no trauma registry data are available to evaluate system performance. However, hospital discharge data are available for basic queries, but these data have not been used to assess the current status of trauma patient care in Indiana on a regional or statewide basis. Indiana administrative rule has not been sufficiently developed to review and monitor the trauma system patient through each phase of care.

The TSATF has provided the de facto leadership for Indiana trauma system development. The size of this group has allowed for broad membership of volunteers. This geographically diverse TSATF includes: surgeons, emergency physicians, other physicians, nurses, administrators, EMS representation, specialty population representation, and state legislators, among others. However, within this broad constituency, the TSATF has no executive committee, and no formally recognized chairperson.

Subcommittees of the TSATF exist that could address many issues regarding trauma system development when appropriate regulations are in place, including the following: Legislation and Funding, Systems Development and Maintenance, Information Management, Education, Injury Prevention, and Protocol Development.

The trauma program and the EMS Commission are in different state agencies. The EMS Commission, within the IDHS, clearly has tremendous health implications and impact on trauma care, governing the EMS personnel and EMS system for optimal timeliness of patient transport. The EMS Commission historically was not interested in becoming the lead agency for the trauma system development, but it was very supportive of the legislation designating the

ISDH as the lead agency. Support for the trauma system has continued through EMS Commission membership on the TSATF and by including TSATF members in the EMS trauma protocol development workgroup.

The ISDH as the lead agency for the trauma program has no infrastructure for the trauma system — no office and no state employee positions for development of the statewide trauma system. The two state trauma program staff are contract employees. The trauma system development effort within ISDH appears to have low priority with a lack of adequate resource commitment to take the program to the next level of development. The state has neither a state EMS Medical Director nor a state Trauma Medical Director.

Bringing the trauma and EMS programs together under a single umbrella agency should be considered, especially as national organizations are proposing an emergency response system for the management of other time-sensitive diseases such as stroke, ST-elevated myocardial infarction (STEMI), and asthma. Developing an infrastructure to address all time-sensitive conditions may be more efficient and economical than building separate programs.

Several trauma center medical directors, working in their own hospitals, cities, and regions, have developed solutions to system problems and priorities that demonstrate their leadership skills. Several examples of solutions to local and regional problems were discussed with the site visit team (SVT). The cooperative and collaborative "putting-the-patient-first" attitude that is needed for successful trauma system implementation is clearly present among members of the TSATF. Through education, this attitude should be spread throughout the state governmental leadership.

RECOMMENDATIONS

- **Develop an Office of Emergency Care within the Indiana State Department of Health that includes both the trauma program and emergency medical services (EMS).**

- Form a Trauma System Joint Policy Committee (in the interim) with leadership representation from the EMS Commission and State Trauma Advisory Board (or Trauma System Advisory Task Force until the STAB is created) to collaboratively develop and implement policies and guidelines for the statewide trauma system.
    - This joint policy committee should be chaired by the state Trauma/EMS Medical Director.

- Formalize an executive committee of the Trauma System Advisory Task Force to serve in the leadership role until such time as the State Trauma Advisory Board is established.

- Elect a chairperson for the Trauma System Advisory Task Force.

- Establish working subcommittees of the Trauma System Advisory Task Force with leadership and specific tasks to support trauma system development, and allow stakeholders to select a focus area of interest for trauma system development.
    - These subcommittees could continue to support the State Trauma Advisory Board once created.

- Consider adding additional subcommittees to the Trauma System Advisory Task Force, e.g., a system performance improvement subcommittee and a trauma medical director subcommittee.
    - The trauma medical director subcommittee could potentially fulfill the responsibilities of a state trauma medical director.

Coalition Building and Community Support

Purpose and Rationale

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:

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

Through the TSATF, Indiana is blessed with the enthusiastic participation of many health professionals and other interested individuals for the development of the statewide trauma system. This group of stakeholders continues to grow, primarily through word-of-mouth contacts. The list of stakeholders is greater than 100 with representation from trauma centers, acute care facilities, rehabilitation centers, emergency physicians, emergency nurses, prehospital providers, legislators, rural health, and several organizations. Participation by state agency representatives was reported to be less active than by other stakeholders.

The PRQ listed some additional members who would be valued, such as representatives from the state Medicaid agency, mental health professionals, and other health payers. It was reported that new members are recruited by identifying a current TSATF member who has a potential contact and then follows up with a formal invitation.

At this time, the stakeholders are all considered members of the Trauma System Advisory Task Force (TSATF). There is no official leadership of this stakeholder group, and no established organizational structure. By default the leadership is the state trauma program manager and L. R. "Tres" Scherer, MD (the current state ACS-COT chairperson).

Large numbers of stakeholders attend quarterly meetings. Several TSATF subcommittees were identified; however, most subcommittees do not meet on a regular basis. It appears that the current role of stakeholders is mostly information exchange. This available energy and enthusiasm is largely undirected to foster trauma system development. It may become difficult to sustain the enthusiasm of the stakeholders if they are unable to contribute, in a meaningful way, to the trauma system development.

Public education materials were developed by St. Mary's Hospital in Evansville with a DVD that was distributed to all hospitals in the state. The primary audience has been hospitals and other health professionals. Trauma center program directors and managers have visited other acute care facilities in their catchment area to begin educating them about the value of a trauma system. The *Trauma Times Newsletter* was launched in the summer of 2008 for the purpose of informing all stakeholders, acute care facilities, and emergency departments regarding important issues related to trauma system development.

Little effort has been directed toward educating the public about the need for trauma system development, or to involve consumers in the TSATF. The media (print and broadcast) have not been invited to participate in the TSATF. Strategies for dissemination of existing public education materials to various media outlets have not been developed.

RECOMMENDATIONS

- Distinguish the roles of the Trauma System Advisory Task Force (TSATF) and the proposed State Trauma Advisory Board (STAB)
    - Educate TSATF members regarding their continuing essential role in trauma system development.
    - Develop an organizational chart to illustrate the relationship between the state's new Office of Emergency Care, the STAB, and the TSATF.

- Develop a strategy to educate the print and broadcast media about the injury epidemic in Indiana and the need for a coordinated statewide system of trauma care.
    - Develop relationships with the print and broadcast media.
    - Develop relationships with community organizations that can help disseminate public education.

- Ensure that the injury data (in the proposed annual report) are integrated into the public information and education effort to better inform the Indiana residents about the need for a coordinated and inclusive system of trauma care.

Lead Agency and Human Resources within the Lead Agency

Purpose and Rationale

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, multi-agency 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

Legislation passed in 2006 established the ISDH as the lead agency for statewide trauma system development and implementation. The ISDH was selected as lead agency based on the recommendation of the TSATF and with the support of the EMS Commission in the IDHS. The ISDH has two contract employees who are attached to the Office of Rural Health. The Trauma Program Manager position is funded by the HRSA Rural Hospital Flex Grant (FLEX) and the trauma registrar contract position was recently funded by National Highway Traffic Safety Administration's (NHTSA) Section 408 funds through the Indiana Traffic Records Committee. The ISDH has been dependent upon various federal grant funds to support the work of the trauma program manager. The HRSA Assistant Secretary for Preparedness and Responses (ASPR) program previously funded the trauma program manager contract position.

The trauma program manager is very committed to the creation and implementation of a statewide system for Indiana. Her attention to detail is apparent from the quality of preparation for this site visit, including the completion of the PRQ. However, one person is inadequate to accomplish all the planning and implementation work needed to move the state trauma system forward. The trauma program manager expressed difficulty in navigating through the ISDH to accomplish goals of the trauma system, such as establishing a website for essential communication. This was attributed to the fact that the trauma program manager position is not a permanent state position and ISDH has no identifiable

state trauma office or program; however, permanent employees in state and local government also often have these same challenges.

The ISDH reports being ranked 50th in state public health agency funding in the country. As a result, the state's ability to fund any public health activities is extremely limited.

A major concern in Indiana is the lack of a formal state trauma program or office. Although ISDH was required by legislation to establish a trauma system, no dedicated state funding was provided to support this mandate. The ISDH is unable to establish any state employee positions for this essential work without direct state funding. Additionally, due to the economic downturn, any request to establish positions or hire staff must go through an additional review process. The Assistant Commissioner described an environment in which it is almost impossible to fill a state position.

The state Health Commissioner and the Deputy Commissioner were unable to attend the consultation meeting on Sunday and Monday as planned, due to air travel delays. The Health Commissioner was identified by participants as the current internal champion for the development of the state trauma system. However, members of the trauma community expressed that the trauma system is not a high priority of the ISDH.

The ISDH also has responsibility for the HRSA, ASPR-funded emergency preparedness program. Emergency preparedness staffing includes emergency preparedness planners, and the program funds a real-time hospital bed availability system. Opportunity exists for cross-cutting efforts between the trauma system and ASPR program.

The EMS Commission, located in the IDHS is currently staffed by an EMS manager and six employees responsible for complaint investigations and operations. The IDHS Chief of Staff, reported support for the efforts of the ISDH in establishing a trauma system for Indiana. He serves on the trauma task force. He and staff from the ISDH ASPR program report that they worked collaboratively on a number of issues, such as designating the same emergency preparedness and Homeland Security Districts. These 10 district boundaries also serve as the state's EMS districts.

RECOMMENDATIONS

- Ensure the new Office of Emergency Care has a high enough profile within the Indiana State Department of Health to:
  - Provide adequate staffing
  - Secure the financial resources required to write the state trauma plan
  - Implement the statewide trauma and EMS systems

- Optimally integrate with related agencies

- Develop specific recommendations for staffing needs in the trauma system plan.
  - Priority permanent positions needed to provide planning, oversight and future state system development include:
    - Trauma System Manager* 1 FTE
    - Trauma System Planning and Outreach Coordinator* 1 FTE
    - Trauma System Medical Director*+ .3FTE
    - Trauma Registrar* 1 FTE
    - Administrative Support 1 FTE
    - Trauma Designation Coordinator 1 FTE
    - Injury Prevention coordinator 1 FTE
    - Performance improvement coordinator 1 FTE

  *indicates initial positions needed to complete plan development.
  +role could potentially be filled by a trauma/EMS medical director subcommittee

- **Hire sufficient staff based on the recommendations identified in the trauma system plan.**

- Seek funding (Indiana State Department of Health and Trauma System Advisory Task Force) to support the development of a statewide trauma system, including support for a State Trauma Advisory Board and program staffing.

Trauma System Plan

Purpose and Rationale

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's first efforts at trauma system planning reportedly began in the 1990s, spearheaded by the Indiana Trauma Advisory Group (ITAG). These efforts apparently failed due to an inability to maintain momentum with the lack of progress. The most recent attempt at trauma system development and planning began in 2004 when the ISDH began working together with a multi-disciplinary group of 50 members representing multiple hospitals who were interested in developing a state trauma system. The TSATF was organized and has now grown to have over 100 members.

Broad enabling legislation (PL155), enacted in 2006, allows the trauma system leadership to formulate a plan and identifies ISDH as the responsible lead agency. To date, the TSATF and trauma program manager (with limited lead agency support) have been engaged in fragmented, and undirected efforts resulting in a "plan to make a plan".

While some of the infrastructure necessary to produce an actual plan is present, leadership is lacking to direct the planning process. No document currently exists that outlines, in an organized manner, the issues to be addressed, priorities, action plans, timelines, or individuals/agencies accountable for accomplishing the action plans. A trauma plan should deal with the broad spectrum of trauma system components from prevention to return to society. No timeline or deadline for completion of such a plan was reported to exist. Further, development of an Indiana state trauma system should not proceed without the production of this essential planning document.

The TSATF is too large to be effective in developing a trauma system plan, especially without designated leadership and direction. The number of projects and initiatives being managed by the trauma program manager is too extensive to also assume this responsibility, especially without dedicated programmatic,

clerical and financial support for the activities of the program manager and TSATF.

