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Trauma Systems Evaluation and Planning Committee

Trauma System Consultation Report

State of Florida

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AMERICAN COLLEGE OF SURGEONS
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Highest Standards, Better Outcomes

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Executive Summary

Overview

Florida has been a leader in the development of trauma systems since the early 1980's. Through the cooperative efforts of a broad group of stakeholders and an engaged state government, Florida has enacted some of the most comprehensive legislation, provided for substantial ongoing funding, and established a network of trauma centers that provide coverage for the majority of the population, while delivering good outcomes as measured against national benchmarks. Over the past two years the Department of Health (DOH) and trauma system stakeholders have been embroiled in a contentious legal battle regarding the rules that govern the designation of new trauma centers. As a result, the policy development and planning necessary for ongoing trauma system development have come to a halt. At present, relationships between hospitals and stakeholders are strained to the breaking point. The controversy around trauma center distribution has resulted in the neglect of nearly all other important trauma system elements.

Although the conflict may be particularly intense in Florida, its nature and potential to consume the attention of trauma system stakeholders is far from unique. Several other states and urban areas struggle with similar challenges regarding trauma center distribution. All of these challenges share a common theme – while a clear and undisputed need for additional trauma centers exists in much of the country, oversupply is common in metropolitan areas. In areas with a potential oversupply of trauma centers, the determination of need for a new trauma center is frequently contentious and is further compounded by a lack of objective standards that would enable a clear data-driven decision. As in Florida, trauma centers in metropolitan areas compete for patient volume. Established trauma centers often resist the addition of new centers, arguing that dilution of patient volumes will be detrimental. Trauma centers seeking to enter the trauma system counter with benefits such as improving access to potentially underserved areas, shortening transport times, and easing overcrowding in existing trauma centers. All ultimately agree that trauma centers should be designated primarily to serve the needs of the population, but each group interprets need in a way that supports their position.

A long standing tenet of trauma system design is that the system's lead agency must have the ability to limit the number and level of trauma centers, and that decisions regarding trauma center distribution should be based upon the needs of the population served. Unfortunately, no consensus exists regarding what metrics should be used to determine need, and population-based data rarely exist for an objective analysis to set appropriate benchmarks. However, a set of choices for determining the nature of the trauma system and the trade-offs inherent in these choices can be outlined.

The optimal balance between these choices and trade-offs will not yield a single universal solution, but will depend upon uniquely local factors, including geography, resource availability, and regional social elements. In the end, the decision is inherently

political rather than purely scientific. For that reason, it is a decision that few regions have been able to execute successfully. Appendix D outlines a set of parameters that have been used to measure need and the benchmarks used in different regions to guide trauma center designation.

It is noteworthy that the concept of designation based upon need is clearly embodied within the Florida statute. This statute establishes criteria for the needs assessment, places an absolute ceiling on the number of trauma centers in the state, and lays out a general regional plan for the placement those centers based upon need (as assessed circa 1990). The difficulty associated with the ongoing political process of needs assessment is equally well exemplified by the DOH's inability to complete the periodic needs assessments mandated in statute, a failure that ultimately underlies the current legal challenges.

The competition between existing trauma centers for patient volume is further amplified by the manner in which the state funds for trauma care, derived from traffic fines, are distributed. The current rule allocates funds between existing trauma centers with a formula based upon patient volume and injury severity. Unfortunately, the threshold value for severity represents relatively minor injury. This distribution scheme creates an environment in which the addition of a new trauma center decreases the share received by every other trauma center (e.g., the funds are divided among more trauma centers and patient volume is redistributed). Existing trauma centers have a clear financial incentive to keep new hospitals out of the pool for trauma funding, and an incentive to compete with one another for patients. Both factors may run counter to the true needs of the patients served.

It is the opinion of the trauma system consultation (TSC) team that the solution to the current conflict around trauma center designation must be solved by a collaborative process, involving all stakeholders and the DOH. The collaborative effort should focus on the universally accepted concept of trauma center designation based upon system need and optimal patient care. The stakeholder group, along with the DOH and perhaps the people of Florida speaking through the legislature, must arrive at a process for the needs assessment that is transparent and acceptable to all. Next, a definitive and transparent process of governance must be established to make decisions about the designation of new trauma centers and re-designation of existing trauma centers based upon that assessment. Given the lack of both current data and an accepted process for decision making, the TSC team also recommends a moratorium on new trauma center designations, either provisional or verified, until the new process is in place.

Despite the tendency to focus on trauma centers, especially in times of controversy, a trauma system is much more than a collection of trauma centers. The trauma center distribution issue is not the biggest challenge to the optimal provision of trauma care in Florida. While the distribution of trauma centers is important, it must not be allowed to paralyze all other aspects of trauma system function and development.

Though the current statute correctly defines and seeks to establish an inclusive trauma system, on an operational basis the trauma system functions much more along the older exclusive model rather than embracing an inclusive approach. For example, most of the state's acute care facilities do not participate in the trauma system, and the statutory mandate for all hospitals to submit a minimum data set on injury patients is not enforced. No standards exist for inter-facility transfer and its evaluation, and patient flow at the EMS level is not adequately controlled. The principle of including all hospitals in the trauma system has been misinterpreted as a directive to create more high-level trauma centers, or to allow individual hospitals to participate at a level of their choice. The tenets of the inclusive system model require that all hospitals participate in a defined way. This does not mean that the hospital is free to choose its own level of participation, independent of need within the trauma system. The appropriate number and location of higher-level trauma centers is independent of the existence of an inclusive system. Most facilities within the trauma system will be focused on the appropriate triage and transfer of severely injury patients to the higher-level trauma centers while providing definitive care for the less severely injured locally, depending upon facility resources. The TSC team recommends that the vision of an inclusive trauma system be revived, renewed, and implemented. This broad recommendation has been embodied through the many recommendations that target the various functional and institutional elements of the Florida state trauma system.

Advantages and Assets

The long history of dedicated participation in Florida's trauma system development is a significant advantage and asset. This is noted on various levels, including hospitals, stakeholder leadership in the trauma community, and the many dedicated providers involved in the trauma system in all capacities. This effort has been in synergy with long-standing public support expressed through legislative action by state government. This synergy has produced strong enabling legislation, substantial funding, and the establishment of the current trauma system. The success of the system can be measured by the provision of trauma care within a Level I or II trauma center within 60 minutes to 97% of Florida's population and 80% of its land area. The national average is 82% of population and 29% of land area. The state faces no major geographical challenges and has few isolated rural areas.

Florida is fortunate to have a wealth of expertise and experience within its well-established trauma centers. These academic trauma centers have a long history of research in trauma care and trauma systems, a history of national leadership, and a demonstrated commitment to data-driven solutions. These academic trauma centers have a legacy of training trauma care providers and providing many of the human resources and much of the social capital that drive the current trauma system. In addition to these academic trauma centers, the state is fortunate to have a significant number of well-organized health care facilities with the commitment, resources, and willingness to seek new trauma center designation. The willingness of new trauma centers to join the ranks of existing centers to create a more comprehensive regional

trauma system is an important asset that can ultimately result in a stronger system of injury care for the state's population and visitors.

The commitment of the DOH leadership to the ongoing development and improvement of the current trauma system is another important asset. The DOH has undergone major structural reorganization, which will strengthen the efforts toward improved integration of the various trauma system components. Florida has a strong and well-tested disaster response system, a system that is well positioned to form the regional infrastructure for a more comprehensive trauma system. The well-established programs for the collection and analysis of injury data are available to inform trauma system planning and to support the several strong injury prevention programs. Florida has a trauma plan, one that has been updated and distributed on a regular basis, most recently in 2011. Unfortunately, the plan does not address the most pressing issues facing the Florida trauma system

Florida also has a very organized and well established network for rehabilitation services that has historically targeted traumatic brain injury and spinal cord injury. This infrastructure can provide the basis for a more extensive rehabilitation network to serve other injury populations, as well.

Challenges and Opportunities

The most striking challenge to the progress and ultimate success of the Florida trauma system is the adversarial relationship that has developed between factions in the previously cooperative stakeholder community. The conflict over trauma center distribution has resulted in deep divisions within the community of trauma advocates and providers and has stalled all aspects of system development. The conflict and the almost exclusive focus on issues surrounding trauma center designation have the potential to endanger the larger collective mission.

The vision for Florida's state trauma system growth and development is outdated, having been carried forward almost unchanged since the early 1990's. Although this vision was ahead of its time when created, the structure of Florida's trauma system has failed to adapt to changing times and improved models of trauma system design. An incomplete understanding and application of the principles underlying an inclusive trauma care system exists. This outdated vision has perpetuated an outdated advisory board structure that no longer represents the current stakeholder community. Truly inclusive stakeholder involvement is lacking, especially for those stakeholders not associated with the existing Level I and II trauma centers. Further, the regional structure described in the original statute and subsequent plan was never fully implemented, potentially due to a lack of resources to support the planned regional trauma agencies. As a result, much of the state has inadequate regional integration.

Although the Florida state trauma plan is well thought out, and regularly updated, it does not adequately address the most complex and difficult issues that arise within the course of trauma system planning. The planning process has been unable to establish a

broadly accepted vision for the future development of Florida's trauma system, especially in regard to balancing system needs, financial incentives, and free-market principles that are related to trauma center designation. The inability of the planning process to address these issues has contributed to the ongoing reliance on the outdated trauma system vision that is at the heart of the litigation dominating the attention of the stakeholders. The trauma system plan has not adequately addressed the metrics and the process for necessary periodic trauma system needs assessment, and it has no systematic process for the designation of trauma centers based upon those needs. Inadequate central coordination of patient flow exists, either from the field to the trauma center or between hospitals within the state trauma system. Even though current statute mandates that all acute care facilities submit data on injured patients, no rules for this mandate have been written. The state trauma program has access to hospital discharge data and the expertise to analyze that data to provide a population-based assessment of injury; however, these resources have been underutilized. As a result, the trauma system does not optimize the use of available data and has not established the infrastructure and processes necessary to monitor system performance.

Florida's trauma system is fortunate to have significant public funding, but these funds are not utilized in a way that optimizes their impact. The current distribution model divides the available funds among the designated trauma centers and apportions the funds by a formula based on volume and the estimated severity of injury. This distribution model creates adverse incentives that place the interests of an individual trauma center in competition with the needs of the trauma system, and thus it does not support balanced system development. Existing trauma centers have clear financial incentives to compete for patient volume and to keep new centers out of the funding pool. These incentives may run counter to the best interests of the state trauma system and of the population that it serves.

General Themes

Find a negotiated solution to the current conflict and re-unify the stakeholder community. The stakeholders have a clear collective commitment to the goal of providing the best care possible to Florida's injured patients. Use this shared commitment to provide the common ground upon which to build a collaborative solution that will benefit injured patients and the allow Florida to build upon the existing successes of its trauma system.

A clear vision and plan accepted by all stakeholders is the necessary foundation for Florida's future trauma system development. This plan should encompass all aspects of system function, specifically including needs assessment, trauma center distribution, EMS operations, system-wide performance improvement, rehabilitation, injury epidemiology, and injury prevention.

The DOH must have unambiguous support from the broad stakeholder community to assume an active role as the lead agency, supported by consistent and uncontested statutory and regulatory authority.

The advisory committee structure must be reconfigured to reflect broader multidisciplinary stakeholder participation and to be representative of the current trauma system composition. The advisory committee structure must be established and accepted as the balanced policy development body responsible for overall system policy and planning.

The current system vision and structure are out of date and should be updated to reflect the principles of an inclusive and comprehensive trauma system design. It is essential to recognize that a trauma system be more than a collection of individual trauma centers, and that an inclusive system is not an unregulated system.

Trauma center designation should be based upon system need, and consistent and objective data should be used in a transparent process to determine that need.

A strong regional infrastructure is needed to adapt statewide policy and procedures to reflect unique local circumstances and to meet local needs.

Florida's trauma system provides good care to its injured citizens, and its development is ahead of many comparable states, yet many aspects of the trauma system can be improved and must be updated. The great wealth and breadth of experience, talent, and resources that exist among the stakeholders can be used to improve Florida's trauma system and drive it to a higher level of function.

Much work is needed. Change is often painful, but stagnation and an inability to adapt are unnecessarily costly on all levels.

Priority Recommendations

Statutory Authority

- Convene a small multidisciplinary work group to analyze all existing statutes and regulations pertaining to the trauma system, including, methodology for needs assessment, process for trauma center designation based on system needs, and control of patient flow (field triage criteria/destination protocols).
    - Review legislation from other states
    - Achieve consensus on the necessary statutory or administrative code changes

System Leadership

- Appoint a new Florida Trauma System Advisory Council (FTSAC) to provide input to policy development for the trauma system.
    - Include both trauma center and non-participating hospitals.

Lead Agency and Human Resources within the Lead Agency

- Establish and fund a statewide performance improvement coordinator position to lead the development of a statewide performance improvement process.
- Contract for the state trauma medical director position and provide compensation for his/her time.

Trauma System Plan

- Revise immediately the Florida trauma system plan to address key issues necessary for the further development of the regional and statewide trauma system.

System Integration

- Use the Regional Domestic Security Task Force Regions (RDSTFR) as the TSA regions.
    - Develop a strong regional structure based on the 7 RDSTFR that enables the integration of trauma centers with EMS, disaster preparedness, and other regional activities.