Another factor impeding the planning process is a lack of appropriate information (e.g., a recent and directed needs assessment or gap analysis) to guide the planning process. It was reported that a group of stakeholders completed a trauma/disaster preparedness assessment in 2001 and a "strengths, weaknesses, opportunities, and threats" (SWOT) analysis in 2002. Two other pertinent assessments have been performed by NHTSA and Purdue University. Although somewhat dated, these assessments, coupled with the SVT recommendations in this report should provide sufficient information to begin the trauma system issue identification process and the establishment of priorities.

A number of planning resources potentially exist in the Indiana state government for assistance with the state trauma planning process, such as the ISDH ASPR program and the IDHS Division of Planning and Assessment. Academic institutions, federal agencies, and private consulting firms offer other resources for planning.

RECOMMENDATIONS

- **Develop a plan for statewide trauma system implementation using the broad authority of the 2006 trauma system legislation.**
    - Integrate the trauma system with EMS, public health, emergency preparedness, and incident management.
    - Clearly describe the system design, including the components necessary to have an integrated and inclusive trauma system.

- Hire a trauma system planner to be responsible for production of the plan.
    - Make staff within the Indiana State Department of Health, especially planning staff assigned to the ASPR program, available to assist in development of the statewide trauma system plan.

- Select a small (no more than 10-15 members) multidisciplinary group of local, regional and/or national trauma system development advisors to serve as an executive planning committee with representation based on the planner's recommendations.

- Set a timeline and deadline for completion of the trauma system plan.

- Review and utilize previous assessments and this report to serve as an overall needs assessment to guide the planning process.

- Assess the feasibility and efficacy of developing a regional structure within the state trauma system.

System Integration

Purpose and Rationale

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

Despite years of well-intentioned expert volunteer effort by the TSATF, Indiana does not have a comprehensive written trauma system plan based on national guidelines or an inclusive statewide trauma system. System integration follows system development.

Some geographic areas within the state demonstrate the cooperative nature that should serve as a model for regional trauma system planning for the remainder of the state. Specifically, the trauma medical directors in South Bend and Fort Wayne have agreed to use their local helicopter resources in a manner that takes the severely injured patient from the scene to the closest appropriate trauma center, rather than to the aircraft's home base trauma center. This reflects appropriate trauma system patient care.

The ISDH, as lead agency for trauma system development, is also a member of the Indiana Traffic Records Coordinating Committee (TRCC) and the CODES Board of Directors. The Indiana Child Fatality Review Team has a broad organizational base, including several members from the state child protective services agency, and the ISDH has a representative on the team.

EMS and Fire are both within the same division at the IDHS, so the integration of EMS and fire with trauma will follow if the ISDH and IDHS work together on trauma system development, until such time as an Office of Emergency Care might be established in ISDH.

Multi-agency collaboration within the state resulted in the establishment of ten Public Health Preparedness Districts with boundaries used for the five EMS regions. However, these districts and regions were created without consideration of trauma system needs or patient flow. Trauma system leaders have not been formally involved in state emergency management planning to date.

Injury prevention outreach is abundant in many parts of the state, but no statewide strategy appears to exist. Injury prevention programs appear to be micro-focused (on issues of interest to trauma centers and prevention organizations) rather than macro-focused (tied to a statewide injury prevention plan), and they are only minimally integrated with trauma system development efforts.

Statewide trauma triage protocols have not been implemented, despite permissive legislation. As a result, an unknown number of critically injured patients may be transported to acute care facilities without the resources to meet the patient's needs in a timely manner.

RECOMMENDATIONS

- Use the existing Public Health Preparedness Districts and EMS regions, to the extent possible, to promote integration of the trauma system resources within the existing EMS and disaster preparedness infrastructure; however, referral patterns that best serve the medical needs of the patient should have priority.

- Develop a process for trauma system integration with the state disaster preparedness infrastructure, including reciprocal committee membership and mutual plan development.

- Develop a process for trauma system integration with the injury prevention community, and develop a shared vision and plan to support trauma system development and maturation.

- Develop a process for trauma system integration with other public health and safety services including mental health, social services, fire, and law enforcement to facilitate resource sharing.

Financing

Purpose and Rationale

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

Indiana currently has no state funding for trauma system development and infrastructure support. However, the ISDH has successfully acquired and used federal funding to begin development and implementation of a statewide trauma system. Trauma system development is currently funded by a grant from the HRSA Rural Hospital Flexibility grant, supporting the fulltime position of the contracted trauma program manager. The ISDH also recently acquired funding from the TRCC which administers the NHTSA 408 traffic records grant. This funding supports the contracted trauma registrar position and development of the state trauma registry. The EMS Commission in the IDHS is funded by EMS provider certification fees.

Some legislative support appears to exist for establishing a trauma fund. A draft bill has been proposed that would fund designated Indiana trauma centers through a motor vehicle registration fee. This bill would not address the core challenge of funding the essential trauma system infrastructure including personnel, State Trauma Advisory Board activities, rule-making, data collection and analysis, performance improvement, and system oversight.

The existing level I and II trauma centers did not report major concerns regarding trauma care reimbursement. The state hospital association representative reported an estimated payer mix of about 8-9% uninsured, 14% Medicaid, and 30% other health insured; however, this varies between individual acute care facilities. The SVT did not find evidence that payer mix has been actively reviewed at the state level or specifically evaluated for trauma care versus all hospital care. Indiana appears to have a free market philosophy, which has driven the development of level I and II trauma centers in acute care facilities and areas of the state where it is profitable to do so.

Northwest and southeast regions of the state do not have any trauma centers at this time. Gary, Indiana has a very different patient mix than the remainder of the state, with penetrating trauma responsible for over 50% of the major trauma

patients at one hospital. This figure could be somewhat misleading as the state does not have a common definition for “trauma patients.”

The state is reported to be a physician-friendly place to practice medicine. Consequently little concern was expressed about availability of neurosurgical and orthopedic subspecialists. Pediatric surgeons were reported to be less available.

The state Medicaid office does fund in-state trauma care for Indiana residents, but it does not fund the care state residents receive in out-of-state facilities. Trauma centers in several adjoining states receive and care for Indiana patients, in some cases without any reimbursement. Many of these trauma centers in border catchment areas would be the appropriate level I or II trauma center for Indiana residents. Integrating these trauma centers into the state trauma system plan would be facilitated if plans for future Medicaid payment could be addressed.

Indiana has a unique opportunity to address funding issues through discussions with the insurance industry. One insurance agency participates on the TSATF and provided financial support for the ACS consultation.

As previously stated, the ISDH has no specific trauma program, and the two trauma system personnel are contractual. No operational budget was provided in the PRQ. No trauma system development and implementation plan describes the budget needs either for the system infrastructure or for undercompensated or uncompensated trauma care in the state. The state trauma system plan should describe the proposed system and establish a draft budget for system development, implementation and sustainment.

A final concern is the lack of liability protection for local EMS medical directors. This creates a financial disincentive for physicians to participate in this important capacity for the EMS and trauma systems.

RECOMMENDATIONS

- **Develop a detailed budget proposal for support of the state trauma system infrastructure within the trauma system plan.**
    - Fund permanent staff positions as recommended in the lead agency section of this report
    - Fund the meetings, travel and operational costs

- Determine if there is a need to fund uncompensated care in Indiana and, if so, at what level.

- Establish reciprocal relationships between Medicaid offices in Indiana and neighboring states to ensure the fair and just compensation of trauma care

is provided, regardless of whether such care occurs in the home, or neighboring state.

Trauma System Assurance

Prevention and Outreach

Purpose and Rationale

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

The PRQ provided an impressive listing of injury prevention programs and outreach by the trauma centers in Indiana. Trauma centers have requirements to conduct injury prevention outreach for ACS verification. The trauma centers reported using data in their trauma registry to identify significant injury patterns that helped them select injury prevention programs.

Indiana did develop a draft Injury Prevention Plan while funded by a Centers for Disease Control and Prevention (CDC) capacity building grant. An Injury Prevention Advisory Group was in existence at the time of grant funding, and did identify the priority injuries for the state to address. Although the subsequent CDC grant was approved, the state did not receive funding to continue support for the injury prevention program and formal adoption of the Injury Prevention Plan. The Injury Prevention Advisory Group became relatively inactive.

No needs assessment or gap analysis has been conducted to identify resources needed or available for injury prevention programming. A recent survey of state injury prevention programs was conducted and sent to 55 injury prevention programs. Unfortunately, not all potential providers of injury prevention programs were contacted (e. g., EMS providers who provide injury prevention programs). This survey effort represents an organized, but incomplete, assessment of current injury prevention programs.

Without an injury prevention program in the ISDH, the trauma centers and other injury prevention organizations have no guidance regarding the selection and implementation of injury prevention programs that could address the most significant injuries to the state's population. No resource center or database that matches effective injury prevention strategies to specific injury mechanisms or population groups is available. Trauma centers and other injury prevention program leaders are not guided to access national resources centers that do exist, such as for suicide, to select *effective* injury prevention programs for implementation.

The resulting individualized approach for selection of injury prevention programs by trauma centers and other injury prevention leaders increases the possibility of duplication of efforts, failure to address the most significant injury issues on a statewide basis, and selection of injury interventions without proven efficacy. Additionally, programs may not be targeted to certain population groups (the PRQ identified the rural and Hispanic communities as potentially not being adequately addressed). Minimal evaluation of injury prevention efforts is occurring, so the outcomes of injury interventions are unknown.

Steps have been taken to integrate injury prevention into the trauma system. An injury prevention subcommittee of the TSATF was recently formed, and many of the state's former Injury Prevention Advisory Council members have indicated an interest in participating. The role of this subcommittee in trauma system development has not yet been defined.

RECOMMENDATIONS

- Identify an injury prevention organization, academic center, or state agency to serve as a repository and a clearinghouse of effective injury prevention strategies, programs, and resources to address injury mechanisms and populations so that this information is available to all injury prevention leaders.

- Identify a specific role and activities for the injury prevention subcommittee of the TSATF that promotes the integration of injury prevention into trauma system development.

Purpose and Rationale

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 misdistribution 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 acute care 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, air ground coordination, early notification of the trauma care facility, pre-arrival 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 state's EMS system is comprised of a heterogeneous workforce functioning within a variety of service delivery models. This results in an inconsistent availability of EMS resources for residents throughout the state.

The IDHS is charged with administering the state's EMS system from within its Fire and EMS Services Branch. It is principally engaged in the following activities:

- licensing EMS provider organizations and vehicles,
- credentialing EMS providers,
- performing audits of system components and educational programs,
- maintaining a statewide EMS information system,
- providing technical assistance to system participants, and
- responding to complaints.

For administrative purposes, the state's EMS system is divided into five districts, each of which includes two of the ten disaster planning and response districts. A manager is assigned to each EMS district.

The rules and regulations governing the state's EMS system are promulgated by the Indiana EMS Commission. Its eleven members are appointed by the Governor and represent a cross-section of EMS stakeholders. The EMS Commission's responsibilities and authorities were updated as of July 1, 2008 by Senate Enrolled Act No. 249. The EMS Commission enjoys broad power to develop and promote the state's EMS system. It has created extensive regulations that define, among other things, scopes of practice and credentialing requirements for various level EMS providers, required equipment lists for ambulances, and EMS agency licensure requirements. The EMS Commission, supported by IDHS staff, meets six times per year.

The lack of uniform availability of qualified medical direction throughout the state's EMS system is a significant deficit. First and foremost, Indiana has no State EMS Medical Director. National professional organizations and the NHTSA standards for state EMS systems emphasize the importance of a state EMS medical director to provide necessary and ongoing clinical expertise, coordination, and oversight.