Financing

- Revise the distribution method of the trauma center fund.
  - Change the statutes and rules governing the fund to ensure that designated trauma centers receive level-appropriate support for the “cost of readiness”.
  - Develop a formula for distribution of funds that focuses on specific deliverables by trauma center level rather than volume and acuity.
  - Include a mechanism to support trauma rehabilitation services (e.g., establish in rule and/or direct trauma centers to use some of their funds to “buy” beds in rehabilitation centers).
  - Revisit the allocation method/ formula on a regular basis (every 3-5 years)

Emergency Medical Services

- Collaborate with the Florida Department of Transportation Governor’s Highway Safety Program to initiate and conduct a National Highway Traffic Safety Administration EMS System Reassessment.

Definitive Care

- Conduct an assessment of the current system, including the parameters outlined in Florida statute 395.402, to inform decisions regarding the location and level of new trauma center designations.
- Establish a transparent, broadly accepted process for future provisional trauma center designation based upon both capacity and trauma system need.
  - Work with stakeholder advisory groups to establish criteria for need
  - Utilize findings from newly conducted needs assessment.
- Establish a transparent, broadly accepted process for initial full designation and ongoing re-designation based upon system participation, center performance, and participation in quality improvement programs.
  - Work with Florida Trauma System Advisory Committee (FTSAC) to establish criteria for initial and ongoing designation
- Impose a moratorium on any new provisional or verified trauma center designation until these new processes are in place.
- Require that all acute care facilities participate in the inclusive and integrated trauma system as a condition of licensure.
  - Designate each acute care facility at an appropriate level, either as a trauma center or a participating facility
  - Require all facilities to submit at least a minimal set of data on every injured patient to the state registry.

System Coordination and Patient Flow

- Evaluate the content, implementation, and method of enforcement of trauma transport protocols (TTPs) to assure uniformity and efficiency of patient flow both within trauma regions as well as statewide.
- Task the Trauma Program with annual reporting on trauma center and non-trauma center destination and patient outcomes (initial destination and transfer).
    - Correct identified deficiencies in trauma system coordination and patient flow using structured processes identified by the Trauma Program.

Disaster Preparedness

- Develop the healthcare coalitions and align with the seven Regional Domestic Security Task Force Regions.
    - Ensure that the disaster medical response plans are integrated through regional planning between members of the healthcare coalition (hospitals, EMS, fire, public health, dispatch, emergency management and law enforcement).

System-wide Evaluation and Quality Assurance

- Reactivate the state Performance Improvement Committee as a subcommittee of the Florida Trauma System Advisory Council (FTSAC) to develop a statewide performance improvement (PI) plan.
    - Ensure that the PI plan outlines the PI process at the provider, regional, and state levels and includes process, structure and outcome measures.
    - Review PI plan templates from other states to guide development of the Florida PI plan.
    - Ensure that the PI plan includes all aspects of trauma care and trauma system performance.
    - Use data from all continuum-of-care participants including trauma centers, non-trauma hospitals, rehabilitation centers, EMS providers and dispatch for system evaluation.
    - Include population-based data.

Trauma Management Information System

- Complete the implementation of the Next Generation trauma registry.
    - Ensure participation by all hospitals.

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

The description of injuries for Florida using population-based data resources was published in the *2009 – 2013 Injury Prevention Strategic Plan*. Vital statistics, emergency department, and hospital discharge datasets were used. A description of injuries by age group, mechanism, fatality, and intent has been updated and published on the Injury Prevention Program website. Clinical data from the trauma registry were not used to enhance the description of injury in this plan. The trauma program has access to other datasets, such as motor vehicle crash records, the child death review program, emergency medical services reports, and law enforcement reports, however, no reports using these data were provided for review. The trauma program annual report describes the injuries treated in the trauma centers, but it does not integrate data from the other population datasets.

The Injury Prevention Program has published on its website fact sheets that address specific mechanisms of injury and related economic information. These fact sheets were last updated using 2009 data, but it was stated that plans exist to update these fact sheets soon. Tables describing injuries in Florida using 2011 data were provided to the trauma system consultation (TSC) team. The website has multiple reports that describe specific mechanisms of injuries from the emergency department and hospital discharge databases. A more detailed analysis of injury using resources from data linkage with other data sets, e.g., motor vehicle crash data, Geographic Information System (GIS) mapping, and International Classification of Disease-9 Injury Severity Score (ICISS) mapping to describe injuries by injury severity are not available.

The Bureau of Emergency Medical Oversight (BEMO) recently formed the Health Information and Policy Analysis Program. Within that program, a dedicated epidemiologist is available for injury epidemiology, EMS, and the trauma program. A statistician is to be hired to support the effort. The epidemiologist responds to special requests for injury data from EMS agencies, hospitals, and injury prevention advocates.

The epidemiologist has identified additional education needed to specialize in injury data and to perform data linkage, such as ICISS, GIS mapping, and probabilistic data linkage. Such training will enhance the quality and depth of injury data analysis to support trauma system program needs assessment, planning, and evaluation. Once the "next generation" trauma registry is functional, the epidemiologist should participate with the performance improvement (PI) committee to learn about the specific PI indicators of

interest and to assist with the selection of variables that will be helpful for tracking regional and statewide trauma system performance. The new Health Information and Policy Analysis Program should be an excellent resource for the trauma program, as well as the Injury Prevention Program, Emergency Medical Services (EMS), and the Traumatic Brain and Spinal Cord Injury Program.

The state has several strategic plans that focus on injury issues: the *2009- 2013 Injury Prevention Strategic Plan*, the *Suicide Prevention Strategy*, and *Enhancing the Traumatic Brain Injury System of Care Action Plan*. Opportunities exist to more fully describe the impact of injury from all mechanisms in Florida to elected officials, health professionals, and advocates within the state.

Recommendations

- Ensure that the epidemiologist has access to advanced training in probabilistic data linkage, International Classification of Disease-9 Injury severity score (ICISS), and Geographic Information System (GIS) mapping to enhance skills in injury epidemiology.
- Update the injury fact sheets on an annual basis to inform the public about the injury problem in Florida.
- Develop a template for an annual or biennial report describing injuries in Florida using both population-based and clinical databases that can be used for the trauma system needs assessment.
    - Produce the report at regular intervals and disseminate it to the public, elected officials, the Florida Trauma System Advisory Council, and all trauma system stakeholders.
- Integrate the injury prevention strategic planning and annual reports between the state injury, trauma, and EMS programs.

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

Optimal Element

I. Assurance to constituents that services necessary to achieve agreed-on goals are provided by encouraging actions of others (public or private), requiring action through regulation, or providing services directly. **(B-300)**

Current Status

A Benchmarks, Indicators and Scoring (BIS) assessment from the 2006 Health Resources and Services Administration (HRSA) *Model Trauma System Evaluation and Planning* document was conducted in 2005. Indicator scores were included in the January 25, 2006 meeting summary of the State Trauma System Plan Implementation Committee Meeting minutes. None of the participants recalled participating in the process, so no information about how the assessment was conducted was available. Trauma system deficiencies identified using this assessment as reported in the Pre-Review Questionnaire (PRQ) included data integration, injury prevention, and the continuum of care.

The BIS assessment can be a valuable process when stakeholders representing all aspects or pillars of the trauma system are engaged. It may be educational in raising awareness and understanding about aspects of the trauma system that are less well understood by some stakeholders. Optimally the assessment is completed separately by each individual, and then data are summarized, rather than reviewing each indicator as a group. The process enables the trauma system leadership (e.g. the proposed Florida Trauma System Advisory Council [FTSAC]) to become informed about the current status of the trauma system and aspects of the trauma system that need attention for development. When summary scores are reviewed with all stakeholders in a facilitated process, consensus building regarding priorities for trauma system development can be achieved. Such a process engages multiple stakeholders and provides direction for strategic planning. Repeating the BIS assessment process with stakeholders at regular intervals provides a quantifiable measure of progress in trauma system development.

When the process for development of the next trauma system plan is initiated, the Florida trauma program should consider using the HRSA BIS assessment to collect data about the trauma system status and to establish priorities for trauma system development in the plan. The use of the BIS assessment every 5 years when a new plan is developed is one method to quantify progress in trauma system development.

Recommendations

- Assemble a multidisciplinary group of stakeholders to conduct a trauma system assessment using the national Health Resources and Services Administration (HRSA) trauma system assessment process in preparation for planning the next Five Year Strategic Plan for the trauma program.
- Perform repeat HRSA trauma system assessments at regular intervals to document progress in addressing priorities for trauma system development.

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 pre-described 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

Florida's trauma system has been under development since the passage of landmark trauma legislation in the early 1990s. Key components of this system include trauma centers, trauma agencies, and trauma service areas, as well as trauma transport protocols, trauma triage criteria for emergency medical service providers, and state-designated brain and spinal cord injury rehabilitation centers.

In 1998, the Florida Legislature directed the Department of Health (DOH) to conduct a study focusing on the state's trauma system and how best to ensure timely access to trauma care. During the 1999 Florida Legislative Session, the DOH Bureau of Emergency Medical Services Oversight (BEMO) was authorized to issue a five-year state trauma plan. This report, published in December 2000, systematically reviewed strategies required to accomplish the state plan objective of meeting the needs of all trauma patients in an inclusive trauma system.

In 2004, the Florida Legislature provided funding for a comprehensive assessment of the Florida trauma system. Based on the findings from this report, the *2005-2010 Trauma System Plan* was developed to improve the existing trauma system.

The authority for the Florida trauma system development is located in Chapter 395, Part II of the Florida Statutes. The Florida trauma system has strong support from the senior leadership in the DOH. The statutes are well written, but very prescriptive. It is obvious the Florida Legislature supports the state trauma system.

The Trauma System Plan Advisory Council (TSPAC) member's terms expired in June 2011. As a result of recent litigation no new appointments were made and the activities associated with TSPAC were suspended. Although Florida has comprehensive and very prescriptive statutes regarding the apportionment of trauma centers, the litigation resulted from an allegation that the state did not revise Rule 64J-2.010, "Apportionment of Trauma Centers within a Trauma Service Area (TSA)" to ensure alignment with the most recent statute and to be consistent with the State Trauma System Plan. Florida Administrative Code Chapter 64J-2 contains the rules promulgated and is based on the authority in Chapter 395, Part II of the Florida Statutes. These rules govern the processes used in the operation of the Florida state trauma system.

The DOH desires that planning and decision making regarding the trauma system remain open and transparent as it carries out its mission. For that purpose, it is essential that a system policy advisory group composed of the trauma system stakeholders be established and remain involved.

Florida has an excellent reputation of collaboration among those interested in reducing the state's mortality and morbidity. Collaboration among the stakeholders must remain a priority to continue improving the care of trauma patients. A small group of stakeholders should be appointed and charged with assisting the state to analyze all existing statutes and regulations pertaining to the trauma system, and include the following:

- methodology for needs assessment,
- process for trauma center designation based on system needs, and
- control of the patient flow.

This group is encouraged to review trauma statutes from other states and to achieve consensus on the necessary statutory or administrative code changes.

Section 395.404(1), Florida statutes, states that "Each trauma center shall furnish, and, upon request of the Department, all acute care hospitals shall furnish for the department review trauma registry data as prescribed by rule of the department for the purpose of monitoring patient outcome and ensuring compliance with the standards of approval." Currently, no rule exists to ensure compliance with this statute. In order to obtain an accurate picture of the effectiveness of the trauma system, data must be available from all licensed hospitals in the state.

BEMO is to be commended for implementing the Emergency Medical Services Tracking and Reporting System (EMSTARS) data system. Unfortunately participation is voluntary with only approximately 50% of the EMS agencies contributing data at the time of the TSC visit. The DOH should adopt rules to require that all EMS agencies and providers participate in EMSTARS and to enter data for each patient encounter. Prehospital data are essential for planning the trauma system and a valuable tool for improving outcomes among the state's residents and visitors who require emergent care.

The state supports EMS protocols, but they are driven by the local EMS agencies. While this has some benefit, the challenge is that no statewide baseline has been established to standardize the prehospital care being provided. The DOH should adopt rules to require a statewide set of EMS protocols that set the minimum standard of care for all licensed EMS agencies. Rules could allow flexibility at the local level to exceed the minimum standard when appropriate. One benefit could be a potential reduction in error rates by EMS personnel because of changing employment between EMS agencies and not being totally familiar with the local system-specific protocols.

In addition to trauma, patients with other time-sensitive disease events such as stroke and ST-Elevation Myocardial Infarction (STEMI) need to arrive at the appropriate facility that can provide optimal care in the most expeditious and efficient manner. Destination protocols need to be established statewide for EMS personnel to accomplish this. Again, this will require rule development to establish destination protocols for trauma and other specific time-sensitive conditions on a regional basis.

Recommendations

- **Convene a small <u>multidisciplinary</u> work group to analyze all existing statutes and regulations pertaining to the trauma system, including, methodology for needs assessment, process for trauma center designation based on system needs, and control of patient flow (field triage criteria/destination protocols).**
    - **Review legislation from other states**
    - **Achieve consensus on the necessary statutory or administrative code changes**

- Develop a rule for statute 395.404 requiring all licensed hospitals to submit a minimum set of data elements to the state trauma registry. Implement and enforce the rule.

- Establish a rule requiring all licensed EMS agencies and providers to submit data to the Emergency Medical Services Tracking and Reporting System on each patient encounter.

- Establish a rule requiring the development and use of minimum statewide clinical protocols for each licensed EMS agency.
    - Allow for regional rather than local EMS agency variability.

- Develop a rule to require model statewide time-sensitive disease destination protocol templates to establish a minimum standard of care for licensed EMS agencies.
    - Require participation of local EMS, trauma centers, non-trauma center hospitals, and county governments in the local response area in the development of regional protocols consistent with the statewide templates.

- Enact and enforce rules consistent with statutory authority.

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, multiagency advisory committee, regularly review system performance reports. **(B-206)**

IV. The lead agency informs and educates state, regional, and local, constituencies and policy makers to foster collaboration and cooperation for system enhancement and injury control. **(B-207)**

Current Status

The DOH is the lead agency for the trauma system in Florida, and responsibility for the trauma program is assigned to the BEMO in the Division of Emergency Preparedness and Community Support. Prior to a recent reorganization within the DOH, the Trauma Program was referred to as the Trauma Office. The Injury Prevention Program was also placed within the BEMO during the reorganization. At the time of the site visit, the Trauma Program was managed by an interim director.

The Trauma Program is supported by:

- A Trauma System Leadership Team consisting of the BEMO/Trauma Program leadership team, Trauma System support staff, BEMO and DOH internal leadership partners.
- A State Trauma Medical Director who is the current chairperson of the Florida chapter Committee on Trauma (COT). This unpaid consultant position (some travel expenses are reimbursed) is traditionally filled by the Florida COT Chair. This position provides trauma surgeons with a prominent voice in the state's trauma program and trauma system.
- The Trauma System Plan Advisory Council (TSPAC) formerly consisted of a large group of stakeholders. The TSPAC is currently suspended pending the resolution of the legal challenges regarding the trauma system. The majority of stakeholder input appears to occur through TSPAC, and suspension of its meetings limits the participation of stakeholders.
- The Florida Committee on Trauma is the state chapter of the American College of Surgeons Committee on Trauma (ACS-COT). This group continues to provide consultation to the DOH and Trauma Program during the suspension of the TSPAC, usually through the State Trauma Medical Director.
- Several planning teams involving stakeholders are in place. These provide opportunity to coordinate with other state and local agencies, the health care community, and professional organizations.

The system leadership currently faces several challenges in addition to the litigation. The suspension of the broadly-based advisory council deprives the majority of stakeholders with an opportunity to provide input to the trauma system leadership in an orderly manner. The Florida COT has assumed the role of advisory council. However, it is not able to truly function as a balanced policy advisory group due to the limitations in voting membership, the preponderance of representation from historical trauma centers and their staff, and the size of the overall body. The Florida COT has an important ongoing mission in the planning and operation of the trauma system.

Given the complex and contentious issues facing the trauma system, a permanent advisory council that is accepted as both balanced and representative of all stakeholders is essential to permit various groups to voice concerns, provide input, and foster renewed collaboration. A vital function of this advisory council would be to create a unifying vision that all stakeholders can support and provide the guiding principles for trauma system operations and future trauma system development. This advisory council could also serve as a mechanism by which to unify the parties regarding systemwide goals, create buy-in, and drive policy and rule-making. An early charge to this group would be to develop broadly accepted, data-driven guidelines for the allocation of trauma centers in the state. Representation from non-trauma center hospitals on the advisory council is essential since many trauma patients are managed in these facilities. To avoid making this advisory group's membership too large and unwieldy, voting membership should be limited to 25 or fewer. Subcommittees or work groups should be formed involving additional stakeholders to address specific tasks (e.g., performance improvement, data management, statewide protocols).

Recommendations

- **Appoint a new Florida Trauma System Advisory Council (FTSAC) to provide input to policy development for the trauma system.**
    - **Include both trauma center and non-participating hospitals.**
- Assign critical roles to the FTSAC to include the following:
    - Develop a vision for the trauma system that is supported by a large majority of stakeholders.
    - Develop criteria for determining the location and level of additional trauma centers.
    - Provide ongoing oversight of the trauma system.
    - Advise the Department of Health, Surgeon General, and director of the trauma program regarding important policies regarding trauma system development and operations.

- Establish appropriate committees of the FTSAC to support key development and policy activities, such as data, performance improvement, and statewide trauma destination protocols.

- Hire a Trauma Program director with clinical expertise in trauma.

Coalition 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

Florida has a long history of engaging individuals and organizations in the development of its trauma system. Numerous organizations and groups were listed as participants in

the most recently published *Trauma System Strategic Plan*. Stakeholders are multidisciplinary, representing trauma surgeons, trauma centers, trauma program managers, emergency nurses; prehospital providers, educators, medical directors, and EMS agencies; air medical personnel; and brain injury and spinal injury rehabilitation professionals. One identified weakness with regard to stakeholder representation is the lack of participants from non-trauma hospitals that do care for injured patients in their communities. However, the state hospital association was represented and presumably advocated for the non-trauma hospitals. While stakeholders are multidisciplinary, the perception of the TSC team is that trauma surgeons are the dominant influential group of stakeholders, potentially to the detriment of overall trauma system planning.

Prior advisory councils convened for the development of the trauma system have had numerous members, and these members have often participated on work groups to address specific trauma system issues. A similar process and evidence of extensive stakeholder involvement exists for the injury prevention program.

Many trauma surgeon stakeholder participants for the TSC visit were those with long term experience in their trauma centers. When asked how they were preparing the future leaders of the trauma system, these stakeholders described efforts they were making to engage more recently trained trauma surgeons in trauma system planning. However, none of the more recently trained trauma surgeons were present during the visit to describe their opportunities for involvement in trauma system planning. The state trauma program should work to identify opportunities or specify certain membership requirements so that more recently trained trauma surgeons gain experience needed for future trauma system leadership roles.

Stakeholders are informed about trauma system developments through an electronic list and updates to the website. The legislature is informed about the trauma system through annual reports prepared by the DOH and stakeholder efforts (Florida COT) to educate elected officials. When asked, the participants did not identify any specific state legislative champions for the trauma program.

Recommendations

- Re-engage the broad multidisciplinary group of stakeholders in development of the trauma system planning and evaluation.
- Identify opportunities for more recently trained trauma surgeons to participate in trauma system planning and evaluation.
- Disseminate annual reports about the trauma system that can help inform the stakeholders, state population, and elected officials about the trauma system.
    - Develop fact sheets that can be shared with the public and elected officials based on information in the annual report.

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, multiagency advisory groups together to accomplish trauma system goals is essential in developing and maintaining the trauma system and is part of providing leadership to evolving and mature systems.

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

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

Optimal Elements

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

a. The legislative authority (statutes and regulations) plans, develops, implements, manages, and evaluates the trauma system and its component parts, including the identification of the lead agency and the designation of trauma facilities. **(I-201.1)**

b. The lead agency has adopted clearly defined trauma system standards (for example, facility standards, triage and transfer guidelines, and data collection standards) and has sufficient legal authority to ensure and enforce compliance. **(I-201.4)**.

II. Sufficient resources, including financial and infrastructure-related, support system planning, implementation, and maintenance. **(B-204)**

Current Status

The Florida DOH has the legislative authority to establish a strong infrastructure for overall planning and design of a comprehensive and inclusive statewide trauma system. The DOH role in the trauma system development is clear in state statutes, but authority to enforce the statutes does not exist. The process by which the agency integrates trauma care and quality improvement into all the hospitals and the EMS program should be better defined. For example, statewide standardized transport protocols are not required, and limited coordination of the trauma assets occurs.

The Trauma Program is currently led (in an interim capacity) by the manager of the Injury Prevention Program. The Division of Emergency Preparedness and Community Support (DEPCS) was recently reorganized, and recruitment has been initiated to fill vacancies, including the BEMO and trauma program director positions. Given the complexity of the tasks involved and the interface with a large cross-section of trauma providers, hiring a trauma program director with clinical experience would be optimal.

In addition to one full-time equivalent (FTE) trauma program director, an additional 6.0 FTEs support the trauma center verification, site survey, strategic planning, and statute and rule implementation activities for the trauma program. No information was provided about the ability of the trauma program to support the trauma service areas with the existing personnel. The data unit has an additional 2.66 FTEs dedicated to the trauma registry data collection analysis and reporting.

No individual was identified with expertise to support the performance improvement effort once the next generation trauma registry is operational. Such an individual will be important to support assessment of the trauma system and to help the regions identify specific issues for performance improvement. Similarly, no personnel were identified who could coordinate the trauma service areas and support their focus on issues such as transport protocols or performance improvement.

The trauma system currently has a designated physician who voluntarily provides medical oversight of the trauma system, the chairperson of the Florida COT. To ensure that sufficient time is allocated for system medical direction, the medical director position requires a commitment of .25 FTE through a funded contractual arrangement. Having a contract for this position invests the person with accountability to the DOH rather than the uncertain accountability associated with a voluntary position. Since it is unclear how the trauma system medical director's role interacts with the state EMS medical director, a job description should be established with clearly defined

deliverables for the trauma medical director position. This will prevent potential confusion and overlap in responsibilities.

Recommendations

- **Establish and fund a statewide performance improvement coordinator position to lead the development of a statewide performance improvement process.**

- **Contract for the state trauma medical director position and provide compensation for his/her time.**

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 *Florida Trauma System Strategic Plan* (January 2011-December 2015) has many good attributes, particularly around the nine goals, associated objectives and assigned responsibilities. Unfortunately, it does not address key issues currently facing the system. As an example, Goal 5 addresses the review and revision of trauma center standards but does not address a method for determining the location and level of any future trauma system expansion. An overarching plan to identify goals and objectives to address important trauma system development issues such as trauma center location and category, regional trauma system design, EMS field triage criteria and destination protocols, data needs, trauma fund distribution, and development and implementation of a performance improvement system is needed to guide and refocus the energy of the many dedicated trauma professionals across Florida.

One of the challenges facing the trauma system is the need for a truly representative body that can serve as an honest broker to complete such tasks as the revision of the trauma system plan. While the listing of more than 50 external, nine DOH, and nine national/federal partners in the current (2011-2015) plan is admirable, the responsibility for the revision of the plan needs to rest with the FTSAC as described in the leadership section. While the formal voting membership of the FTSAC will need input from a wide variety of stakeholders during the revision, the difficult decisions about key issues should be decided by the FTSAC and recommended to the DOH.

During the revision process, the *Model Trauma System Planning and Evaluation* document produced by HRSA's trauma program in 2006 should be carefully reviewed. The public health framework described in that resource should be applied to Florida's new trauma system plan. All aspects of the trauma system should be addressed. Within the three core functions of the public health model, objectives related to each of the following trauma system elements should be considered.

Core Function: Assessment

Assessing the Injury Problem
Assessing the System Resources, Infrastructure, Processes, and Performance
Benchmarks for the Assessment Phase

Core Function: Policy Development

Designation of a Lead Agency
Role of the Lead Agency in Policy Development
Enabling Legislation
State Trauma System Plan
Preparation for the Plan
Management Information System

Core Function: Assurance

Enforcement and Regulation
Patient Destination and Hospital Care
EMS Systems and Assurance
Training and Educating a Competent Workforce
Trauma System Evaluation and Performance Improvement

Floridians may best be served by the development of an overarching, high level vision of an ideal trauma system. This high level document could then be organized by the goals, objectives and strategies necessary to attain the vision over time. This latter document could be similar in form and function to the *Florida Trauma System Strategic Plan* (2011-2015). As one set of goals and objectives are met, they could be replaced by others each of which would contribute to movement toward the overall vision.

Additional considerations should include: resources for trauma system disaster planning, importance of the trauma system and trauma centers to disaster response, the financial framework for the trauma system, financial planning, and reporting the trauma system financial status.

Recommendations

- **Revise immediately the Florida trauma system plan to address key issues necessary for the further development of the regional and statewide trauma system.**
- Adopt the plan formally through a broad trauma stakeholders group, the Florida Trauma System Advisory Council, and the Department of Health.
- Define the objectives, measurements, timeline, and assigned responsibilities for full implementation of the trauma plan.
    - Initiate any regulatory/statutory changes immediately to avoid the *unnecessary* proliferation and associated costly duplication of services of high level trauma centers.
    - Ensure integration of related strategic plans (e.g., injury prevention, disaster preparedness, highway safety, EMS, and rehabilitation)

- Establish a regular schedule and process for the trauma system plan revision.
- Consider the possible need for two trauma system plans, one at a visionary level and the other at a more strategic level.

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

The *Trauma System Strategic Plan* for 2011-2015 was completed with broad stakeholder input. Integration with EMS and emergency and public health preparedness plans is evident and ongoing with active communication between agencies and representation on each other's committees and working groups. The recent DOH reorganization has the Division of Emergency Preparedness and Community Support which facilitates the integration of emergency preparedness, EMS, and the Trauma Program. Plans are underway to integrate the Trauma Program and the Injury Prevention Program. With support from the newly formed Health Information and Policy Analysis Program, data acquisition and sharing between all these programs should be greatly facilitated.

Integration with EMS occurs at many levels including planning, operations, evaluation, and performance improvement. Established routines include feedback provided to EMS regarding any patient admitted to the intensive care unit when performance improvement issues related to prehospital care are applicable. EMS conducts a variety of injury prevention and outreach activities, and these are coordinated with the Injury Prevention Program. Information about these activities is shared with the Trauma Program.