All Indiana EMS provider organizations and individual providers are required to have a local medical director. However, the medical director qualifications are minimal. They do not ensure competency, familiarity with the EMS system, or an understanding of the expectations of the role. Even with the minimal qualifications, some provider organizations find it difficult to establish a relationship with an engaged medical director.

Regulations define the scope of responsibilities of an EMS medical director in several areas, but some ambiguity remains. Implicitly, EMS medical directors are at liberty to determine the scope of practice for advanced level EMS systems without further oversight. Yet, the rules also identify only four areas for which a medical director may establish protocols. No requirement or explicit authorization exists for triage or patient destination protocols. Further, the rules and regulations do not provide authorization for an EMS medical director to remove a provider from clinical duty related to concerns of competency or other significant cause.

Some difficulty in identifying EMS medical directors undoubtedly relates to physician availability in rural communities. It was reported by participants that in some cases medical direction is provided with less than appropriate engagement by the responsible physician. The state has not developed a meaningful process to facilitate matching the EMS system's needs with qualified physicians. For example, EMS medical directors who volunteer their time and expertise have no

state-sponsored liability protection, and no EMS medical director course or conference is offered to help physicians understand their roles.

Throughout Indiana, EMS is accessed via E9-1-1. Several hundred EMS provider organizations deliver care, ranging from basic to advanced life support, and non-transporting services to air ambulances. Local governments (e.g., city, town, county) are responsible for ensuring the availability of EMS within their jurisdictions. Local jurisdictions are also free to determine what level of service will be provided (e.g., basic versus advanced life support).

EMS providers are educated in accordance with the National Standard Curricula for First Responder, EMT-Basic, EMT-Intermediate, and EMT-Paramedic. Re-credentialing requirements stipulate continuing education needs but do not specify topic areas that must be included. For example, the total number of continuing education hours is mandated, but no requirement specifies the number of those hours for topics related to trauma, pediatric care, cardiac care, stroke care, etc.

As in many rural areas of the United States, volunteers comprise a significant portion of the EMS workforce. Volunteer recruitment and retention pose an ongoing and increasing challenge.

All EMS incidents are reported to the state for inclusion in a central data repository. A nominal number of standardized reports are periodically prepared from that data. Frequently, customized reports are requested and generated for system stakeholders. In early 2009, Indiana's EMS system will transition to a National EMS Information System (NEMSIS) silver-compliant dataset. Accompanying system upgrades should enable more robust queries and facilitate improved information exchange within the state's EMS system.

Seven air medical services operate 16 rotor-wing bases in Indiana. No regulations govern their deployment. EMS rules and regulations do direct many aspects of their operations, but do not mandate specific dispatch or patient destination decision-making processes.

NHTSA performed a technical assessment of the Indiana EMS system more than a decade ago. Little institutional memory of that assessment and the provided recommendations remain.

RECOMMENDATIONS

- **Recruit and hire a qualified State Trauma/EMS Medical Director who will provide clinical expertise, oversight, and leadership for the state's Trauma and EMS systems.**

- Develop additional qualifications for local EMS medical directors, including an EMS medical director course.

- Develop strategies to recruit and retain qualified physicians as local EMS medical directors, including protections from liability for those who volunteer their time or receive only modest (non-compensating) stipends.

- Develop procedures that enable the State Trauma/EMS Medical Director to oversee the appropriateness and approval of local EMS protocols, with a goal of creating greater degrees of uniformity.

- Ensure that each local EMS system utilizes a trauma triage protocol that helps to guide patient destination decision making and is based on a statewide guideline.

- Develop guidelines for topic areas, including trauma, to be covered as part of EMS provider continuing education requirements.

- Develop authority for local EMS medical directors to suspend, pending due process, EMS providers from clinical duties for concerns relating to competency or conduct.

- Request a NHTSA Technical Reassessment of the statewide EMS system within the next two years.

Definitive Care Facilities

Purpose and Rationale

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

Indiana has 129 acute care hospitals with emergency departments as of 2007, including two Veterans Administration Hospitals. Although these acute care hospitals appear to be generally well distributed throughout the state, 16 of Indiana's 92 counties do not have a hospital. Currently 46 of the 129 acute care hospitals are considered rural, and 35 are designated as Critical Access Hospitals.

Indiana has 7 trauma centers that have been independently verified by the ACS in the state, but this does not take into consideration trauma centers in other neighboring states that receive and treat patients injured in Indiana. Of the seven trauma centers, three are level I centers (two adult, one pediatric) and four are level II centers (one pediatric). Another hospital was reported to be considering seeking ACS verification as a level II center. The 7 trauma centers are predominately located in the center of the state and in urban and suburban locations. The state has three burn centers, one of which is dedicated to the care of pediatric patients, all of which are verified by the American Burn Association. Indiana has two pediatric hospitals, and one is an ACS verified level I pediatric trauma center.

The ISDH does not currently have the specific authority to designate or revoke the designation of trauma centers. PL 155-2006 gives broad responsibility to the

ISDH for development, implementation and oversight of a statewide comprehensive trauma system. Draft regulations have been proposed that would allow the ISDH to designate trauma centers at levels I- IV, consistent with the classifications outlined by the ACS *Optimal Resources for the Care of the Injured Patient.* The draft regulations have not yet been adopted. They propose that the ISDH would confer designation only after the applicant hospital has been successfully verified by the ACS as a level I or level II trauma center. Re-designation will require successful re-verification by the ACS. A designation process orchestrated and administrated solely by the ISDH is proposed for hospitals seeking designation as level III or level IV centers. If the draft regulations are approved as written, the ISDH will rely totally upon the ACS to assure compliance with requirements for level I and II trauma center optimal performance (such as appropriate performance improvement activities, the competency and education of providers such as nurses, surgeons and emergency physicians, injury prevention, outreach, and research). It is not clear to what degree the ISDH will assume the responsibility for ensuring compliance with trauma center requirements for level III and IV trauma centers or for all trauma centers during the interval of designation.

From a system design and development standpoint, it has not been determined whether the designation process will utilize an “open” (any acute care facility can seek to become a trauma center at any level they choose and can attain) or “closed” (the number, location and level of trauma centers is controlled based on need) strategy. This is a key system implementation decision which has far-reaching implications and ramifications that will need to be made by the system leadership.

The ISDH has no routine interval assessment of ongoing compliance with ACS trauma verification requirements. The ISDH does not request, nor does it receive any voluntarily submitted reports from trauma centers containing performance information based on indicators and benchmarks or compliance data. However, it is also not clear whether the trauma centers could prepare this information for submission to the lead agency. It is not known if performance improvement (PI) at trauma centers is standardized or consistent, but some prehospital PI appears to be performed. No evidence-based clinical best care practices or standards for education or provider competency exist across the trauma system; however they may exist at the verified level I and level II trauma centers. Little seems to be known about performance improvement (PI) activities at non-trauma centers.

Attending trauma surgeons at trauma centers are assumed to be readily available at all times. This is not monitored by ISDH. While the availability of specialty surgeons at trauma centers was not specifically investigated by the SVT, it did not appear to be an issue, again, with the assurance that this is a requirement for ACS verification. Information regarding the consistent availability of trauma surgeons and specialty surgeons at the non-trauma centers was not provided and may not be readily available. Mid-level providers (nurse

practitioners and physician's assistants), as well as hospitalist physicians are used at a number of trauma centers and non-trauma centers. The credentialing and oversight of these providers in general, and particularly in regard to care of trauma patients, is highly variable and hospital dependent across the system. It was not apparent that the ISDH ensures the initial competency of or monitors the maintenance of competency of any trauma care providers (e.g., requirements for Advanced Trauma Life Support [ATLS], Advanced Burn Life Support [ABLS], Pediatric Advanced Life Support [PALS], Rural Trauma Team Development Course [RTTDC], etc.). Further, it is not known if the lead agency intends to assume this role in the future.

A method for assuring the capabilities and commitment of trauma centers relating to pediatric care, along with clearly defined inter-facility transfer criteria for children, have not been established and will need to be explored systemwide. Additionally, standardized inter-facility transfer criteria for adult patients do not exist, making transfers dependent on individual providers. This promotes variability and inconsistency in the utilization of transfer resources.

Essential information is not available to validate the current geographic distribution of level I and level II trauma centers and that their volumes are adequate for skill maintenance. This absence of data precludes any meaningful assessment or recommendations for either the reconfiguration of or addition of trauma centers. Definitive care at a trauma center appears to be theoretically available to the entire state population within 30 minutes by ground or air transport. From an operational standpoint, however, this may not be the case due to prehospital triage and transportation issues. Ultimately, the efficacy and efficiency of the current trauma system configuration is difficult to accurately evaluate without performance and outcome data, including reliable estimates of over and under triage, from both trauma centers and non-trauma centers.

The state trauma system is theoretically composed of five EMS regions, each composed of two districts. These are primarily based on emergency preparedness regions. It is not clear how these regions relate to actual trauma patient flow and transfer patterns. ISDH has no formal regional governance or administrative oversight for the trauma system. Grass roots initiatives on the part of some level II centers have led to the cultivation of a more formal model regional structure. However, these activities have occurred in isolation from the statewide trauma system. The feasibility of maintaining and coordinating the development of this type of regional structure should be more formally explored from a systemwide perspective.

The current trauma system would best be categorized as an exclusive system which does not appropriately include all acute care facilities in the system at some level of participation that defines their roles and responsibilities. The TSATF vision, and presumably that of the lead agency, is to move toward an

inclusive system where all hospitals will, in some formal way, participate in trauma patient care and data acquisition.

The issues of prehospital destination (triage) criteria for air and ground transport, hospital bypass, use of air medical services at the scene and inter-facility transfer remain unresolved. Consideration has been given to the concept of repatriation (back triage) from a higher level of care to one of lesser intensity when appropriate; however, neither formal systemwide criteria nor an organized process for this currently exists.

The trauma centers seem well integrated among themselves and are active in the TSATF. It does not appear that all the non-trauma centers have the same level of integration and TSATF participation.

The SVT believes that some lack of understanding about the implications of formal inclusion of all acute care facilities in the trauma system exists. Some degree of ambivalence on the part of nontrauma centers was detected. Nurses, physicians, and hospital administrators from these facilities may have differing understanding and opinions regarding the advantages and disadvantages of formal participation in the trauma system. The formal inclusion of all acute care facilities at some level of participation will entail setting expectations and standards appropriate for a facility's particular level of participation, and subsequently holding those facilities to those standards. Some concerns may revolve around patient volumes, reimbursement and unfunded mandates, as well as reporting and regulation. Identifying and addressing incentives and disincentives to participation in the system will be essential to achieving successful and recruitment of all acute care facilities into the system.

RECOMMENDATIONS

- **Perform a needs assessment to determine the number and level of trauma hospitals needed within the state.**

- Clearly define roles, responsibilities, and accountabilities for all acute care facilities within an inclusive trauma system plan.

- Develop a process to support all acute care facilities that choose to become a trauma participating hospital.

- Refine the current trauma system model only as appropriate information becomes available regarding trauma care performance, outcome, and patient flow for trauma centers and the other acute care facilities.

- Encourage the trauma medical director subcommittee of the Trauma System Advisory Task Force to identify and promulgate evidence-based clinical guidelines for trauma care.

- Assure that all acute care facilities submit data to the trauma system registry commensurate with their level of participation in the trauma system.

- Include standards for pediatric trauma care in the overall trauma system plan.

- Include adjacent out-of-state trauma centers and other acute care facilities in the designation process and Indiana trauma system activities.

- Explore the advantages and disadvantages of an open versus closed designation process.

- Explore incentives and disincentives for the formal participation of all acute care facilities in the trauma system.