Florida has 19 TSAs. In a few TSAs, a local multidisciplinary operational unit, called a trauma agency, is in place which provides an opportunity for local collaboration among agencies involved in trauma care. In the locales where the trauma agencies exist, they seem to be providing a useful function. Florida also has 7 Regional Domestic Security Task Force Regions.

Integration with disaster planning is evident. The State Emergency Response Team (SERT) is composed of agency-appointed Emergency Coordination Officers (ECOs) and staff from state agencies, and representatives from volunteer and non-governmental organizations that operate under the direction and control of the Governor and State Coordinating Officer (SCO). The SERT is grouped into 18 Emergency Support Functions (ESFs) that carry out coordination and completion of response and recovery activities in the State Emergency Operation Center (SEOC) during an emergency or disaster. These ESFs are grouped by function rather than agency, with each ESF headed by a primary state agency and supported by additional state agencies. The trauma system is integrated into the Florida Incident Command System through ESF-8, the Health and Medical function.

Standards exist for trauma centers to have written policies and protocols to provide mental health services, child protective services, and emotional support to trauma patients and their families. Trauma centers are also required to provide community injury prevention programs.

Recommendations

- **Use the Regional Domestic Security Task Force Regions (RDSTFR) as the TSA regions.**
    - **Develop a strong regional structure based on the 7 RDSTFR that enables the integration of trauma centers with EMS, disaster preparedness, and other regional activities.**
- Complete the integration of the Trauma Program and the Injury Prevention Program.

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

Florida is fortunate to have several funding sources to support the trauma program. A fund of two million dollars is generated through a 10 cent vehicle registration tax and used for operation and management of the Trauma Program. Revenue generated through red light camera fines is distributed to all trauma centers in the state and in 2012 totaled $12.6 million. Disbursement is based on a statutory formula that addresses patient volume and acuity.

Federal funding received through the Assistant Secretary of Preparedness and Response (ASPR) has provided $46 million to support hospital preparedness efforts to 22 trauma centers and 19 non-trauma centers over the last 10 years. Additional revenue to support the trauma system is generated through school bus violation fines, speeding citations in certain counties on interstate I-95, and limited support through the Florida Office of Rural Health.

The federal funding sources may only provide short term assistance as they are primarily from federal grant programs, but they are beneficial until more sustainable state resources become available. The Trauma Program needs to continue to seek and maximize available resources that can be used to support and sustain the trauma system. The Trauma Program may also want to consider seeking available private foundation funding to support its goals and objectives.

The Trauma Program currently does not have a statewide performance improvement program. It is essential that funding be identified or redirected to support a statewide performance improvement program that includes the participation of all trauma centers and all EMS agencies. Likewise, data submission in the state trauma registry is essential for all trauma-designated and non-designated hospitals. All EMS agencies should submit data to the EMSTARS.

As the needs of the Trauma Program and trauma system change, the Trauma Program should consider revising the statutes and rules governing the trauma fund to ensure that designated trauma centers receive level-appropriate support for the “cost of readiness”. In addition, distribution of funds should focus on the deliverables established by the Trauma Program rather than volume and acuity exclusively.

Trauma rehabilitation is an area the trauma system needs to assess to determine if the current system is meeting the needs of all trauma patients with severe injuries. It is important for the DOH to be creative in determining ways to support trauma

rehabilitation services. Consider promulgating rules to allow or require trauma centers to use funding to possibly buy beds in rehabilitation centers.

Recommendations

- **Revise the distribution method of the trauma center fund.**
    - **Change the statutes and rules governing the fund to ensure that designated trauma centers receive level-appropriate support for the "cost of readiness".**
    - **Develop a formula for distribution of funds that focuses on specific deliverables by trauma center level rather than volume and acuity.**
    - **Include a mechanism to support trauma rehabilitation services (e.g., establish in rule and/or direct trauma centers to use some of their funds to "buy" beds in rehabilitation centers).**
    - **Revisit the allocation method/ formula on a regular basis (every 3-5 years)**
- Assess the funding needs of the trauma system and determine if existing financial resources are sufficient to meet its needs (e.g. for regional support).
- Identify and provide sustainable funding to support a statewide performance improvement system.
- Identify and provide sustainable funding to enhance data sources to support clinical and business decisions of the trauma system.

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 system-wide. 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
• 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 Florida Trauma Program appears to be actively involved with injury prevention efforts in collaboration with the state's Injury Prevention Program. Although the Trauma Program does not have dedicated personnel to support injury prevention efforts by trauma centers, the Trauma Program compiles lists of injury prevention-related programs conducted by trauma centers and publishes the list on the program's website. The list serves as a great resource for the other hospitals, EMS agencies, and other organizations. Several of these injury prevention programs are evidence-based, such as the "WalkSafe", "Prom-Night" and "Shattered Dreams." Numerous other injury prevention resources are also available on the Injury Prevention Program's website. Some of the state injury prevention activities, conducted in collaboration with various organizational partners include: bike safety, drowning prevention, senior falls prevention, the Safe Kids program, and the special needs car seat program.

The state EMS program surveyed EMS providers to assess their involvement in injury prevention and outreach education activities. The survey results indicated that 25-35% of EMS providers were involved in injury prevention programs such as promoting "Prom-Night" and a motorcycle safety program. The state EMS program also administers the federally-funded EMS for Children program. Many injury prevention activities directed toward children are funded and administered through this program with resources available to hospitals and EMS providers. The state EMS Advisory Council is also active in injury prevention, provider safety, and pubic information efforts. It administers the Public Information and Education and Relations program, developed by the National Highway Traffic Safety Administration (NHTSA).

The recent integration of the Trauma Program and Injury Prevention Program will provide an opportunity for better coordination and integrated planning with injury prevention goals and strategies. Both programs have injury-related data that can be used to generate reports, focus injury prevention efforts, and educate the providers and the public. The new program integration may also provide opportunities for better collaboration at the state level with external partners like the Governor's Highway Safety Program and community organizations. EMS injury prevention goals and activities should also be included during efforts to collaborate with the Governor's Highway Safety Program strategic planning.

Outreach

Trauma centers must offer educational opportunities to referring facilities and EMS agencies as a requirement of their designation. As an example, one facility provides disaster management education, training on chest tube insertion, EMS case reviews, and EMS continuing education. They also teach the Trauma Nurse Core Curriculum (TNCC), Emergency Nursing Pediatric Course (ENPC), and other trauma related courses. The telemedicine system is used to deliver outreach education to rural healthcare providers. Another facility offers 4 hour continuing medical education (CME) trauma modules to EMS providers. They also provide monthly feedback to EMS transport agencies and invite them to attend trauma grand rounds.

At the state level, examples of outreach education activities include a Trauma Awareness Day and Legislative Day where the public, media and policymakers are educated about the state trauma system. These outreach efforts have been very successful and can serve as a model for other states. Another successful outreach education effort includes the provision of the ACS's Rural Trauma Team Development Course (RTTDC) supported with funding from the Office of Rural Health. This course encourages a team approach to the treatment and stabilization of trauma patients by rural facilities.

Recommendations

- Ensure integration of the state's Injury Prevention Program with both the Trauma Program and EMS programs to facilitate the coordination of DOH injury prevention with other community injury prevention activities.

- Ensure the integration of EMS and Trauma Program injury prevention goals into the Governor's Highway Safety Program strategic plans.

- Expand the telemedicine network and include educational outreach activities for all acute care facilities (including critical access hospitals) and EMS providers.

- Seek opportunities to participate in targeted media efforts to educate the public on trauma system development and injury prevention.

Emergency Medical Services

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 (p 20) (White Book).

Human Resources

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

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

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

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

Integration of EMS Within the Trauma System

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

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

Optimal Elements

I. The trauma system is supported by an EMS system that includes communications, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated. **(B-302)**

a. There is well-defined trauma system medical oversight integrating the specialty needs of the trauma system with the medical oversight for the overall EMS system. **(I-302.1)**

b. There is a clearly defined, cooperative, and ongoing relationship between the trauma specialty physician leaders (for example, trauma medical director within each trauma center) and the EMS system medical director. **(I-302.2)**

c. There is clear-cut legal authority and responsibility for the EMS system medical director, including the authority to adopt protocols, to implement a performance improvement system, to restrict the practice of prehospital care providers, and to generally ensure medical appropriateness of the EMS system. **(I-302.3)**

d. The trauma system medical director is actively involved with the development, implementation, and ongoing evaluation of system dispatch protocols to ensure they are congruent with the trauma system design. These protocols include, but are not limited to, which resources to dispatch, for example, ALS versus BLS, 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 Program is located within the BEMO, under the DEPCS, within the DOH. The EMS Program has the authority to license ambulance agencies, ambulances, and prehospital care providers, to perform ambulance inspections, and to approve EMS education programs. An EMS Advisory Council, supported by statute, provides input to

the BEMO. The EMS Advisory Council membership has a broad array of stakeholders, including a trauma surgeon. The work of this Council is supported by 11 committees that address a comprehensive range of topics relevant to EMS. The Council meets quarterly. Committee meetings may occur in association with Council meetings or at other times that are appropriate.

Florida has a 0.5 FTE EMS Medical Director, contracted by the state. This position is not based on statute. The EMS Medical Director is not authorized to determine or enforce EMS state policies, but serves in an advisory capacity. One of the EMS Medical Director's major roles is to act as a liaison to EMS agencies and prehospital providers at a local level. The EMS Medical Director interacts regularly with various professional organizations in the state, including the Florida EMS Medical Directors and the Florida COT. The EMS Medical Director also serves as the chairperson of the Emergency Medical Review Committee for the BEMO. This Committee reviews any concerns regarding EMS agency or prehospital provider performance.

The *Florida Regional Common EMS Protocols* manual was developed by a large group of individuals involved in the emergency treatment of patients. The state funded the printing of this manual in 2004. These protocols include the Trauma Transport Protocol (1.10). However, except for certain components of the Trauma Transport Protocol, none of these protocols are mandated by the state.

In order to be licensed by the state, EMS agencies are required to get a certificate of public need (COPN) from the county in which their service area exists. Each EMS agency is required to have a medical director who is responsible for the agency's medical protocols as well as the medical care delivered by that agency's EMS personnel. No statewide EMS medical oversight or statewide system of regional EMS medical oversight occurs. Some counties and cities have formed agencies that provide oversight or direction of EMS activities.

Florida is served by air medical services in 55 locations. Each air medical service is required to have a medical director. Each ground ambulance service enters into a specific contractual agreement with an air service for support. As with ground ambulance services, air ambulance agencies, air ambulances, and air ambulance personnel must be licensed by the state. No specific state mandated protocols address air-transport of the trauma patient. The air ambulance service is required to follow the trauma transport protocols (TTP) of the ambulance service to which it is responding. No regular evaluation or continuous quality improvement (CQI) of air medical transport is conducted by the EMS Office.

Discussion with the EMS Medical Director indicated that time-critical systems of care for stroke and STEMI are being considered within the state. It is not clear what steps are being taken to ensure that these systems are developed in a harmonious manner. It is also not clear how the current statewide trauma system is being considered in the development of statewide systems to treat other time-sensitive conditions.

NHTSA conducted an evaluation of the state's EMS system in 1993. In general, the report was laudatory and praised the state for its dedication and leadership in the

provision of high quality EMS services. Today, Florida is still seen as leader in EMS, particularly in EMS education. An extraordinary population growth has occurred in Florida over the last decade, along with great population diversity, and a staggering number of visitors. However, since 1993, no external assessment of the EMS system or other statewide needs assessment has been conducted. Such an evaluation and/or assessment would be invaluable for ensuring that Florida continues to provide high quality and cost-efficient EMS services to its population and visitors.

Recommendations

- **Collaborate with the Florida Department of Transportation Governor's Highway Safety Program to initiate and conduct a National Highway Traffic Safety Administration EMS System Reassessment.**

- Review the membership of the EMS Advisory Council and its committees to ensure an appropriate representation of trauma surgeons and trauma program managers.

- Ensure that all state systems developed for response to time-critical diagnoses (currently trauma, stroke, STEMI) are integrated, efficient, and cost effective (not duplicative).
    - Implement, with consensus of the stakeholders, standardized statewide triage destination guidelines/protocols for time-critical diagnoses.

    - Develop a mechanism for the establishment and integration of additional time-critical diagnoses into the EMS system as they may emerge.

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 de-designation.

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 non-designated 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 levels 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

Florida has been a leader in the development of trauma systems since the 1980's. A fairly comprehensive needs assessment was conducted, leading to the establishment of a regional infrastructure by the early 1990s. This plan, established in statute, included the definition of 19 TSAs and standards for the number and location of trauma centers. The TSAs are scaled to the level of individual counties or small groups of counties, and decisions were based on geography, traditional patient flow, and population. The plan called for at least one trauma center (Level I or Level II) in each TSA, plus a variable number of additional trauma centers apportioned largely on the basis of population. The apportionment plan established a ceiling of 44 trauma centers without clear justification for this number. The Florida statute was amended shortly after 2000 to require a comprehensive needs assessment, which was completed in 2005. The statute set specific parameters to be considered in the allocation of trauma centers and required a yearly needs assessment. No needs assessments have been conducted as required by statute, and no changes to the apportionment plan have occurred.

In the period between 2005 and 2010 the Trauma Program received a small number of requests for new trauma center designations. All were in areas of need, both as identified in the apportionment plan and in the perception of the trauma community. These requests were granted without opposition. In the 2011 application cycle, four new requests for provisional trauma center status were granted, all to hospitals operated by a single corporation. These requests were consistent with the existing 1990 apportionment plan, but existing trauma centers did not believe that all new trauma center designations were truly in areas of need. A group of existing trauma centers challenged the apportionment rule in court, and the rule was ruled invalid in late 2011 by an administrative law judge. This ruling was appealed by the DOH, but it was subsequently upheld by the district court of appeals in late 2012. During the course of the appeal, the DOH continued to follow existing statutory processes regarding provisional and permanent designation. As of December 2012, the DOH advised the trauma community that any new applications for provisional designation could not be approved. Two provisional trauma centers were granted verified status in early February of 2013.

A highly contentious atmosphere continues to generate legal challenges between hospital systems and animosity among providers related to the following:

- The sharp increase in interest in trauma center designation, especially among hospitals that are members of a single highly integrated hospital network,
- Differences in opinion about the need for these trauma centers and their impact on existing trauma centers, and
- The inconsistencies between Florida's statutes and rules

In the wake of this conflict, all stakeholder advisory committees have been suspended and all trauma-related strategic planning is on hold. Trauma system development and any efforts at a negotiated solution have come to a halt.

The Florida statute declares that the trauma system will be based upon an inclusive model, but operationally this is not the case. On a day-to-day basis, the trauma system functions as a loose aggregation of trauma centers, with little cooperation between trauma centers and almost no central coordination of EMS or trauma center activity. Trauma system operations, governance, and advisory leadership do not fully embrace the true essence of an inclusive system, and operate under the assumptions of an older exclusive model.

This trauma system has had substantial success, especially in urban areas with close proximity to large established trauma centers. In these urban areas, overall system mortality and system access parameters are above national averages. Some areas of the state are still less well served. According to simple geographic analysis and hospital discharge data analyzed for the DOH, opportunity exists to further refine the trauma system. The data regarding patient access and need for additional trauma centers has been extensively reviewed. Diametrically different conclusions have been reached by the opposing factions and even by the same authors at different points in time. Attempts by the DOH to gain consensus for changes in the apportionment rules have been ongoing since about 2005, but the efforts have failed to produce any new rules.

Data from the American Hospital Association reveals that Florida has 208 acute care hospitals with emergency departments. Of these 13 are critical access hospitals.

At the time of the TSC visit, Florida had 24 verified trauma centers and 4 provisionally designated trauma centers in operation, including the 2 new verified designations announced in February, 2013. Florida had 8 Level I trauma centers, 11 Level II trauma centers, 3 Level II and pediatric trauma centers, one joint pediatric center, and one stand-alone pediatric center.

Of the non-designated hospitals, 108 meet minimal state standards for EMS to deliver injured patients, leaving approximately 80 hospitals entirely outside the trauma system. The ratio of 28 designated trauma centers to 108 hospitals eligible to receive injured patients by EMS is more consistent with an exclusive trauma system model. The trauma center coverage mapping website from the University of Pennsylvania (www.traumamaps.org) reports that 89% of the land area and 98% of the population of Florida are within 1 hour of a Level I or Level II trauma center, compared to 35% of land area and 90% of population for the nation as a whole. Data supplied by the DOH estimates that Florida's population in 2011 as slightly over 19 million. Including provisional centers, this yields a ratio of 1.47 Level I or Level II trauma centers per million people on an aggregate basis. Review of specific metropolitan areas yields ratios as follows:

- 4.4 trauma centers per million in the Pensacola area,
- 2.7 trauma centers per million in the Tallahassee area,

- 1.8 trauma centers per million in the Tampa region,
- 1.4 trauma centers per million in South Florida and
- 1.4 trauma centers per million in the Orlando area.

These population ratios are roughly in the middle of national ratios, which range from about 0.3 to 6.6 trauma centers per million people.

The Trauma Program has a well-defined process for application, provisional designation, and verification of trauma centers at either Level I or Level II, including provisions that the designation of new trauma centers be based upon system need as well as facility capacity. System need has not been fully re-assessed since 1990, and the updated assessment in 2005 did not touch on all areas. As a result, significant disagreement has occurred over areas of need and the appropriateness of new provisional designations approved under the 1990 structure. To be provisionally designated, a hospital must submit a letter of intent to the DOH. If the hospital matches a “slot” identified in the 1990 plan, it is allowed to complete an application. The application is reviewed, and if found acceptable, the hospital is opened for treatment of trauma patients and local EMS transport protocols are adjusted. No on-site verification of capacity is required prior to allowing the facility to treat trauma patients. Verification is then granted after successful review approximately one year later.

The period for re-verification is set at 7 years, the longest interval for re-verification specified for any state in the nation. The standards for Level I and Level II trauma centers are roughly based on standards promulgated by the ACS-COT Trauma Center Verification program circa 1990, though the Florida standards are less comprehensive. The ACS-COT standards have been extensively reviewed and updated in the intervening years, while the Florida standards have not been revised.

Florida has no provisions for designation of trauma centers below Level II and no requirements for other hospitals that want to participate in the trauma system. Some EMS agencies have established minimal services that a hospital must have in order to receive injured patients from the field. No uniformity of these minimal hospital services exists, as some EMS service areas allow the transporting EMS providers to over-ride trauma transport protocols based upon their judgment. Statute authorizes the DOH to collect a minimum data set for all injured patients from all acute care hospitals, but no rule has been established for this statute, so data submission does not occur. The Trauma Program should establish the standards for all hospitals participating in the trauma system, including submission of data. Additionally the Trauma Program should consider whether development of Level III and Level IV trauma centers would be of benefit to the trauma system.

Florida was among the first states to require a needs analysis prior to trauma center designation, and the state established a comprehensive set of parameters upon which to make that judgment. However, the Trauma Program has not been able to keep pace with the needs assessment process required by statute. As a result, the process for trauma center designation has been based on an outdated model that no longer reflects the trauma system status or stakeholder perception. This mismatch in vision is

combined with a funding scheme that intensifies competition between trauma centers for patient volume. It has additionally caused the recent interest in new trauma center development to be highly contentious, and it is viewed as threatening to existing trauma centers. Intense disagreement about areas needing trauma centers has paralyzed the trauma system and disrupted cooperation between trauma centers.

Although Florida statute correctly identifies the attributes of an inclusive and integrated trauma system, the present system structure is that of an exclusive trauma system, with only Level I and Level II trauma centers having identified standards and data submission requirements. As noted above, the designation of new trauma centers is viewed as a threat to existing centers, when ideally these new centers could allow for better matching of patients to hospitals with appropriate capabilities. Rather than creating a threat to current trauma centers, the development of a true regional network of facilities with known capability will improve availability and efficiency of care to injured patients. Matching patients to the lowest level trauma center able to provide necessary care will ultimately optimize trauma system efficiency. It will decrease utilization of EMS resources and prevent the overload of higher level trauma centers resulting from the transfer of patients with minor injuries. Florida should realign its focus to facilitate a statutorily required goal of providing the most cost-efficient trauma care possible.

Recommendations

- **Conduct an assessment of the current trauma system, including the parameters outlined in Florida statute 395.402, to inform decisions regarding the location and level of new trauma center designations.**

- **Establish a transparent and broadly-accepted process for future provisional trauma center designation based upon both capacity and trauma system need.**
    - **Work with stakeholder advisory groups to establish criteria for need.**
    - **Utilize findings from a newly conducted need assessment.**
- **Establish a transparent, broadly accepted process for initial full designation and ongoing re-designation based upon system participation, center performance, and participation in quality improvement programs.**
    - **Work with Florida Trauma System Advisory Committee (FTSAC) to establish criteria for initial and ongoing trauma center designation.**
- **Impose a moratorium on any new provisional or full trauma center designation until these new processes are in place.**
- **Require that all acute care facilities participate in the inclusive and integrated trauma system as a condition of licensure.**
    - **Designate each acute care facility at an appropriate level, either as a trauma center or a participating facility.**

- **Require all facilities to submit at least a minimal set of data on every injured patient to the state registry.**

- Revise current criteria for Level I and Level II trauma centers to reflect current national standards.
- Establish minimal standards and a minimal trauma dataset for hospitals participating in the trauma system that are not trauma centers.
- Consider the establishment of Level III and potentially Level IV trauma center designation status to more accurately reflect the capacity of designated facilities.
- Shorten the period of trauma center verification from 7 years to 3-5 years.
- Consider adoption of an external process, such as that provided by the American College of Surgeons, for trauma center verification to reduce the workload on Trauma Program personnel.
- Strengthen requirements for initial provisional trauma center designation to include on-site verification of institutional capacity and commitment.

System Coordination and Patient Flow

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 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

Components of Florida's trauma transport protocols (TTPs) are described in rules Chapter 64J-2. The rules cover both adult and pediatric trauma patients. The rules state that TTPs will use the Adult Trauma Scorecard Methodology and the Pediatric Trauma

Scorecard Methodology to establish “trauma alert” patients -- patients who will be transported to a trauma center. Florida does not use Centers for Disease Control (CDC) Trauma Field Triage Guidelines. The rule does not address interfacility transport or the use of air medical services.

The *Florida Regional Common EMS Protocols* manual includes the Trauma Transport Protocol (1.10) that uses the Adult and Pediatric Trauma Scorecard Methodologies. The protocol includes a brief section on interfacility transport as well as a section on helicopter transport procedures. The use of the protocols listed in the manual is not mandated by the state. Each EMS agency must develop a TTP, have it approved by the EMS agency’s medical director and submit it to BEMO for review and approval. Some stakeholders expressed concern that often the TTPs are developed and submitted to BEMO without any input from the regional trauma centers. BEMO has no process to determine if the TTPs were developed with appropriate input from regional trauma centers and non-trauma center hospitals or if appropriate harmonization among TTPs for different EMS agencies has occurred within a specific trauma region.

No specific state mandated protocols address air medical transport of the trauma patient. Each EMS agency enters into a specific agreement with an air medical agency. That air medical service is required to follow the TTP of the EMS agency to which they are responding. No regular evaluation or performance improvement of rotor-wing trauma transport is conducted by BEMO or the Trauma Program.

Interfacility trauma transfer agreements are arranged independently between hospitals. The sending physician is responsible for arranging the transfer. No centralized real-time electronic information system or centralized communication center provides EMS providers or physicians with information regarding the availability of medical resources at various trauma centers or of the availability and location of EMS resources that could be of assistance with transport. Participants at the TSC meeting stated that, in general, they have little trouble transferring patients from a lower level facility to a higher level facility in a timely fashion. However, no representatives from non-trauma center hospitals were present.

Reports prepared by various academic trauma centers over the last several years using hospital discharge data found that a substantial number of trauma patients, who should go to a trauma center are not being transferred. This would suggest that the current TTP process in Florida is not optimal. Neither the state Trauma Program nor EMS Program regularly identifies the following through a performance improvement process:

- The frequency of EMS providers not complying with TTPs,
- The factors associated with episodes of non-compliance, and
- The outcomes of patients associated with episodes of non-compliance.

From a hospital perspective, the Trauma Program does not regularly determine the frequency of inappropriate decisions made by non-trauma center hospitals to transfer or not transfer patients to a trauma center, the reasons behind those decisions, or the outcomes associated with those patients. The state trauma system also does not

regularly evaluate the timeliness of interfacility trauma transfers, and its relationship to patient outcomes.

Additionally, the Trauma Program does not conduct performance improvement to determine if the appropriate application of the TTPs adequately identifies patients who need to go to trauma centers. Such information is needed to identify strategies to improve compliance with TTPs and the performance of appropriate and timely interfacility transport.

Recommendations

- **Evaluate the content, implementation, and method of enforcement of the trauma transport protocols (TTPs) to assure uniformity and efficiency of patient flow both within trauma regions as well as statewide.**
    - Engage the EMS and Trauma programs, the Florida Trauma System Advisory Council and the EMS Advisory Council.
    - Implement and adhere to the current Centers for Disease Control Trauma Field Triage Criteria.

- **Task the Trauma Program with annual reporting on trauma center and non-trauma center destination and patient outcomes (initial destination and transfer).**
    - **Correct identified deficiencies in trauma system coordination and patient flow using structured performance improvement processes identified by the Trauma Program.**

- Produce an annual report that evaluates the current status of air medical transport of trauma patients for both scene response and interfacility transport.

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 on 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

Florida has at least 38 in-patient rehabilitation facilities that are accredited by the Commission on Accreditation of Rehabilitation Centers (CARF). Of these, 29 are state-designated inpatient rehabilitation facilities that specifically meet the needs for adult and pediatric patients with traumatic brain injury (TBI) and spinal cord injury (SCI). The majority of adult trauma centers have a rehabilitation facility within each geographic catchment area; however, the Panhandle area has more limited access to rehabilitation centers. The pediatric rehabilitation facilities are geographically situated to cover the North (Jacksonville), Central (Tampa), and South (Miami) areas of the state.

The rehabilitation community appears to be well integrated with the trauma system, and it is adequately represented in committees at multiple levels. The Brain and Spinal Cord Injury Program (BSCIP) has responsibility for overseeing the programs that specialize in the care of TBI and SCI populations. Although an inventory of rehabilitation facilities specializing in the care of TBI and SCI patients exists, no such comprehensive inventory of all rehabilitation facilities for care of other injured patients was reported. Therefore, the total number of rehabilitation beds for injured patients in Florida is not available. No waiting list for in-patient rehabilitation beds is currently being maintained. An estimated 33% to 50% of TBI patients are admitted to rehabilitation facilities specialized in TBI care. Insurance status was reported as the major determinant of the rehabilitation center/program to which patients are transferred. Participants also expressed concerns that older adults may have sub-optimal access and delivery of rehabilitation services.