Purpose and Rationale

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 non-designated 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 system-wide prehospital triage criteria to ensure that trauma patients are transported to an appropriate facility based on their injuries. These triage criteria are regularly evaluated and updated to ensure acceptable and system-defined rates of sensitivity and specificity for appropriately identifying 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

Indiana currently has no method in place to determine if the right patient gets to the right hospital in the right amount of time. No statewide prehospital trauma triage guidelines have been adopted, and existing prehospital trauma triage guidelines vary by city, county, or region. It was reported that prehospital trauma triage guidelines do not exist in some areas of the state. However, legislation passed on July 1, 2008 paves the way for the adoption of rules for prehospital trauma triage and transportation protocols that are consistent with the ACS field triage decision scheme.

A work group with representatives from the TSATF and EMS Commission was formed to address this rule, and a draft document has been developed. It was reported that these guidelines have not been formally approved because the work group was unable to reach consensus. Participants reported that trauma patients are transported to the closest hospital, regardless of whether the hospital is a designated/verified trauma center or has the capability to care for the patient's injuries. Prehospital trauma triage decisions may currently be based on a prehospital provider's judgment or patient request. Concerns were reported regarding legal issues that may arise if an acute care facility is bypassed in order to transport a patient to a trauma center.

Inter-facility transfers of trauma patients from acute care facilities to the trauma centers is occurring, but no statewide data exist to determine the number of transfers or length of stay at the sending hospital. No systemwide inter-facility transfer guidelines exist for trauma patients, and no plans to develop such guidelines were reported. The trauma centers reported having inter-facility transfer agreements with the acute care facilities in their region.

No central (statewide) communication center exists to facilitate the inter-facility transfer of trauma patients. Representatives from the trauma centers reported that they have predetermined processes in place to facilitate inter-facility transfers. These processes vary between and among the trauma centers. Examples include direct communication between the sending and receiving emergency physicians; one call placed to a toll free number at the trauma center; and one call placed directly to the trauma medical director. Inter-facility transfers (acute care facility to trauma center) are reportedly occurring from emergency department to emergency department, and such transfers occur regardless of inpatient bed availability. It was also reported that in some instances trauma patients are transferred from an acute care facility with surgical capacity without having been seen by a surgeon.

One acute care facility in the northwest region of the state reports receiving about 200 critically ill trauma patients annually, and approximately 50% of these patients have sustained penetrating trauma. Some trauma patients are stabilized and treated at this acute care facility as the risk of transfer would result in poor outcomes. Representatives from this acute care facility report difficulties in finding a receiving trauma center available or willing to accept transfers. Some transfers are accepted due to pre-established professional relationships. Some transfers are, reportedly, refused due to insurance reasons or state border issues. Representatives from this acute care facility are interested in attaining level II trauma center status. No state trauma system process is in place to address these identified transfer issues, or to facilitate the implementation of a new trauma center based on population need.

It was reported that one non-trauma acute care facility accepts patients who require replantation services. Burn patients are either transported directly to burn centers from the field or to a trauma center for stabilization. Once the initial stabilization has been completed, transfer to a state or adjacent state burn center is reported to be a smooth process, and burn bed availability has not been an issue.

An anecdotal report of delay in transfer to a higher level of care due to weather was described. Eight critically ill trauma patients, each requiring transfer for definitive trauma care, were not able to be transferred in a timely manner because of weather conditions. Although numerous system problems were identified, they were not reported to ISDH, and no performance improvement processes or corrective actions were implemented following this event. This represents a failure on the part of the acute care facility to make the report and failure on the part of the trauma system to address the issue once the information became known. This same facility reported that the decision to transfer a trauma patient to a trauma center is usually encouraged by the trauma nursing staff.

Repatriation of trauma patients to an acute care facility was reported to be a rare occurrence. Participants reported that surgeons in the acute care facilities are not interested in accepting trauma patients for ongoing care, thus the ongoing care defaults to an internist.

Trauma centers reported no barriers to transferring patients to a rehabilitation facility, and no increase in length of stay due to transfer delays. Delays were reported in transferring patients to skilled nursing facilities, most likely due to the insurance status of the patient. The trauma centers reported that they have to absorb the cost of care at the skilled nursing facilities for uninsured trauma patients.

The ISDH has no process for accepting complaints, concerns, or violations regarding prehospital trauma triage issues, inter-facility transfer issues, or higher level of care issues. No performance improvement monitoring is conducted for any aspect of field trauma triage or inter-facility transfers. Some reports of unnecessary transfers to trauma centers, e.g., secondary over-triage, were made, but the trauma system has no processes in place to address these issues.

The trauma centers reported that they have performance improvement processes that address prehospital triage or inter-facility transfer issues. It was stated that identified performance improvement issues occurring in the rural setting are very difficult to follow-up on due to problems with identifying the appropriate prehospital medical director.

RECOMMENDATIONS

- **Develop, approve, and implement statewide prehospital trauma triage guidelines as well as inter-facility transfer criteria.**

- Develop, approve and implement a performance improvement process to monitor over and under-triage in the state.

- Develop performance indicators and ongoing performance improvement surveillance processes to monitor adherence to or issues related to prehospital trauma triage guidelines and inter-facility transfer criteria.

- Encourage each trauma center to create a “one call does all” system to coordinate inter-facility transfers.

Rehabilitation

Purpose and Rationale

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

Indiana was reported to have robust rehabilitation facility resources with adequate bed capacity and services appropriate for trauma patients. The type, intensity, and timeliness of case management and discharge planning for trauma patients at trauma centers is perceived to be very good by both rehabilitation and acute care providers. Participants expressed no concerns with timely access to inpatient rehabilitation services, perhaps with the exception of Indiana residents repatriated from neighboring state trauma centers.

The post acute care or rehabilitation phase of care is not formally integrated into the trauma system. Representatives from rehabilitation facilities participate on the TSATF. While numerous local practices exist, no systemwide, consistent, standards or practices exist for post acute care and rehabilitation relating to:

- indications for early physical medicine and rehabilitation (PM & R) consultation,
- transfer agreements, or
- criteria to identify patients with injury-specific, condition-specific, or acuity-specific requirements for particular rehabilitation resources.

Trauma center representatives and their PM & R colleagues appear to have learned from each other about how, when, whether, and what type of, post acute care rehabilitation services should be provided to patients, but this informal guidance is less available for other acute care non trauma center hospitals that treat injured patients.

A systemwide rehabilitation resource assessment and inventory apparently exists. It is not clear whether this includes out-of-state rehabilitation facilities and resources or those under the auspices of the Veterans Administration. All 21 of Indiana's post acute care rehabilitation services are reportedly Commission on Accreditation of Rehabilitation Facilities (CARF) accredited. Five have additional specialty accreditation for brain injury rehabilitation and one has specialty accreditation for spinal cord injury. All facilities appear to have appropriate medical direction. All of these facilities reportedly collect and submit functional outcome and other data contained in the Uniform Billing System for Medical

Rehabilitation (UB92/04) to appropriate federal agencies. These data, or a subset thereof, have not yet been utilized for any trauma system evaluation purposes, and they are not currently submitted to, or included in, the state trauma registry data set. Individual rehabilitation facilities conduct performance improvement activities, but these appear to be facility specific without some degree of common indicators or process across facilities.

A unique and valuable resource is the Indiana Spinal Cord and Brain Injury Research Board. This recently created entity has, thus far, modestly funded 14 grant proposals for spinal cord and brain injury research. There seems to be enthusiasm for supporting trauma system research activity in the area of post acute care. A future opportunity to obtain support for linkage of acute care and post acute care data should be investigated.

RECOMMENDATIONS

- Create a database of rehabilitation facilities according to capabilities for treating patients with various conditions and acuity such as ventilator-dependent or ventilator weaning, severe versus moderate versus mild traumatic brain injury (TBI), spinal cord injury (SCI), and pediatric.

- Analyze trauma patient flow and discharge patterns to rehabilitation facilities, skilled nursing facilities, and nursing homes to determine if patients are transferred to the appropriate rehabilitation facility.

- Develop, implement and monitor compliance with transfer agreements, policies, and criteria from trauma centers and acute care facilities which assure patient needs are matched with rehabilitation facility capabilities, regardless of ability to pay for services.

- Explore possible financial or other incentives for rehabilitation facilities to more fully and reliably participate in the care of trauma system patients.

- Add pertinent post acute care data elements to the state trauma registry data set which will allow pertinent questions regarding long term functional, financial, and other outcomes to be answered.
    - Establish a process for rehabilitation facilities to enter data directly into the statewide trauma registry.
    - Include the rehabilitation phase of care in the systemwide performance improvement process by identifying and monitoring salient long term and short term post acute care performance indicators and benchmarks.

Disaster Preparedness

Purpose and Rationale

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

Indiana's approach to disaster planning follows federal funding targets and availability, and the state has taken advantage of several federal funding opportunities. Subsequently, ISDH maintains responsibility for hospital preparedness while IDHS focuses on out-of-hospital aspects. It is not apparent from provided documentation and participant discussions that trauma experts or leaders have been integrated into preparedness efforts.

Indiana's disaster preparedness and response system has achieved several noteworthy accomplishments. A statewide triage tag system has been implemented to help facilitate responder familiarity with the system and continuity of patient care. The state's Emergency System for Advanced Registration of Volunteer Health Personnel (ESAR-VHP), as well as liability protection for volunteer health care workers deployed to assist during disasters, have been developed. A hospital bed tracking system has also been established.

Disaster preparedness efforts focus on ten emergency preparedness districts. Within each district acute care facilities cooperate to determine preparation priorities and a corporation has been established to receive and distribute grant funds. Supply and equipment stores are being developed in each district, and a statewide hospital materials tracking system is in evolution.

Indiana has a state disaster plan that is used with some degree of regularity due to tornadoes and other natural disasters. The disaster plan embraces an all-hazards approach that includes responses to mass casualties and an evolving interoperable communications system.

Periodic drills help to improve preparedness. However, they typically only test a limited number of components, and optimal integration is not often evaluated. The state has not assessed human resource issues related to the multiple affiliations responders have with response organizations.

The concept of surge capacity is not broadly agreed upon. Participants expressed considerable concern about the assessment of surge capacity and what it really means.

Among EMS provider organizations, disaster preparedness education is variable. In some cases it may represent a significant effort. In other cases, volunteer providers may be unintentionally excluded by virtue of the schedule for educational offerings and exercises.

Indiana obviously has considerable expertise and resources related to disaster preparedness and response. Less apparent is whether or not all potential resources, such as experts in trauma care or even the National Guard, have

been invited to planning processes, and whether or not they have “bought in” to the plan that exists.

RECOMMENDATIONS

- **Involve the State Trauma/EMS Medical Director in statewide disaster planning initiatives.**

- Plan and conduct disaster exercises that test system integration of out-of-hospital and hospital components.

- Develop, at the state level, a multi-disciplined disaster planning group that includes, but is not limited to, representatives from ISDH, IDHS, *trauma experts*, EMS stakeholders, and others with identified expertise and resources.

- Develop and implement plans to routinely assess and validate each hospital’s potential surge capacity.

- Conduct a human resources assessment to determine how the potential multiple occupational commitments of disaster responders might affect their abilities to contribute to a disaster response.

Purpose and Rationale

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 multi-agency 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 lead agency for trauma has the responsibility for trauma system evaluation, but no processes have been implemented to date to achieve this requirement. The state trauma registry has been established but is in its infancy and not capable of providing adequate data. However, other data sources available to the lead agency could be used to accomplish an initial systemwide evaluation.

Indiana has no forum for discussing trauma system PI processes. The TSATF has 7 subcommittees, but not a PI subcommittee. One TSATF member stated that PI is embedded within the Information Management Subcommittee.

No systemwide case review process is in place. Some of the trauma centers report the integration of prehospital providers into their trauma PI programs. Examples of this local integrated PI are referrals, trauma patient rounds, membership on the hospital PI committees, multidisciplinary peer review committees, referral follow-up letters, and education. The trauma centers also report including the transferring acute care in their PI processes as issues are identified. They report adequate loop closure processes.