Florida has a strong emphasis on TBI and SCI within the rehabilitation community, and these prominent programs have a committed constituency. Significant program successes include the following:

- The immediate reporting of TBI and SCI in-patients to the BSCIP registry,
- Referral of TBI and SCI patients to a regional case manager who begins providing an innovative process of care,
- An experimental and innovative program for surgical implantation of diaphragmatic pacers for SCI patients who are unable to wean from mechanical ventilation (many have been subsequently weaned from ventilation), and
- A well-funded trust fund to help pay for TBI and SCI patient services.

Recommendations

- Maintain and regularly update a comprehensive inventory of licensed rehabilitation centers and beds available to treat trauma patients.

- Evaluate the access to and delivery of rehabilitation services for the geriatric trauma population on a regional basis. Repeat every 3-5 years.
- Evaluate the access to and delivery of rehabilitation services to uninsured patients.

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

As a result of 9/11 and the devastation from multiple hurricanes, Florida has developed impressive health and medical response plans and amassed caches of medical assets. With stakeholder support, the DOH has developed a mass casualty incident (MCI) plan and surge capacity plan. The DOH, EMS, hospitals, and the community have regularly exercised these plans, generated after-action reports, and acted upon some of the recommendations. An example of their efforts was the Tempest Guards exercise where hospitals were found to need increased security and decontamination procedures.

The DEPCS administers the Public Health Emergency Preparedness (PHEP) and ASPR funding to support various public health and healthcare provider disaster planning and response. Over the past 10 years, $46 million have been provided to trauma centers from the ASPR grant to build response capabilities for burn and surge capacity planning, exercises, training, and equipment. This grant funding has also

supported the development of six state medical teams and mobile medical assets including 3 Gateway shelter systems.

Florida is also in the process of implementing a disaster management system (e.g., EMResource and HavBed) that includes healthcare resources and patient tracking. However, the disaster management system is not yet inclusive of all healthcare providers (EMS, dispatch, hospitals) statewide. The Trauma Program should investigate the application of these resources for monitoring patient flow and coordination on a regional and statewide basis.

Florida has developed a wonderful model for telemedicine called Florida Emergency Trauma Telemedicine Network (FETTN) and SPARROWnet. The telemedicine system provides urgent consultation and educational capabilities, and it was used to provide care following the Haiti earthquake disaster. The first state activation occurred as tropical storm Isaac approached the Florida coast. The successful activation of the telemedicine system demonstrated the benefit of the state's ability to enhance communications for state health, trauma, and healthcare systems. Future expansion of the FETTN system should include the integration of more trauma centers and participating trauma hospitals, as well as developing protocols for use of the system.

Through the ASPR grant, the DEPCS is working to establish healthcare coalitions. These coalitions should include all healthcare providers: EMS, dispatch, hospitals, trauma centers, burn centers, nursing homes, emergency management, local public health, and public safety. Seven Regional Domestic Security Task Force Regions (RDSTFR) were created after 9/11 with Homeland Security funding. These regions offer a natural structure for the further development of healthcare coalitions, TSAs, and EMS regions. The healthcare coalitions, along with a state Medical Advisory Committee, can form the infrastructure to support development of crisis standards of care guidelines for hospitals and EMS. Bringing trauma stakeholders together to participate in this process may help launch, and provide a focus for, regional trauma system planning.

EMS agencies and the state fire chiefs have also been active in statewide disaster planning efforts. The DOH has developed an ambulance deployment plan which is well integrated with the State Fire Emergency Response Team plans.

The state EMS and Trauma Program staff members are trained in the National Incident Management System (NIMS) and the Incident Command Structure. They have taken numerous courses to support the ESF 8 leadership role for the DOH in the event of a disaster. The BEMO staff members have response roles and responsibilities in the event of a disaster and serve at the SEOC on the SERT.

Florida has developed a communications system that is both redundant and provides interoperability. This communications capability includes – operation radar and mobile field communication teams with trailer assets that can establish voice communications.

Recommendations

- **Develop the healthcare coalitions and align with the seven Regional Domestic Security Task Force Regions.**
  - **Ensure that the disaster medical response plans are integrated through regional planning between members of the healthcare coalition (hospitals, EMS, fire, public health, dispatch, emergency management and law enforcement).**

- Seek additional funding for further development and implementation of the Florida Emergency Trauma Telemedicine Network (FETTN) and SPARROWnet systems to support disaster response.

- Establish a state medical advisory council, including the state EMS and trauma medical directors, to develop crisis standards of care guidelines.

- Seek funding for further development of the real-time resources such as the EMresource and HAvBED systems for disaster resource management and patient tracking.

  - Include all acute care hospitals, EMS agencies, and dispatch agencies.

System-wide Evaluation and Quality Assurance

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

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

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

Optimal Elements

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

a. The lead trauma authority ensures that each member hospital of the trauma system collects and uses patient data, as well as provider data, to assess system performance and to improve quality of care. Assessment data are routinely submitted to the lead trauma authority. **(I-301.1)**

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

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

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

Current Status

A review of the *Florida Trauma Registry Report*, the *State Trauma System Annual Report*, *Trauma Service Area Analysis Report*, and the *Modes of Transportation Report*, revealed that the Trauma Program has done an excellent job in compiling the available trauma registry data to provide a framework for trauma system evaluation. However, the data analysis has some limitations because Florida does not currently collect trauma data from all hospitals and all EMS providers. As a result, a comprehensive and accurate picture of patient flow and appropriate patient destination (including over- and under-triage) is not possible. Ultimately, the trauma system data analysis should make it possible to determine if the right patient gets to the right facility at the right time.

Even with limitations in data quality and completeness, the *Annual Report of Florida Trauma System Performance* was published. This report applied the Trauma Quality Improvement Program (TQIP) methodology, which is an assessment of trauma center performance as a ratio of expected outcome. It was determined that many trauma centers were operating within expectations. All trauma centers should be encouraged to use the TQIP process for facility PI. TSC participants expressed strong support for using TQIP for trauma center performance improvement, and then using this methodology as a platform for state trauma system evaluation. The Trauma Program is investigating the addition of TQIP data elements into the next generation Florida Trauma Registry.

The Trauma Program does not currently have an active trauma system advisory council or a multidisciplinary PI committee to provide oversight for management of a state PI process. Even though the PI, trauma registry, and research planning teams continue to meet, the agendas reflect a focus on the next generation trauma registry, data dictionary updates, injury prevention activities, and the timeliness of data submission.

However, some prior systemwide PI efforts led to changes in protocols for tourniquets, burn care, TBI care, and rural trauma care.

Florida has not developed a regional infrastructure to implement and support PI activities for an inclusive trauma system. Additionally, a state PI plan has not yet been developed to provide strategic guidance to evaluate issues affecting the trauma system, including defined processes and measures.

Recommendations

- **Reactivate the state Performance Improvement Committee as a subcommittee of the Florida Trauma System Advisory Council (FTSAC) to develop a statewide performance improvement (PI) plan.**
    - **Ensure that the PI plan outlines the PI process at the provider, regional, and state levels and includes process, structure and outcome measures.**
    - **Review PI plan templates from other states to guide development of the Florida PI plan.**
    - **Ensure that the PI plan includes all aspects of trauma care and trauma system performance.**
    - **Use data from all continuum-of-care participants including trauma centers, non-trauma hospitals, rehabilitation centers, EMS providers and dispatch for system evaluation.**
    - **Include population-based data.**
- Continue efforts to integrate the Trauma Quality Improvement Program (TQIP) data elements into the next generation Florida Trauma Registry to provide a baseline for the state trauma system performance improvement.
- Establish a regional PI infrastructure consistent with the Regional Domestic Security Task Force Regions, providing medical representation and state and/or regional staff support.
    - Routinely monitor the EMS triage and transport guidelines and protocols for compliance.
    - Conduct regional PI workshops to educate the continuum-of-care providers on the statewide PI plan, process and measures.
    - Include the assessment of over and under triage in the systemwide performance improvement process as the data system becomes more inclusive.

- Require all Florida trauma centers to participate in a statewide or national risk-adjusted benchmarking process.

Trauma Management Information Systems

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 system-wide data that allow and facilitate evaluation of the structure, process, and outcomes of the entire system; all phases of care; and their interactions. This information should be used to develop, implement, and influence public policy.

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

Finally, every effort should be made to conform to national standards defining processes for case acquisition, case definition (that is, inclusion criteria), and registry coding conventions. Two such national standards include the National Highway Traffic Safety Administration's National Emergency Medical Services Information System (NEMSIS), which standardizes EMS data collection, and the American College of

Surgeons National Trauma Data Standard, which addresses the standardization of hospital registry data collection. Strictly adhering to national standards markedly increases the value of state trauma MISs by providing national benchmarks and allowing for the use of software solutions that link data sets to enable a review of the entire injury and health care event for an injured patient.

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

Optimal Elements

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

a. There is an established injury surveillance process that can, in part, be used as an MIS performance measure. **(I-102.1)**

b. Injury surveillance is coordinated with statewide and local community health surveillance. **(I-102.2)**

c. There is a process to evaluate the quality, timeliness, completeness, and confidentiality of data. **(I-102.4)**

d. There is an established method of collecting trauma financial data from all health care facilities and trauma agencies, including patient charges and administrative and system costs. **(I-102.5)**

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

a. The lead trauma authority ensures that each member hospital of the trauma system collects and uses patient data, as well as provider data, to assess system performance and to improve quality of care. Assessment data are routinely submitted to the lead trauma authority. **(I-301.1)**

b. Prehospital care providers collect patient care and administrative data for each episode of care and not only provide these data to the hospital, but also have a mechanism to evaluate the data within their own agency, including monitoring trends and identifying outliers. **(I-301.2)**

c. Trauma registry, ED, prehospital, rehabilitation, and other databases are linked or combined to create a trauma system registry. **(I-301.3)**

d. The lead agency has available for use the latest in computer/technology advances and analytic tools for monitoring injury prevention and control components of the trauma system. There is reporting on the outcome of implemented strategies for injury prevention and control programs within the trauma system. **(I-301.4)**

Current Status

The management information system that supports the planning and evaluation of the Florida trauma system is, clearly, a work in progress. Multiple datasets are available, but the most essential of these for trauma system planning and evaluation are in evolutionary stages.

The current Florida trauma registry has existed since 2008. It was originally developed in a common database program (MS Access™). Challenges were encountered when attempting to import data from various hospital-based trauma registries. This precluded routine reporting back to the trauma centers and use of the data for trauma system planning. Recently, an annual report was produced that mirrors the ACS National Trauma Data Bank (NTDB) report. This provided a high level overview of the demographic characteristics of the Florida trauma centers with some limited comparisons to national data in NTDB.

Due to the acknowledged limitations in the existing trauma registry, including its inability to produce meaningful information in a timely manner, the Trauma Program, in collaboration with trauma data stakeholders, has undertaken a process to upgrade the state trauma registry. Reportedly, the new registry will be NTDB compliant, and it will have embedded transaction capabilities to facilitate data transfers from individual trauma centers and uploads to the NTDB. A well-known vendor with clients in multiple states has received the contract to create the next generation trauma registry. The projected implementation date is July 1, 2013. Once the new trauma registry is operational, training should be offered to all trauma registrars along with inter-rater reliability assessment to ensure the consistency of data submitted.

While waiting for the trauma registry to become operational and have adequate data for analysis, work should begin on identifying a list of reports that will be useful for assessment of the trauma system, development of the trauma system plan, and system PI. One or more work groups of trauma medical directors, trauma program managers, EMS providers, and system leadership could be selected. Involving the epidemiologist early in the process will provide opportunities for sample reports to be run once some data are available so that it can be determined if additional refinement is needed.

Recommendations

- **Complete the implementation of the next generation trauma registry.**
  - **Ensure participation by all hospitals.**
- Provide training to trauma registrars to ensure consistency in data entry.

    - Complete and report inter-rater reliability checks between and among hospital trauma registrars.

- Identify and convene a work group consisting of trauma medical directors, trauma program managers, EMS providers, and trauma system planners (possibly under the Florida Trauma System Advisory Committee (FTSAC) or trauma program managers group) to:
    - Develop a list of reports that will be essential to the revision of the trauma system plan (distribution of patients, transfer patterns, time to definitive care [field and transfer], etc.)
    - Conduct modeling of changes in distribution of patients, transfer patterns, and times to definitive care (field and transfer) (may need to work with urban planners or similar for modeling techniques).
- Assign the FTSAC with the development of a list of standardized reports to be run on a quarterly basis that will assist in ongoing performance monitoring of the trauma system.
    - Maintain the same list of reports for at least one full year before adaptation, deletion, or substitution.
    - Distribute the reports widely to stakeholders and advisory bodies.
- Continue to work toward data linkage of the Emergency Medical Services Tracking and Reporting System (EMSTARS), the hospital discharge data, motor vehicle crash, and other datasets to better inform trauma system planning, development, monitoring, and evaluation.