Reportedly, some prehospital agencies are involved in trauma PI activities, but no evidence of trauma-related audits or PI projects was provided. The state has no statewide multidisciplinary forum for the prehospital agencies reporting of trauma PI activities. One representative involved in prehospital PI is also a member of the Commission. However, this forum is limited in its ability to monitor PI activities.

Statutory protection of the state trauma registry data is questionable. State trauma leadership could not verbalize a plan of action to ensure the protection of state trauma registry data. The lead agency described a process that is underway to obtain business agreements between the lead agency and the trauma centers pertaining to the submission of hospital trauma data.

The individual trauma centers reported that they were confident with the current legislation addressing peer review protection for in-hospital peer review activities. However, it was reported that a recent case had challenged this law, and the peer review data were deemed discoverable. The state does not have access to the trauma hospital's peer review data elements.

Indiana has no trauma system PI plan. The PRQ contained a draft document titled "Preliminary Performance Improvement Guidelines" prepared by the state trauma program manager for discussion at the trauma plan development retreat. Contents of this document were obtained by networking with other state trauma program managers. The TSTAF became focused on trauma center verification issues at the retreat and never addressed these guidelines. This PI guideline document is ambitious and not based on a review of available data or a needs assessment. The list of audit filters is ambitious and also includes lists of general statistical reports. No staffing is available at the Lead Agency to support statewide PI initiatives and processes.

The Indiana Trauma Network (ITN) has a membership consisting of trauma center trauma program managers, trauma coordinators and trauma registrars. The ITN meets quarterly to discuss their hospital-based PI processes and to share best practices. A significant accomplishment of this group was assisting the state trauma manager with completion of the data dictionary for the state trauma registry. The ITN has initiated discussions on how it can provide leadership and support for the state trauma system and PI processes. The ITN should be a standing agenda item for each TSATF meeting in order facilitate information sharing and planning for statewide trauma system initiatives.

A trauma center's epidemiologist testified that numerous data validation projects have been completed and published in peer reviewed journals. His projects have identified issues with data validation, and he is committed to working closely with the ISDH and ITN to resolve these issues. He also plans to work collaboratively on data validation for the state trauma registry.

Because no data analysis had been completed to evaluate the trauma system, participants were asked to identify their perceived systemwide PI issues. The issues identified are:

- Prolonged trauma patient assessments and resuscitations at acute care hospitals causing transfer delays to the trauma centers
- Overuse of diagnostic tools such as radiography that will not change the plan of care for transfer to a trauma center
- New equipment training/competencies for prehospital care providers
- Lack of trauma protocols; non-adherence to protocols
- Pediatric triage (primary and secondary over and under triage)
- Inconsistent neurosurgical management of TBI
- Inability to assure that trauma patients get to the right hospital in the right amount of time
- Prehospital trauma triage and transport
- Rural trauma education for all trauma care providers
- Pediatric trauma care (triage, transfer agreements, equipment, EMSC representation on EMS Commission)

The state has a mandatory reporting requirement for hospital-acquired complications and serious adverse events. Some of these events are directly linked to trauma PI. One trauma center reported an excellent example of a PI issue identification, corrective action, and ongoing monitoring directly related to one of the mandatory reporting filters.

RECOMMENDATIONS

- **Create a performance improvement (PI) subcommittee of the Trauma System Advisory Task Force (TSATF) to develop a trauma system performance improvement plan**
    - **Develop a PI process template as a resource tool for all trauma centers and participating hospitals**
    - **Standardize a subset of trauma PI activities for each trauma center and participating hospital**
    - **Implement regional PI processes that feed into the statewide trauma PI processes**

- Ensure in statute the protection from discoverability of the state trauma registry data for regional and statewide performance improvement and peer review processes.

- Identify one system issue of interest, determine how it can be measured, agree on definitions, processes, gather the data, and do the measurement.

- Ensure that both the trauma center and trauma system include the mandatory reporting events (never events and sentinel events) in their PI plans and processes.

- Perform annual systemwide trauma evaluations using available data sources focusing on processes of care and patient flow.

Purpose and Rationale

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

In many regards, Indiana is a data rich environment. In particular, the CODES project provides both a source of information and a process for linking disparate datasets. The CODES project, funded by the NHTSA and the IDHS, links statewide motor vehicle crash, EMS, and hospital data that match vehicle, crash, and human characteristics to medical and financial outcomes. The CODES project also has access to UB92/04 hospital discharge and death certificate data.

Individual trauma centers each have functional trauma registries from a variety of vendors. Some of these software systems have presented challenges in the past and others are awaiting upgrades. However, when asked if current trauma center registries are meeting individual facility needs, the answer was “yes”, in spite of these challenges.

The ISDH has purchased ImageTrend’s Trauma Bridge™, a web-based trauma registry system to serve both as an aggregation, analysis and reporting tool at the state level, as well as a collection instrument for hospitals wishing to use its web-based data entry features. Smaller hospitals, in particular a few Critical Access Hospitals (CAH) are testing and using the web-based system for data entry.

EMS data collection is currently undergoing a transition to a National EMS Information System (NEMSIS) silver-compliant version of FireHouse™ Software. This upgrade will be completed in January, 2009, and will include the standard data definitions and XML transaction language provided by NEMSIS. This additional standardization, supported by concentrated training, could serve to increase the consistency of data collection and linkage to other data sets. In 2006, it was noted that missing fields reduced the matching capabilities of EMS data within the CODES project. Trauma Bridge™ is marketed as being able to seamlessly integrate prehospital EMS incidents with the trauma registry. Given that the EMS data system has not yet been fully deployed, that assumption has not yet been fully validated in Indiana.

Many planning and PI activities have been postponed while waiting for the statewide trauma registry to become fully functional, despite the availability of multiple other data sources that could support such activities. Additionally, some level of trauma center data aggregation and reporting might be available through the ACS' National Trauma Data Bank. When queried about when the evolving state trauma register would be fully capable of accepting all data from various trauma centers, plus direct input from smaller hospitals, and also capable of aggregation, analysis, and reporting the answer was "hopefully within six months".

Some degree of uncertainty exists about the confidentiality of data within the state trauma registry and protection from discoverability. This was particularly true in relation to any peer review or PI activities.

A Director of the Trauma Registry was recently hired after the position had been vacant for more than a year. This individual is responsible for coordinating all aspects of the program related to the collection, analysis, and dissemination of data from the Indiana Trauma Registry. Reportedly, the new director of the trauma registry is very experienced and knowledgeable regarding issues related to the trauma registry, and she also possesses the skills necessary to train hospital personnel across the state in the use of the trauma registry.

RECOMMENDATIONS

- **Amend or create a statute with specific language to ensure the confidentiality of the trauma registry and of trauma system performance improvement activities and to protect both from discoverability.**

- **Create and implement a Trauma System Information Management Plan.**
    - Enlist the Indiana Trauma Network and other invited individuals, such as representatives from Purdue University's CODES project
    - Outline specific goals, objectives, strategies, and tasks with appropriate assignments and timelines within the plan
    - Assimilate, analyze, and utilize existing data
    - Develop a policy and procedure for data requests

- Collaborate with the CODES project and other data sources to supplement and supplant deficiencies in the trauma registry both on an interim and long-term basis.

- Work to ensure timely access to data that will meet the needs of subcommittees on performance improvement and research.

Purpose and Rationale

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 co-investigators 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

A number of research projects pertaining to trauma, trauma response, and trauma data have been published by members of the TSATF and other trauma stakeholders. This research is occurring both at level I and level II trauma centers. To date, completed research using trauma registry data has focused on data from a single trauma center. No collaborative research involving multiple in-state trauma centers was noted. A series of papers by Thein Hlaing and various colleagues concerning trauma registry data validation may serve as a basis for data quality assurance and improvement within the state trauma registry while the Trauma Bridge program becomes fully operational and begins accepting data from disparate data sources.

The trauma program managers and trauma medical directors expressed confidence that trauma registry data are well protected at the local facility level. Processes for research data access are not standardized across trauma centers. Access was noted to be far more difficult for external researchers when compared to those facility employees.

There has been, and continues to be, collaboration with various university academic programs including public health, epidemiology, and nursing. The stakeholders did acknowledge that such collaborative opportunities, as well as research opportunities in general, could be strengthened by the development of a trauma research agenda. The purpose of such a research agenda would be to help focus structure, process, and outcomes research in areas of identifiable systemwide concern or interest.

Recently, a Traumatic Brain Injury/Spinal Cord Injury Research Fund was established. The first round of research grants was recently awarded resulting in 14 new, two-year projects. During this initial round, no awards were made for acute care research projects. Opportunities may exist in the future for both acute care research pertaining to TBI/SCI and issues such as demonstrating the benefit of linkage between the prehospital, trauma registry, and rehabilitation datasets for the TBI/SCI patient.

RECOMMENDATIONS

- Convene a group comprised of trauma stakeholders and representatives of appropriate university academic programs to develop a trauma research agenda for Indiana.

- Work with individual trauma centers and the state trauma registrar to assist potential researchers to gain appropriately protected access to various data sets.

- Select and prioritize projects from the research agenda that would be appropriate for the TBI/SCI fund, and recruit qualified researchers to serve as investigators in those projects.

Focus Question 1

How are other states that are “stingy” with public health money addressing the trauma system financing issue? Do other states have much success in getting insurance companies involved?

All states are "stingy" with public health money (as well as other funding). Attached is the state public health per capita budget ranking. (see Appendix C)

Here are key points to consider when seeking or managing funds received for the trauma system, regardless of how much funding you are seeking or how much funding is provided:

- Ensure that proposals for trauma system funding *dedicate* those funds for trauma system use only. Ensure that those funds are protected from being decreased or eliminated either through diversion of all or some of the dollars to other agencies or programs, or back into the general state coffers.
- Help funders understand what they are investing in and why.
- Have a concrete plan for the use of the funding, (i.e., budget, business plan, etc.)
- Prepare an annual report detailing how the funds were spent and to what benefit. Document the return on investment, choosing indicators that the funders or legislators and the public will understand and see as important to them.

Many strategies have been used by other trauma systems to obtain or increase trauma system funding. Some examples are attached. (see Appendix D) The majority of strategies are related to traffic fine surcharges, however, other creative strategies for generating initial or supplemental and diverse sources of funding include the following:

- A small excise tax on motor vehicle sales (including ATVs and motorcycles)
- A small excise tax on firearms and ammunition sales
- Taxes on hunting, firearm and boating licenses
- A small tax on liquor licenses and/or sales
- A small tax on firework sales
- A small tax on drivers’ licenses or vehicle registrations and renewals (perhaps slightly higher for teens and the elderly licenses)
- 1% return on motor vehicle insurance premiums from insurance carriers
- Fee added to gun show exhibitor and/or purveyor fee
- A small excise tax on gasoline
- A small excise tax on cell phone purchases or use
- Tobacco taxes

- Property taxes
- Gaming revenues

Obviously, system leaders seeking funding from public or private sources must be sensitive to the current or future economic environment (gasoline prices, car industry problems, etc), the political climate (election years), and constituency concerns (profiling, National Rifle Association, etc.). Develop a rationale to educate funders and other advocates in support of the selected funding strategy, and be sure to address the concerns of the opposition (e.g., cell phones are increasingly responsible for crashes from distracted driving, teens are responsible for a disproportionate number of crashes, alcohol is implicated as a factor in 50% of fatal crashes as well as other injuries).

Mississippi provides an example of a method of generating funds and how much those methods can potentially generate (as well as how to manage those funds). Mississippi House Bill 1405 is expected to generate approximately $32 million for the trauma system with funds generated in the following manner:

- $4 on each set of vehicle license tags
- $10 on each speeding violation that is between 10-20 miles per hour (mph) over the posted limit
- $20 on each speeding violation between 20-30 mph over the posted limit
- $30 on each speeding violation over 30 mph the posted limit
- $10 for each reckless driving and/or careless driving offense

Mississippi's legislation created an escrow account and mandates that whenever the trauma fund exceeds $25 million, the remaining funds will be transferred to the escrow account and will not be returned to the general revenue fund.