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 non-designated centers or were never admitted to the hospital owing to death at the scene of incident or because their injuries were insufficiently severe to require admission. The state and national hospital discharge databases are examples of population-based data. These discharge databases contain information that was abstracted from medical records for billing purposes by hospital employees who enter these data into an electronic database. For investigators seeking a wider perspective on the care of injured patients in their region, these more inclusive data sets, compared with registries, are essential tools. Other population based data that may be of help include mortality vital statistics data recorded in death certificates. Selected regions might have outpatient data to capture patients who are assessed in the ED and then released.

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

Participation in Research Projects and Primary Data Collection

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

Measures of Research Activity

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

Optimal Elements

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

a. The lead agency has available for use the latest in computer/technology advances and analytic tools for monitoring injury prevention and control components of the trauma system. There is reporting on the outcome of implemented strategies for injury prevention and control programs within the trauma system. **(I-301.4)**

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

a. The trauma system has developed mechanisms to engage the general medical community and other system participants in their research findings and performance improvement efforts. **(I-306.1)**

b. The effect or impact of outreach programs (medical community training/support and prevention activities) is evaluated as part of a system performance improvement process. **(I-306.3)**

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

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

Current Status

Many of the Florida trauma centers have an extensive history of conducting trauma research. Additionally, many EMS agencies have a long history of being involved in EMS research, including trauma-related EMS research. Currently, several trauma research studies being conducted at Florida trauma centers are being supported by federal funding. Participants described how the Florida COT had a research subcommittee which provided some advice to the Trauma Program regarding research issues and priorities, but that subcommittee is no longer active. Some participants stated that they are attempting to independently form trauma research networks with other trauma centers, both within and outside their trauma regions to conduct translational research.

The State Surgeon General stated that he plans to develop a Trauma Research Agenda. However, within the PRQ, the Trauma Program stated it did not have a role in conducting trauma research. The PRQ further states that trauma research, whether clinical or focused on injury prevention, is the responsibility of the state's trauma centers. No role was reported for the Trauma Program to plan a strategy to identify trauma system research priorities, to facilitate trauma system research collaboration, or to use its infrastructure and data for research. No information was provided to indicate if or how the Trauma Program would work with trauma center researchers to identify funding opportunities or collaborations with state agencies that could result in potential funding of trauma system research.

Data from the current trauma system registry are not available to researchers. The Trauma Program anticipates that data from the next generation trauma registry will be available to researchers in the near future. Minimal consideration has been given to formatting data or developing various types of datasets that would reduce technical and regulatory burdens for investigators.

Recent state reports regarding the Florida trauma system do not highlight the research being conducted by the designated trauma centers. Including such information in such reports could help demonstrate some of the important contributions made by the trauma system to the health and well-being of Florida residents and to the nation.

Many stakeholders, especially the younger trauma center medical directors, are eager to conduct research within the trauma system. The Trauma Program has tremendous opportunities to facilitate research that will benefit the Florida residents, and also underscore the value of the trauma system.

Recommendations

- Create a research committee of the Florida Trauma System Advisory Council.
  - Develop a state Trauma Research Agenda.
  - Develop state, regional, and facility policies and operating procedures to limit administrative and regulatory burdens for investigators to use trauma system data.
  - Identify potential opportunities for research funding.
  - Reach out to potential research collaborators with funding sources.
- Identify potential resources and potential collaborators for research within the state.
- Compile a list of on-going and recently completed trauma research within the state on an annual basis and publish it on the Trauma Program website.
- Seek guidance to ensure that data submitted to the next generation trauma registry are stored and formatted in a way that will facilitate analysis and data sharing.

Focus Questions

Focus Question 1

Geographical areas: Florida has 19 trauma service areas (TSAs) per s. 395.402 (4)(a), Florida Statutes. Florida also has seven Domestic Security Task Force (DSTF) regions, which are stated in s. 395.402 (2)(e), Florida Statutes. Statute requires that this regional structure be included as a geographical consideration in trauma system planning and integration with emergency and disaster planning.

- **Which geographical representation (TSAs or DSTF or other) would best promote an inclusive, sustainable trauma system with safe, effective, and efficient care?**

A strong regional infrastructure will be a critical element in the implementation of a more integrated inclusive trauma system in Florida. A regional structure is necessary to allow for local adaptation of the core policies that form the basis of the trauma system. The regions will also provide the primary structure for a systemwide PI program. The need for a regional structure was recognized in the original 1990 plan, but the regions created were too small in most cases. Additionally, no funding was provided for the necessary administrative support of the regions. The existing TSAs bear no geographical or political relationship to regional structures established for EMS, disaster, or other related activities. Therefore, efforts to simply re-invigorate or re-develop the original TSA structure are unlikely to be efficient or effective.

As stated in the report, the TSC team recommends that the DSTF regions be adopted as the regional template for further trauma system development. A smaller number of regions covering a larger geographic area will enable more effective regional development. Alignment with the domestic security program may help identify additional resources (personnel and fiscal) to support regional trauma system development. The alignment of regional structures for the various overlapping elements of trauma systems, disaster response, and domestic security will facilitate a more integrated and cooperative relationship that will strengthen each of the component parts.

- **What geographical characteristics (e.g., county groups, geographic measurement, proximity to existing trauma centers, EMS distances) are most relevant in apportionment of trauma centers?**

Historically, simple geographic proximity and acceptably short transport times to a trauma center have been primary factors in the assessment of trauma center distribution, at least on a theoretical basis. While the notion of concentric rings around trauma centers representing distance or transport time provides a very gross measure of likely placement, it does offer a starting point for discussions. Common benchmarks use a 60 minute maximum transport time (based upon the relatively arbitrary concept of the “golden hour”) and a maximum transport distance of 50 to 100 miles. Planning must also take into account issues such as natural barriers, transportation resources, the

potential for extreme weather conditions, man-made barriers (traffic, crashes, parades, etc.), and real or perceived threats of terrorism. Several computer-based modeling approaches can be used to evaluate these factors and to assess the effect of placing a trauma center at a given geographical location.

Evaluation of geographical catchment areas must be conducted. A balance between a sufficient population base to justify the resource expenditure for a new trauma center must be determined while at the same time ensuring that sufficient trauma center capacity exists to care for the injured population. The population base needed to support a Level I or Level II trauma center is dependent upon a number of factors, including the type and frequency of injuries, population demographics, and policy based decisions around system redundancy, surge capacity, and financial investment. As a result, the population base may range between 350,000 to more than 1,000,000 persons per Level I or Level II trauma center.

Both of the analyses above focus primarily upon high-level centers (Level I and II). However, with an inclusive model it is likely that trauma system access through lower level centers (Level III and possibly Level IV) is a more important metric, allowing for initial evaluation and stabilization prior to transport to higher level centers as needed. The location and capacity of these lower level trauma system resources modifies and enhances the optimal distribution of high level centers. By filling in the background information with these resources (Level III and Level IV trauma centers plus participating non-trauma center facilities), the need, location, and level of higher level trauma centers may become more focused.

- **What non-geographical characteristics should be considered in apportionment of trauma centers?**

From a practical standpoint, geographical characteristics for decision making are inherently limited by the fact that almost all trauma systems have existing facilities with relatively fixed capabilities. It is quite difficult to either build a new trauma center at a desired location, or to remove one from an undesired location. Some degree of geographic or temporal maldistribution occurs in all states, but this can be compensated for by optimizing patient flow. For example, initial access to the trauma system can be provided through the inclusive network of lower level trauma centers or trauma participating facilities with appropriate interfacility transfer processes. Longer distance primary transport to high-level centers can be reserved for appropriate cases.

Other issues that must be considered are during discussions of placement and levels of trauma centers include:

- The balance between system redundancy and patient volume per trauma center. This is especially critical in areas of high vulnerability, either to mass casualty events or to the potential loss of individual centers
- Social support systems for injured persons and facilitating their return to the community. Patients who are displaced long distances from home face significant challenges in follow-up, rehabilitation, and reintegration

- Support for training/teaching missions
- System costs and efficiencies

Appendix D provides additional information pertaining to this focus question.

Focus Question 2

Trauma Center Surgeon Salaries and On-call Pay: Provide national benchmarks for trauma surgeon salaries and on-call pay for Trauma Surgeons, Neurosurgeons, and Orthopedic surgeons.

Data on salary and on-call pay for trauma surgeons is confounded by differing reporting methodologies, varying sample sizes, and regional influences. In addition, compensation may be complex and dependent on a variety of practice parameters and incentives. The data shown below should therefore be considered useful approximations and subject to adjustment secondary to local market conditions and contract scope. Since compensation varies over time and by location, national data sources should be accessed periodically to update the information.

Trauma Surgeon Salaries:

No data specific to trauma surgeon salaries are available prior to this publication:

> Fakhry SM, Watts DD: What's a Trauma Surgeon Worth? A Salary Survey of the Membership of the Eastern Association for the Surgery of Trauma. *Journal of Trauma, 49*:833-38, 2000.

A subsequent update was performed by Fakhry et al. in 2005 and presented at the 2006 American Association for the Surgery of Trauma (AAST) meeting. An additional salary survey was published in 2009 that provided mean data for midlevel faculty, plus bonus and call pay:

> Cohn, SM, Price, MA, Villareal, CL: Trauma and Surgical Critical Care Workforce in the United States: A Severe Surgeon Shortage Appears Imminent. *Journal of the American College of Surgeons, 209*(4):446-452, 2009.

Data are also available from the American Association for Medical Colleges (AAMC) for academic salaries. The Medical Group Management Association (MGMA), Sullivan Cotter and Associates, along with other sources have data for for non-academic surgeons.

Fakhry 2000 data: Mean salary $229,142 ± 78,045
Fakhry 2005 data: Mean salary $285,236 ± 104,543
Cohn 2009 data: Approximate mean salary $350,000, including bonus and call pay

The AAMC reported total compensation in 2011-12 to be a mean of approximately $359,000 (50th percentile for Associate Professor). The MGMA data are essentially similar.

On Call Pay:

Data aggregated from several sources are provided below, but as stated in the introduction, on-call pay varies significantly by region, the size and type of hospital, as well as other variables. One of these sources is Sullivan, Cotter and Associates, and this group conducts an annual survey. The most recent can be purchased on their website: www.sullivancotter.com/:

Trauma Surgeons:	$800–$2000 per day
Neurosurgeons:	$1000–$4000 per day
Orthopedic Surgeons:	$1000–$2000 per day

Focus Question 3

Integration of EMS, Rehabilitation, and Injury Prevention: What can be done to strengthen the integration of EMS, trauma centers, non-trauma hospitals, rehabilitation facilities, and injury prevention programs in Florida's trauma system?

Numerous opportunities exist to improve the integration of the Trauma Program with EMS, injury prevention, and rehabilitation. Many are described within the body of the report. Representatives from each of these specialty focus areas should feel engaged in trauma system planning, development, and performance improvement. Rather than thinking about these groups as unique entities, they should be recognized as essential partners for the Trauma Program with which relationships are built and maintained. One method is to ensure that each partner has a voice on work groups and within the voting membership of the FTSAC. Methods to keep all partners regularly informed about trauma system policies and activities should be developed. Email alerts directing partners to important updates on the Trauma Program website could be one strategy.

Non-trauma hospitals care for many injured patients, most often those with less serious injuries. However, it was reported that these hospitals do receive trauma alert patients when EMS identifies the hospital as the closest appropriate facility according to the trauma destination protocol. These non-trauma hospitals need to be integrated into the EMS and trauma system. Health professionals in these non-trauma hospitals need an organized response team in the emergency department, as well as communication with trauma center experts to guide resuscitation, and to facilitate the interfacility transfer. Feedback about the care provided by the non-trauma hospital is also essential to improve performance. The regional infrastructure provides an opportunity for collaboration between EMS, the non-trauma hospitals, and the trauma centers that will ultimately enhance the care provided to seriously injured patients.

Non-trauma hospitals need recognition for their role within the trauma system and identifying them as participating trauma hospitals is one mechanism. Data about the care provided to injured patients by these hospitals are essential to the trauma system for planning, performance improvement, and evaluation at the regional and state level. A minimal dataset for participating trauma hospitals should be identified so that Florida has more comprehensive data regarding care to all injured patients.

Recommendations

- Ensure a representative from EMS, trauma centers, non-trauma hospitals, rehabilitation, and injury prevention as a voting member on the newly formed Florida Trauma System Advisory Committee (FTSAC).

- Create an Injury Prevention subcommittee of the FTSAC and include key representatives from EMS, trauma centers, non-trauma hospitals, rehabilitation facilities, and injury prevention programs in the membership.

    - Include representation from each of the 7 Regional Domestic Security Task Force Regions should be included as well.

- Identify a representative from each non-trauma hospital to receive updates sent by the Trauma Program to all trauma stakeholders.

- Develop a regional infrastructure and ensure that all non-trauma hospitals, EMS agencies, trauma centers, and other interested groups are invited to meetings and have a voice during the regional needs assessment, planning, performance improvement, and system evaluation processes.

- Engage EMS agencies, non-trauma hospitals, and trauma centers within each region in discussions and decisions regarding trauma destination protocols, consultation for the care of seriously injured patients, trauma interfacility transfer guidelines, and transfer agreements.

How should prehospital, trauma center, and post-hospital data be linked to improve the trauma system (prevention and care) at the local and state levels?

The key to being successful for data linkage and concatenating (aggregating) various data sets is to ensure that the data contained in each source are as reliable and valid as possible. The Division of Emergency Preparedness and Community Support (DEPCS) controls two of the most essential databases -- the state's trauma registry and the EMSTARS.