Another unique proposal is that trauma centers are operationally a fourth public service after police, fire, and prehospital EMS, as the *in-hospital EMS.* As such, the trauma system should be entitled to an allotment of, or allocated a separate budget of federal, state or municipal public safety funds.

Involving third party payers in trauma system funding is often approached by creating "carve outs," which is more common for hospital rather than system reimbursement. For example, in Maryland the care of the injured patients is reimbursed at a higher rate if they are treated at a trauma system hospital/center than if treated elsewhere. Additionally, some generated funds come from a $2.50 surcharge on motor vehicle registrations, and these funds are deposited into the Maryland Trauma Physician Services fund that reimburses physicians and trauma centers directly. While not specifically generating trauma system funds, it does provide an incentive for hospital participation in the system.

Motor vehicle Personal Injury Protection (PIP) insurance coverage is another strategy. Florida is a no-fault auto insurance state and mandates PIP coverage.

Beginning in January 2008, the first $5,000 will go to reimburse physicians and dentists who provide emergency care and inpatient services. After the first 30 days, any remaining amount will be available to hospitals and other covered providers. New Jersey is another state that mandates PIP coverage at a much higher rate.

Recommendations

- Develop a detailed budget for the trauma system infrastructure with explanations and rationales for individual items.

- Review potential financing strategies and through discussions with legislators and other potential funders, select a strategy for future trauma system funding.

- Keep accurate accounting records of all trauma system expenses for which the funding is used.

- Develop an annual report describing the use of funds in accordance with the approved budget and how funding benefits the trauma system and Indiana residents.

Focus Question 2

How have other states (examples) given prehospital caregivers the authority to determine the appropriate destinations for patients? We have been advised that this will require legislation in Indiana. What is the role of Level III and IV centers in cases where they are closer than a level I and II center from a prehospital perspective?

Patient destination protocols help EMS personnel make decisions that result in getting patients to the most appropriate acute care facilities capable of caring for their patients' conditions. Commonly, such protocols are tailored and intended to be applied for the care of pediatric, obstetric, cardiac, stroke, and trauma patients. They are used in EMS systems on local, regional, and statewide bases.

As EMS personnel attempt to apply destination-related protocols to individual situations, some concepts are particularly relevant.

- **Guideline**: provides general guidance to help facilitate decision-making processes. By itself, it neither represents a standard of care, nor is it a mandate. It usually represents broad consensus and is a useful tool.

- **Protocol:** directs EMS personnel to perform specific actions or deliver specific care in the absence of information or direction that would have them do otherwise.

- **Medical decision-making capacity:** is a person's (patient's) ability to make medical decisions for him/herself based on an understanding of the situation, potential available choices, and consequences of the desired choice. As the consequences of any medical decision increase, the individual requires a greater degree of medical decision-making capacity. EMS providers must rely on their abilities, often with assistance from an on-line medical control physician, to assess a patient's medical decision-making capacity when the potential consequences of a specific decision are significant.

- **Informed consent:** in the case of a patient who desires EMS personnel to do something different than proscribed by their protocol, informed consent is the process by which EMS personnel explain the risks and benefits of such a patient's decision and, to the best of their ability, attempt to have the patient understand the risks and benefits.

- **Self-autonomy:** is the premise that people have the right to direct what happens to their bodies, including the medical care they receive. To deny a patient his/her self-autonomy is a significant matter. Denial of self-autonomy may only be appropriate when it is clear that the patient lacks sufficient medical decision-making capacity and informed consent is not possible because, for example, the patient currently lacks the ability to understand risks and benefits.

Thus, a trauma triage protocol, based on broadly accepted guidelines, directs EMS providers' patient destination decisions in the absence of contrary direction or information. When a patient expresses his/her desires, and they are contrary to protocol, EMS providers are obliged to assess and consider the patient's medical decision-making capacity. Further, they must attempt to provide informed consent. The goal is to have the patient understand the risks and benefits of the decision, and to obtain consent to proceed to the appropriate destination. When the patient appears to possess medical decision-making capacity, understands the risks and benefits, and continues to request a deviation from protocol, then self-autonomy should be preserved, and the patient's expressed desires should be honored.

The members of the SVT are not aware of a jurisdiction that "authorizes" EMS personnel to disregard a patient's expressed desire given the prerequisites described above. The only exceptions exist when the patient's request is outside the scope of service provided in the EMS system. For example, an EMS system may employ a policy that restricts destinations in certain circumstances, such as always go the closest "appropriate" facility in times of inclement weather. An EMS system may also have a limitation on how far it will routinely transport patients. In Pittsburgh, PA, for example, patients who lived on the periphery of the city limits would sometimes request transportation to hospitals outside the city limits. The EMS system invoked a policy that it would only provide such transport on an as able basis (e.g., system volume is suitable for removing a unit from the city's jurisdiction). EMS supervisors were involved in every decision.

A goal of every state-of-the-art trauma system is to be inclusive. Inclusivity mandates that all hospitals that receive injured patients participate in the trauma system. Each understands its roles and responsibilities in the system and, among other things, participates in PI activities. Most participating hospitals will be level III or level IV trauma centers. Collectively, they are integral to the system, usually caring for the majority of injured people. Level III and IV trauma centers accept a significant responsibility for efficiently assessing injured patients, initiating stabilization and resuscitation, and rapidly determining which patients are more appropriate for care at a higher level trauma center. Their participation in systemwide PI activities helps to ensure that transfer and care decisions are optimized.

Issues regarding which patients are appropriate for “bypass” of a level III or IV trauma center in favor of a Level I or II trauma center can involve complex solutions. Factors that may come into play for any given injury scene may include the following: relative distance/time to different trauma centers, transportation networks, need for rapidly available stabilizing care in the context of EMS provider capabilities, and even weather conditions.

Ultimately, it should be clearly stated within a state trauma plan that level III and IV trauma centers are integral to the care of the injured patient. They play valuable roles that should be recognized and capitalized upon. The potential contributions that level III and IV trauma centers can make should be fully implemented to provide the best care for all patients in the trauma system. The inclusion of all acute care facilities at an appropriate level of trauma designation will also have a significant impact on prehospital triage destination. Once all level III and IV trauma centers become fully engaged in the assessment, stabilization, and early transfer of trauma patients who have needs for a higher level of care, patient decision making will have less of an impact on patient outcomes in the future.

Recommendations

- Develop an inclusive trauma system with a role for all acute care facilities in the stabilization, resuscitation, and inter-facility transfer of seriously injured patients.

- Develop educational materials for EMS providers to assist them in patient education regarding the description of the risks and benefits of non-trauma hospital destination and in providing informed consent.

Focus Question 3

Are there examples of states that have successfully implemented statewide only (non-regionalized) systems? What might be the better option for Indiana? Are there successful "systems" examples from states that are not "overly regulated?

Delaware is one state that does not have a regionalized trauma system. The state of Delaware, however, has only three counties and is smaller than most regions in larger states such as Washington, Oregon, and Indiana. A state the size of Delaware can operate as a single region in terms of system organization, hospital catchment areas, and distribution of resources.

Both the population size and health care system resources of Indiana are very similar to Washington State. Washington has a population of about 6.6 million people dispersed across 65,500 square miles, with 97 hospitals, 39 of which are Critical Access Hospitals. This is comparable to Indiana's population of 6.3 million people across 35,867 square miles, 129 hospitals including 35 Critical Access hospitals.

As described in the body of this report, the state should develop and implement a strong statewide trauma system that identifies the system needs and plans for the distribution of trauma centers in the inclusive trauma system. The roles for all acute care facilities within the state and neighboring states should be included. The trauma system should have strong state leadership by the ISDH and a State Trauma Advisory Board that sets standards for trauma system participation including the following:

- EMS roles in trauma care,
- Expectations for all acute care facilities,
- Patient distribution and patient flow,
- Trauma registry management,
- Systemwide evaluation and PI, and
- Injury prevention.

The SVT recommends that Indiana develop a strong statewide trauma system plan that includes regional districts that are contiguous with the EMS and emergency preparedness districts already developed in the state. These districts may not directly align with acute care facility catchment areas or referral patterns, but there are benefits to having an already existing district organization to address system implementation at the local and regional level.

In states with strong effective trauma systems, the regions are essential for implementing the system at the ground level. Multidisciplinary regional councils (representative of the large and small hospitals in the region, EMS services, surgeons and emergency physicians, trauma nurse coordinators and registrars and local government officials) are able to implement the system, addressing local issues at the most appropriate level. They can assure system integration and build local coalitions and community support for all segments of the system. Subcommittees of these regional councils may also be used to address trauma system PI. Representative physicians and nurses from the hospitals in these regions can work together, protected under state statutes, to improve patient care in the region.

Examples of States That Are Not Over Regulated

Both Washington and Oregon are states that are "not over regulated." Oregon is a state that has a well-designed system that is not well funded. No funding is provided for the uninsured. There is a small office that provides the lead agency function. Oregon has a State Trauma Advisory Board and seven Area Trauma Advisory Boards.

Washington is a very well funded state, with a fairly large office integrated in the Office of Community Health System. It has eight strong EMS and Trauma System Regions. Washington also has a dedicated account called the Trauma Care Fund that supports uncompensated and undercompensated care.

Recommendations

- Develop a statewide trauma system that includes regions or districts for local implementation of the trauma system.

- Provide formal authorization, in regulation, to create regions, establish regional councils, and provide general guidance for their activities.

Focus Question 4

After review of the hierarchy, infrastructure, and organizational structure of the Indiana Department of Homeland Security (EMS) and the Indiana State Department of Health (Trauma System and Disaster Management) does the review panel have recommendations to improve the structure and function of these organized elements of trauma care and disaster management?

The trauma and EMS systems are inextricably linked with each other in the goal of providing optimal patient care and improving patient outcomes. Leaders from each system should be actively engaged in the development of policies for the comprehensive system. Ideally, the trauma system and EMS system should be housed within the same agency in any future restructuring of state agencies. In most states, both EMS and Trauma are within the Department of Health, and often they are a joint office within that department.

One of the key recommendations contained in this report involves the establishment of an Office of Emergency Care within ISDH. This office would oversee both the EMS and trauma systems. Additionally, it would position the ISDH well to protect the public's health by guiding the development of these two essential systems (EMS and trauma), as well as systems for the emergency response of other time-sensitive diseases such as stroke, STEMI and asthma. Special populations including pediatrics, geriatrics, rural, and minority emergency care needs could also evolve in an integrated and coordinated fashion. The trauma system plan could serve as a model for the development of other time-sensitive programs that will also depend on the EMS system and acute care facilities that may also be trauma centers. Such a process could reduce the potential conflicts in policy development for the trauma and EMS systems.

As state government restructuring may be unlikely in the near future, and moving either the EMS or trauma programs to a new department is problematic for a host of reasons, a third option may be beneficial.

Form a joint policy committee between the Department of Health and the Department of Homeland Security to maximize the efficacy of both the EMS and Trauma programs to achieve consensus on policies and approaches to reach the mutually beneficial goal of establishing a comprehensive trauma system in Indiana. This joint policy committee should be composed of representatives from the EMS Commission and the State Trauma Advisory Board (or Trauma System Advisory Task Force executive committee in the interim). Minnesota has successfully implemented such a joint policy committee, and guidelines developed for that committee could serve as a model for Indiana.

Recommendations

- Restructure the Indiana State Department of Health to develop an Office of Emergency Care that includes the trauma system program and the EMS Commission.

- Consider the formation of a Joint Policy Committee as described above as an interim measure.

Acronyms

ABLS - Advanced Burn Life Support
ACS – American College of Surgeons
ASPR – Assistant Secretary for Preparedness and Responses
ATLS – Advanced Trauma Life Support

BIS – Benchmarks, Indicators, and Scoring

CARF – Commission on Accreditation of Rehabilitation Facilities
CDC – Centers for Disease Control and Prevention
CODES – Crash Outcomes Data Evaluation System project

EMS – Emergency Medical Services
ESAR-VHP – Emergency System for Advanced Registration of Volunteer Health Personnel

HRSA – Health Resources and Services Administration

ICJI – Indiana Criminal Justice Institute
IDHS – Indiana Department of Homeland Security
ISDH – Indiana State Department of Health
ITAG – Indiana Trauma Advisory Group
ITN – Indiana Trauma Network

mph – miles per hour
MTSPE – Model Trauma Systems Planning and Evaluation

NEMSIS – National Emergency Medical Services Information System
NTDB – National Trauma Data Bank

PALS – Pediatric Advanced Life Support
PI – performance improvement
PIP – personal injury protection
PM & R – physical medicine and rehabilitation
PRQ – Pre-review Questionnaire

RTTDC – Rural Trauma Team Development Course

SCI – spinal cord injury
STAB – state trauma advisory board
STEMI – ST elevated myocardial infarction
SVT – site visit team

TBI – traumatic brain injury

TRCC – Traffic Records Coordinating Committee
TSATF – Trauma System Advisory Task Force
TSC – trauma system consultation

Appendix A: Site Visit Team Biographical Sketches

CHRISTOPH R. KAUFMANN, MD, MPH, FACS (TEAM LEADER)

Dr. Christoph Kaufmann is Associate Medical Director, Trauma Services at Legacy Emanuel Hospital in Portland, Oregon. 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 Harborview Medical Center in Seattle. He is board certified in 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 47th Combat Support Hospital to Saudi Arabia and Iraq. In 1993, Dr. Kaufmann was assigned to the USUHS Department of Surgery with responsibility as trauma consultant to the U.S. Public Health Service. He served as Director, Division of Trauma and Emergency Medical Systems, Health Resources and Services Administration (HRSA), 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 the Department of Surgery at USUHS as Principal Investigator of the Demonstration Project for Telepresence Surgery. He served as Chief, Division of Trauma and Combat Surgery, and Region Chief, American College of Surgeons Military Committee on Trauma. Dr. 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 is now International Chair of the Advanced Trauma Life Support (ATLS) Subcommittee for the ACS Committee on Trauma.

Dr. Kaufmann is an author of the current revision of the HRSA Model Trauma Care System Plan. He has given over 100 presentations in 16 different countries. He has been a member of numerous local, state, national and international committees, both military and civilian, relating to trauma systems and trauma care, including:

- Member, Trauma Systems Consultation Committee, ACS COT
- Associate Examiner, American Board of Surgery
- Executive Committee, American College of Surgeons Committee on Trauma
- Site Surveyor, ACS Trauma Center Verification & Review Committee
- Trauma Center Site Surveyor, VA, PA, IL, and WA
- Member, Committee on a Vision for Space Medicine Beyond Earth Orbit, IOM
- Editorial Board, NATO Emergency War Surgery Handbook, 3rd 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 the1999 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.

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.

THOMAS J. ESPOSITO, MD, MPH, FACS

Thomas J. Esposito, M.D., M.P.H. is a Professor of Surgery at Loyola University, Stritch School of Medicine in Maywood, Illinois. He is the Director of the Division of Trauma, Surgical Critical Care and Burns in the Department of Surgery at Loyola University Medical Center. Additionally, he serves as the Director of Injury Analysis and Prevention Programs at the Loyola University Burn & Shock Trauma Institute. He is an attending surgeon at Loyola University Medical Center.

Dr. Esposito received his medical degree from Georgetown University School of Medicine in Washington, D.C. and a master's degree in Public Health from the University of Washington School of Public Health and Community Medicine in Seattle, Washington. He did his surgical training at St. Elizabeth's Hospital in Boston, Massachusetts. Following his residency, Dr. Esposito completed fellowships in Critical Care and Traumatology at the Maryland Institute for Emergency Medical Services Systems, and in Injury Prevention at Harborview Injury Prevention and Research Center in Seattle.

A Diplomat of the American Board of Surgery, Dr. Esposito has a Certificate of Added Qualifications in Surgical Critical Care. He is a Fellow of the American College of Surgeons and Vice-Chair of the Chicago Committee on Trauma of the ACS. He is also a member of the national ACS/COT.

Dr. Esposito's professional organization memberships include, the American Trauma Society, the American Association for the Surgery of Trauma, the Eastern Association for the Surgery of Trauma, the National Association of EMS Physicians, the Chicago Metropolitan Trauma Society, Society of University Surgeons, the Society for Academic Surgery, Society of Critical Care Medicine, the American Public Health Association, and the Illinois Public Health Association, among others.

He has been appointed to the Prevention Committee of the AAST and EAST as well as to both organizations' committees on the Future of Trauma Surgery. He serves as the Chair of the AAST Injury Assessment and Outcome committee as well as the EAST Task Force on Research Related Issues and is a member of the Illinois EMSC Advisory Council. He is a consultant to the US Department of Transportation, and a number of states on trauma care system issues. He has served as a trauma center and trauma system site reviewer for the ACS, NHTSA, and the states of Mississippi, Maryland, and Pennsylvania. He was a recipient of the NHTSA Public Service Award in 1993 and the Florida Committee on Trauma, David Kreis Visiting Trauma Professor Award in 2005. He serves on the Board of Directors for the Critical Illness and Trauma Foundation in Bozeman, Montana, the Eastern Association for the Surgery of Trauma, and the SAFEAMERICA Foundation. He also serves as Medical Director of the Rural Emergency Medical Services and Trauma Technical Assistance Center and is the AAST liaison to the Brain Trauma Foundation.

In addition to clinical and teaching duties, Dr. Esposito is active in many trauma related studies and projects. He is the recipient of over $500,000 in federal and private grants to conduct these activities. He has a particular interest in trauma prevention strategies, trauma systems and their development and evaluation. He also has expertise in the area of trauma data systems and outcomes research. He has numerous trauma related publications and presentations to this credit.

HEIDI HOTZ, RN

Heidi Hotz is the Trauma Program Manager at Cedars-Sinai Medical Center, a DHS designated and ACS verified Level I Trauma Center. She is also the Past President of the Society of Trauma Nurses (STN) and Immediate Past President of the Trauma Managers Association of California (TMAC). She has over 25 years of trauma clinical and program management experience inclusive of trauma data, trauma performance improvement - peer review, trauma program - systems development and implementation, injury prevention, consultant for trauma centers and systems, and all trauma related issues across the continuum of care. She has extensive experience in trauma education inclusive of lectures

on many aspects of trauma care, trauma educational curriculum development, and conference and event planning. She was the Chair of the Advanced Trauma Care for Nurses® (ATCN) Committee in Arizona for 6 years. She was the first appointed Chair of the STN's ATCN National-International Committee, and is currently ATCN Faculty. She is an author and Faculty Member for the STN's Trauma Outcomes Performance Improvement Course (TOPIC). She was a member of the STN Board of Directors for over 8 years in the positions of Director at Large, Treasurer, President Elect, and President. She is also a Board Member and Executive Committee Member with the American Trauma Society. Heidi Hotz has been actively involved in many local, regional, national and international trauma projects, programs, and initiatives and has held many trauma leadership positions. Her involvement includes trauma hospital and trauma system site surveys; project-program development for screening and brief interventions for alcohol in trauma patients; expert panelist for trauma educational events, invited participant in national trauma leadership forums; spokesperson for media events; work group participant for the Model Plan for Trauma Systems; provided testimony at formal hearings in support of trauma systems funding; member of the Health Resources and Services Administration (HRSA Trauma Stakeholders Committee).

JANET GRIFFITH KASTL, MA

Janet Griffith Kastl is the Director of the Washington State Office of Emergency Medical Services and Trauma System. She has held this position since passage of the Washington State Trauma Care Act in 1990. Prior to serving as Director, she oversaw the Trauma Assessment Project that planned and created the 1990 *Report to the Legislature*, resulting in enactment into statute with full funding. In 1997, the Legislature passed the Trauma Care Fund Act, which provides a dedicated fund that is available for designated facilities, physicians, and EMS providers of care to major trauma patients.

Ms. Kastl began her career as an EMS Systems Planner and Regional EMS Administrator when the state's EMS system was in its infancy. An early advocate of addressing trauma care through a systems approach, she played a strong role in the development and successful implementation of a statewide EMS and Trauma System in Washington. During her 30-year career in public health, Ms. Kastl has taken on increased responsibilities in the development, administration, and evaluation of health delivery systems, specializing in EMS and trauma systems development. Due in no small measure to her extensive experience, knowledge, skills and dedication, Washington's system enjoys a broad reputation for excellence and is considered a national model by many public health professionals.

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.

Appendix B: List of Participants

American College of Surgeons
Trauma System Consultation
December 14th-17th, 2008

Name	Title	Organization
Aaland, Mary, MD, FACS	Trauma Medical Director	Parkview Hospital
Adams, Dawn	Operations Manager	Public Health & Preparedness Commission-ISDH
Addison, Larry, RN	2008 President, Indiana ENA	West Central Community Hospital
Addison, Meredith, RN, MSN	Nurse	State and local ENA
Alley, Ann	Director	Office of Primary Care, Public Health & Preparedness Commission, ISDH
AnLeitner, Maureen	Nursing Manager of SLC Emergency Services	The Methodist Hospitals- Gary
Beeson, Jim, MD	Emergency Medicine Physician	St. John's Health System
Bensard, Denis, MD	Chief of Surgery	Peyton Manning Children's Hospital at St. Vincent
Bjerke, H. Scott, MD, FACS	Medical Director, Trauma Services	Clarian Health
Boyer, Bryan, MD	Trauma Surgeon	Memorial Hospital of South Bend
Braeckel, John	Hospital Preparedness Director	Public Health Preparedness & Emergency Response-ISDH
Brandt, Lisa M., RN	Orthopedic Nurse	St. Vincent Hospital
Broden, John	Indiana State Senator	State of Indiana
Butt, Tina, RN, EMT-I	EMS/ECC Coordinator	Dearborn County Hospital
Buttry, Jill, RN, MSN, CNS	Trauma Program Manager	Deaconess Hospital
Chadd, Tammy	State Office of Rural Health and Primary Care Network Director	ISDH

Name	Title	Organization
Craig, Stephanie, RN	Education and Risk Management Director	Dearborn County Hospital
Daniels, Dawn, DNS, RN, PHCNS-BC	Clinical Nurse Specialist	Riley Trauma Services
Dillard, Denise	VP of Governmental & External Affairs	The Methodist Hospitals- Gary
Duerden, Marc, MD	Physiatrist/Medical Director TBI	Hook Rehab. Center/Rehab. Association of IN
Durkin, Patrick	Primary Care Network Coordinator	ISDH
Duwve, Joan, MD	Medical Director	ISDH
Falimirski, Mark, MD	Medical Director, SICU	Indiana University Medical Center
Farias, Seferino, MD	Chief of Trauma Surgery	The Methodist Hospitals, Inc.
Ford, Charles	Associate Vice President	Emergency Preparedness, Protection, and Response- Wishard Hospital
Garvey, Michael	Chief of Staff	Fire and Safety Division EMS/ISDH
Gomez, Gerardo, MD	Trauma Medical Director	Wishard Hospital
Gosse, Sue RN, Ph.D.	Assistant Professor	Indiana State University College of Nursing, Health & Human Services
Graves, Charlene, MD	Retired pediatrician & ISDH Trauma-Injury Prevention Medical Director- Founding Member	ISDH
Gravett, Mike	Manager	Strategic Partnerships with Lifeline
Gray, Lisa, RN	Peds Trauma Coordinator	St. Mary's Medical Center
Grover, Spencer, FACHE	Vice President	IN Hospital and Health Association
Hackworth, Jodi, MPH	Epidemiologist	ISDH Injury Prevention Program
Hartman, Chris, MD, FACEP	Emergency Physician	St. Francis Health Network, American College of Emergency Physicians, Indiana Chapter
Hendrickson, Kevin, RN	Outreach Trauma Coordinator	Deaconess Hospital
Hollister, Lisa, RN	Trauma Program Manager	Parkview Hospital

Name	Title	Organization
Holt, Worthe, Jr., MD, MMM	Medical Liaison (PHI)	Indiana Affiliate Board of Directors for AHA & PHI Air Medical
Howard, Janet, RN	Trauma Clinical Nurse Specialist	Memorial Hospital of South Bend
Howard, Matthew S., RN, MSN	Manager, Riley Trauma Services	Riley Hospital for Children
Ingram, Bob, MSN, RN, CEN	Director, Trauma Services	Memorial Hospital of South Bend
Jacobson, Lewis E., MD	Vice Chair, IN ACS-COT, Associate Professor of Surgery	Wishard Hospital
Jolly, Michele	Trauma Registrar	Deaconess Hospital- Evansville
Joy, Teri, RN, BSN, CEN	Trauma Coordinator	Wishard Hospital
Kelso, Don, MBA, ACHE	Executive Director	Indiana Rural Health Association
King, Nils	Traffic Records Coordinator	Indiana Criminal Justice Institute
Klitzsch, Ryan	Division Director, Traffic Safety	ICJI
Kresca, Paula	Trauma Registrar	Memorial Hospital of South Bend
Kruger, Edward G., CPCU	Technology/Project Coordinator	Indiana Farm Bureau Insurance
Lanzarotti, Stephen, MD, FACS	Surgeon	St. Mary's & Deaconess Evansville
Lefler, Stephanie, RN	Director of Trauma Services	St. Mary's Medical Center
LeGrand, Daniel, MD	Chief Medical Officer	St. Vincent Indianapolis Hospital
Lohse, Willis, RN	Emergency Department	West Central Community Hospital
Louden, Stephanie, RN	Nursing Manager of NLC, Emergency Services	The Methodist Hospitals- Gary
Lowry, Rick RN	Chair, Indiana Trauma Network Trauma Program Coordinator	Clarian Methodist Hospital
Madden, Tom, MD	Emergency Physician	Bloomington Hospital
McGee, Michael A., MD	Emergency Medicine Department	The Methodist Hospitals of Indiana

Name	Title	Organization
Meyer, Vickie, RN	Trauma Program Manager	Lutheran Hospital of Indiana
Millikan, William, MD	Trauma Medical Director	St. Mary's Medical Center
Mitton, Jayne	Executive Director, Surgical and Trauma Services	Memorial Hospital of South Bend
Monroe, Judith	Health Commissioner	ISDH
Olinger, Michael, MD	Emergency Physician	Wishard Hospital
Patel, Kayur V. MD, FACP	Chief Medical Officer	Terre Haute Regional
Pettit, Tracie, RN	Trauma Registrar	ISDH
Perkins, Susan D., RN, BSN, CCRC	Trauma System Manager/Rural Health Liaison	ISDH Trauma System/ Injury Prevention
Pitcock, Nancy, RN,	Chief Nursing Officer	St. John's Health System
Poole, Debbie, RN	Executive Director, ICU	St. Mary's Medical Center
Reiss, Gene	Trauma Registrar	Riley Hospital for Children
Rhew, Rick	Director of Compliance, Former Interim CFO	The Methodist Hospitals- Gary
Robertson, Loren	Assistant Commissioner	Public Health and Preparedness Commission
Roob, Mitch	FSSA, Secretary/Director	Family & Social Services Administration
Scherer, L.R. "Tres", MD, FACS	Chair, ACS-COT& EMSC Trauma Medical Director	Riley Hospital for Children
Smith, Jason	EMS Manager	ISDH
Stidham, Dana	RHC and Emergency Preparedness Coordinator	Indiana Rural Health Association
St. John, Wendy, RN	Assistant Trauma Nurse Coordinator	Wishard Hospital
Stone, Cynthia, Dr. PH, MPH, RN, C	Associate Professor	School of Public Health, Indiana University
Stuffle, Vicki, RN	Director, ED	Memorial Hospital
Suilon, Benjamin, RN	Emergency Department Staff Nurse, State ENA Injury Prevention Co-Chair	St. Vincent- Frankfort Emergency Department

Name	Title	Organization
Tabor, Brian	VP- Government Relations	IHA
Thomas, Scott, MD, FACS	Trauma Medical Director	Memorial Hospital of South Bend
Turpen, Lee CCEMT-P	Commission Member/COJ Manager	Indiana EMS Commission/American Medical Response
Vanoven, Julie, RN	Emergency Services Director	Terre Haute Regional Hospital
Vassy, Matt, MD	Interim Trauma Medical Director	Deaconess Hospital
Vaughn, Tabitha, RN	Manager, ED	Wishard Hospital
Wasilewski, Kathi, RN	ER Director	Saint John's Hospital
Wible, Gregory D.	Academic Counselor	IU School of Nursing
Mrs. Gregory Wible	School Nurse	
Zhu, Thein	Trauma Epidemiologist	Parkview Hospital, Trauma Services

Appendix C: State Public Health Budgets

State Public Health Budgets -- FY 2006-2007			
State	**FY 2006-2007**	**FY 06-07 Per Capita**	**Per Capita Ranking**
Hawaii [2]	$195,921,585	$152.41	1
Vermont [3]	$91,161,923	$146.11	2
District of Columbia [2]	$66,020,000	$113.53	3
New Mexico	$154,991,800	$79.30	4
California	$2,859,486,000	$78.43	5
Idaho	$114,008,700	$77.74	6
West Virginia	$133,424,089	$73.37	7
Oklahoma [1]	$240,056,000	$67.07	8
Massachusetts [4]	$389,234,985	$60.47	9
Wyoming	$30,674,270	$59.56	10
New York	$1,111,688,300	$57.58	11
Alabama	$239,822,539	$52.15	12
Colorado	$229,536,071	$48.29	13
Delaware [2]	$41,198,600	$48.27	14
Rhode Island	$49,446,623	$46.32	15
Alaska [2]	$30,797,600	$45.96	16
Tennessee	$269,582,200	$44.64	17
Louisiana	$176,481,464	$41.16	18
Maryland [2]	$224,837,000	$40.04	19
Kentucky	$168,367,300	$40.03	20
Washington [4]	$254,023,500	$39.72	21
New Jersey	$345,200,000	$39.57	22
South Carolina	$168,538,389	$39.00	23
Virginia [4]	$288,715,937	$37.78	24
Nebraska [4]	$63,008,127	$35.63	25
Utah	$83,187,400	$32.62	26
NATIONAL MEDIAN $32.62			
Florida [2]	$501,774,108	$27.74	27
Arkansas	$73,686,871	$26.21	28
Connecticut [2]	$79,786,634	$22.76	29
South Dakota	$17,702,809	$22.64	30
Illinois	$276,278,000	$21.53	31
New Hampshire	$27,148,280	$20.65	32
Arizona	$125,871,800	$20.41	33
Michigan [4]	$197,287,300	$19.54	34
Pennsylvania [2]	$239,482,000	$19.25	35
Georgia [6]	$162,416,101	$17.34	36
Iowa	$50,703,746	$17.00	37
North Dakota [7]	$10,638,482	$16.73	38
Kansas	$45,394,453	$16.42	39
Montana	$13,968,630	$14.79	40
Oregon	$54,315,766	$14.68	41
North Carolina [2]	$129,554,172	$14.63	42
Texas	$341,103,992	$14.51	43
Minnesota [2]	$69,923,000	$13.53	44
Mississippi [2]	$38,869,936	$13.35	45
Ohio [4]	$149,854,080	$13.06	46
Missouri	$59,965,408	$10.26	47
Maine [2]	$13,414,240	$10.15	48
Indiana	$61,549,176	$9.75	49
Wisconsin [4]	$51,286,800	$9.23	50
Nevada	$8,868,017	$3.55	51

Notes:

1 May contain some social service programs, but not Medicaid or CHIP.

2 General funds only.

3 Includes federal funds.

4 Budget data taken from appropriations legislation.

5 Missouri's percent change based on FY 2005-06 and FY 2006-07 actual expenditures.

6 Georgia's budget data for FY 2006-07 taken from appropriations legislation.

7 North Dakota's budget data for the 2007-2009 biennium taken from appropriations legislation.

Appendix D: Summary of Trauma Systems and Funding Mechanisms by State

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Summary of Trauma Systems and Funding Mechanisms by State

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State	Legislated Trauma System?	Is that System Funded?	Fines/Fees on Moving Violations	Fines/Fees on Other Criminal Penalities	Motor Vehicle Registration/License Plates or Driver's License Renewal Surcharge	Cigarette Excise Tax	Gambling	General Revenue Funds	Surcharge on 911 calls	Other	
Alaska	Yes	No									
Alabama	No	No									
Arkansas	No*	No									*Hearings in 2008 for possible legislation in 2009.
Arizona	Yes	Yes				X	X				
California	No	Yes	X								
Colorado	Yes	Yes			X						
Connecticut	Yes	No									
Delaware	Yes	No									
District of Columbia	No	No									
Florida	Yes	Yes	X								
Georgia	No	No						X *			* Not a permanent funding source.
Hawaii	Yes	Yes				X					
Iowa	Yes	No									
Idaho	No	No									
Illinois	Yes	Yes	X	X							
Indiana	Yes	Yes			X						
Kansas	Yes	Yes		X							
Kentucky	Yes	No									
Louisiana	Yes	No									
Massachusetts	Yes	No									
Maryland	Yes	Yes			X						
Maine	Yes	No									
Michigan	No*	No									*Development of System in Progress
Minnesota	Yes	Yes						X*			*$ from General fund, but generated from a hospital license fee of all Hospitals & money from Dept of Health
Missouri	Yes	No									
Mississippi	Yes	Yes	X		X	X					
Montana	Yes	No									
North Carolina	Yes	No									
North Dakota	Yes	No									
Nebraska	Yes	Yes			X						
New Hampshire	Yes	No									
New Jersey	Yes	No									
New Mexico	Yes	Yes			X						
Nevada	Yes	No									
New York	Yes	No									
Ohio	Yes	Yes		X							
Oklahoma	Yes	Yes	X		X	X					
Oregon	Yes	Yes						X			
Pennsylvania	Yes	Yes	X	X							
Rhode Island	No	Yes	X								
South Carolina	Yes	No									
South Dakota	No	No									
Tennessee	Yes	Yes				X					

Summary of Trauma Systems and Funding Mechanisms by State

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State	Legislated Trauma System?	Is that System Funded?	Fines/Fees on Moving Violations	Fines/Fees on Other Criminal Penalities	Motor Vehicle Registration/License Plates or Driver's License Renewal Surcharge	Cigarette Excise Tax	Gambling	General Revenue Funds	Surcharge on 911 calls	Other
Texas	**Yes**	**Yes**	**X**						**X**	
Utah	**Yes**	**Yes**	**X**	**X**						
Virginia	**Yes**	**Yes**	**X**		**X**					
Vermont	**No**	**No**								
Washington	**Yes**	**Yes**	**X**		**X**					Surcharge on sale or lease of a new vehicle
Wisconsin	**Yes**	**Minimal**						**X***		
West Virginia	**Yes**	**No**								
Wyoming	**Yes**	**No**								

*Partial funding for Trauma Coordinator position and $50, 000 for RTAC development and infrastructure