Population-based datasets are very important for understanding the overall injury prevention and control system in Florida. Vital records (death certificates), census data, hospital discharge, emergency department, and highway safety datasets are all prime targets for analysis and linkage. The initial goal of such linkages and analyses is to overcome what the TSC team characterized by the familiar statement "you don't know what you don't know". However, the linkage with these various datasets are secondary to the focus of bringing the next generation trauma registry on-line, having all acute care hospitals submit data to the state trauma registry, and the build out of the EMSTARS to include all "high-volume" EMS agencies.

Recommendations

- Concentrate on the timely and full implementation of the next generation trauma registry.
- Increase participation in the Emergency Medical Services Tracking and Reporting System (EMSTARS), concentrating on high volume EMS agencies that do not currently contribute.

- Develop a web-based abbreviated trauma registry input process for use by the non-trauma acute care hospitals, and require them to submit data.

- Explore the development of a unique trauma patient identifier (such as the trauma band being used in Arkansas, or the central registry available in California) to enable linkages between the trauma registry (transferring hospital and trauma center) and EMSTAR.

- Provide training opportunities for the staff members in the Health Information and Policy Analysis Program to gain skills in probabilistic data linkage, International Classification of Disease-9 Injury Severity Score mapping, and Geographic Information System mapping.

What EMS-trauma structure promotes accountability for local and state system outcomes?

The Florida EMS and trauma system provides a good opportunity for promoting accountability for local and state trauma system outcomes. Although trauma centers have well established internal PI programs, no statewide standard approach for measuring trauma system or patient outcomes currently exists. No evidence was provided to suggest that most EMS personnel are engaged in their local hospital PI programs. Only in very limited areas of the state are EMS personnel integrated with regional or multi-county hospital PI programs.

To promote accountability for state trauma system outcomes, the Trauma Program should take the initiative to work collaboratively with the trauma centers, local EMS agencies, the Florida COT, EMS Medical Directors, and the State EMS Advisory Council to establish statewide quality benchmarks for the trauma system. Trauma centers will need to establish or expand their current PI program to include both the local EMS providers and those EMS agencies outside the county that have routine referrals into their facilities.

Many data sources are available to assist in establishing a statewide data-driven PI program. The EMSTARS, state trauma registry, Hospital Discharge data, Highway Safety Crash Data, and Uniform Data System for Rehabilitation are examples of data that can be made accessible to the local and regional trauma centers. Since BEMO has re-organized and formed the Health Information and Policy Analysis Program, resources exist to support a statewide PI initiative.

It may be necessary to review existing legislation to ensure privacy protection is provided to the trauma centers and EMS agencies participating in the local and regional PI programs.

Recommendations

- Establish statewide quality benchmarks for the state trauma system in collaboration with system stakeholders.

- Have the staff members of the Health Information and Policy Analysis Program develop regional and statewide reports to measure the identified benchmarks and potential contributing factors using appropriate datasets.

- Share the findings (both regional and statewide) regarding the trauma system status regarding benchmarks with stakeholders.
    - Encourage multidisciplinary stakeholders to discuss findings at regional meetings and identify potential opportunities to improve the trauma system.
    - Help all health care providers to understand the importance of their role in the trauma system for the improvement of care to injured patients.

What is the best timeline for integrating new destinations (new trauma centers or specialty care) into trauma transport protocols?

The regulatory process for trauma center designation, as it is stated in the regulatory standard and timeline, appears to take approximately 12 months. The provisional trauma centers need time to establish call schedules, to train staff on protocols, and to develop the internal infrastructure and resources needed to provide trauma services. The new trauma centers do not know the exact date when provisional status or full designation status will be achieved. In addition, the local EMS agencies and their medical directors need time to meet with the new trauma center to develop or modify their transport protocols and train their personnel on the modifications.

Recommendation

- Allow at least 90 days for integrating new facilities as trauma center/specialty care destinations into the EMS transport protocols.

Appendix A: Acronyms

AAMC – American Association of Medical Colleges
ACS – American College of Surgeons
ASPR – Assistant Secretary for Preparedness and Response

BEMO – Bureau of Emergency Medical Oversight
BIS – Benchmarks, Indicators, and Scoring
BSCIP – Brain and Spinal Cord Injury Program

CARF - Commission on Accreditation of Rehabilitation Facilities
CDC – Centers for Disease Control
CME – continuing medical education
COPN – certificate of public need
COT – Committee on Trauma
CQI – continuous quality improvement

DEPCS - Division of Emergency Preparedness and Community Support
DOH – Department of Health
DOT – Department of Transportation

ECO – Emergency Coordination Officer
EMS – Emergency Medical Services
EMSTARS - Emergency Medical Services Tracking and Reporting System
ENPC – Emergency Nursing Pediatric Course
ESF – Emergency Support Function

FETTN - Florida Emergency Trauma Telemedicine Network
FTE – full-time equivalent
FTSAC – Florida Trauma System Advisory Council

GIS - Geographic Information System

HRSA – Health Resources and Services Administration

ICISS - International Classification of Disease-9 Injury Severity Score

MCI – mass casualty incident
MGMA – Medical Group Management Association

NHTSA – National Highway Traffic Safety Administration
NIMS – National Incident Management System
NTDB – National Trauma Data Bank

PHEP – Public Health and Emergency Preparedness
PI – Performance Improvement
PRQ – Pre-Review Questionnaire

RDSTFR - Regional Domestic Security Task Force Regions
RTTDC – Rural Trauma Team Development Course

SCI – spinal cord injury
SCO – State Coordinating Officer
SEOC – State Emergency Operation Center
SERT – State Emergency Response Team
STEMI – ST-Elevation Myocardial Infarction

TBI – traumatic brain injury
TNCC – Trauma Nurse Core Curriculum
TQIP – Trauma Quality Improvement Program
TSA – Trauma Service Area
TSC – trauma system consultation
TSPAC – Trauma System Plan Advisory Council
TTP – trauma transport protocol

Appendix B: Methodology

The Florida Department of Health (DOH) requested this trauma system consultation, which was conducted under the auspices of the American College of Surgeons (ACS), Trauma System Consultation (TSC) program. The multi-disciplinary Trauma System Consultation (TSC) team consisted of: two trauma/general surgeons, one emergency physician, a state EMS/trauma director, a trauma program manager, a rural trauma and prehospital specialist, and a public health and injury specialist. Biographical sketches for team members are included as Appendix C of this report.

The primary objective of this ACS trauma system consultation was to guide and help promote a sustainable effort in the graduated development of an inclusive and integrated system of trauma care for the State of Florida. 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*. Prior to the visit, the TSC team reviewed the ACS Pre-Review Questionnaire (PRQ) submitted by the DOH, along with a number of related supporting documents provided by the DOH and information available on government websites.

The TSC team convened in Tallahassee, FL on February 2-5, 2013, to review the Florida trauma system. The meetings during the four-day visit consisted of plenary sessions during which the TSC team 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 TSC team 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 Florida. This report was developed independently of any other trauma system consultations or assessments.

Appendix C: Review Team Biographical Sketches

ROBERT J. WINCHELL, MD, FACS- TEAM LEADER

Dr. Robert Winchell is currently head of the Division of Trauma and Burn Surgery at the Maine Medical Center and Associate Professor of Surgery at the Tufts University School of Medicine. He received his undergraduate degree from the California Institute of Technology, his M.D. from Yale University, and did his internship, General Surgery residency, and Trauma and Critical Care Fellowship at the University of California, San Diego, where he remained on the faculty as Associate Professor of Clinical Surgery in the Division of Trauma through 1999. After leaving the University of California, Dr. Winchell established and subsequently directed the Tacoma Trauma Center in Tacoma, Washington. The trauma center continues to operate successfully as a joint venture between two previously competing hospitals. In 2001, Dr. Winchell moved to the Maine Medical Center and assumed his current post in 2004.

Dr. Winchell has been involved in trauma center and trauma system design and operation in a wide variety of settings covering the spectrum of system development. He was instrumentally involved with both the day-to-day operations and ongoing development of the San Diego County trauma system for over ten years and served as chair of the San Diego and Imperial County Committee on Trauma. He participated in the operation and ongoing development of the Washington state trauma system, serving on the state advisory board, and as chair of the Southwest EMS region. Since moving to Maine, Dr. Winchell has worked to develop the Maine state system, is a member of the state advisory board, and is a past chairman of the Maine State Committee on Trauma. He is Chair of the Trauma Systems Evaluation and Planning Committee of the American College of Surgeons and also serves as a senior site reviewer for the trauma center verification program of the College.

Dr. Winchell is Board certified in General Surgery, with added qualifications in Surgical Critical Care. Dr. Winchell is a Fellow of the American College of Surgeons as well as a member of the American Association for the Surgery of Trauma, the Association for Academic Surgery, the Southwest Surgical Congress, and the Society of Critical Care Medicine. He is author of more than 50 scientific papers and book chapters, and has given over 100 regional, national, and international presentations.

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* (7 editions), *Child Health Nursing* (2 editions), *Pediatric Nursing: Caring for Children* (5 editions), *Maternal and Child Nursing Care* (3 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. *Child Health Nursing* was recognized as an American Journal of Nursing Book of the Year in 2010. 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 served 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.

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. She received the Distinguished Alumni Award from the Johns Hopkins University in 2010.

SAMIR M. FAKHRY, MD, FACS

Dr. Fakhry graduated from the American University of Beirut, School of Medicine in 1981. He completed his residency in general surgery and his fellowship in critical care and trauma at the University of North Carolina at Chapel Hill in 1988.

From 1988 until 1991 he led the trauma program as Director for Trauma Services at George Washington University Medical Center in Washington D.C. In 1991, he became Director of Surgical Critical Care Services at UNC Hospitals in Chapel Hill, NC. While at UNC, he rose to the rank of Associate Professor of Surgery with Tenure and was awarded several teaching awards by the medical students and the surgical residents. He remained there until 1997 when he was recruited to the Inova Regional Trauma Center at Inova Fairfax Hospital in Falls Church, Virginia as the Chief of Trauma Services.

From August 1997 until December 2008, he held the position of Chief, Trauma and Surgical Critical Care Services at the Inova Regional Trauma Center. He was also

Associate Chair for Research and Education, Department of Surgery; Medical Director for the Inova Regional Trauma Center Injury Prevention Program and Professor of Surgery, Virginia Commonwealth University - Inova Campus. In January of 2009, Dr. Fakhry was appointed Professor of Surgery and Chief of the Division of General Surgery at the Medical University of South Carolina (MUSC) in Charleston, South Carolina. He is also the Physician Leader of the Surgical Acute and Critical Care Service line at MUSC.

Dr. Fakhry has been heavily involved in trauma and surgical critical care research and in injury prevention. His research interests include trauma systems, medical informatics applications, traumatic brain injury, intestinal injury, motor vehicle crashes, aggressive driving and surgical education. He has authored over 100 peer-reviewed publications, abstracts and book chapters. He is a member of many national societies and serves on several national committees and boards. Dr. Fakhry was Principal Investigator (PI) for the Crash Injury Research and Engineering Network (CIREN) Center at Inova Fairfax Hospital from May, 2000 until December, 2008. He is currently PI together with Dee Ford MD on an NIH funded research project entitled “Critical Care Excellence in Sepsis and Trauma” (CREST). The goal of CREST is to improve patient outcomes for sepsis and trauma by educating providers and providing access to specialist consultation via telemedicine technology to participating rural hospitals in South Carolina.

RONALD F. MAIO, D.O., M.S., FACEP

Dr. Maio received DO degree, in 1976, from Michigan State University's College of Osteopathic Medicine (MSUCOM). After completing his internship and serving in the US Army in Germany as general medical officer, he did an Emergency Medicine Residency at MSU affiliated hospitals in Lansing, Michigan, and is board certified in Emergency Medicine. In 1988 he received an MS in Clinical Research Design and Statistical Analysis from UM SPH.

Dr. Maio is the Director of the Office of Human Research Compliance Review (OHRCR) for the University of Michigan, and is a Professor of Emergency Medicine and former Associate Chair for Research for the Department of Emergency Medicine. Prior to being appointed Director he was the Assistant Dean for Research Regulatory Affairs at the Medical School and also was the founder and Director of the University of Michigan's Injury Research Center, based in the Department of Emergency Medicine.

Dr. Maio has practiced emergency medicine in both the rural and non-rural setting, was an assistant medical director for two EMS systems in Michigan, and, served on the board of the Huron Valley Ambulance Association based in Ann Arbor, Michigan. Dr. Maio has also served on numerous state and federal committees and panels and has served as the chair for the National Association of EMS Physicians’ (NAEMSP) Research Committee.
Dr. Maio's primary areas of research have been in traumatic injury and also the effectiveness of EMS systems. His research has ranged from epidemiologic studies and observational studies to randomized controlled trials (RCTs) and he has conducted

studies in children and adults. In regard to injury he has particular interests in the relationship of alcohol and other drugs to the occurrence and severity of injury and the outcomes following injury and also in regional variation in motor-vehicle crash morality.

DREXDAL PRATT

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

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

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

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

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

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

Dr. Sanddal is currently the Manager of the American College of Surgeons (ACS) Trauma Systems and Verification Programs. Prior to his current position, he served as President of the Critical Illness and Trauma Foundation (CIT), in Bozeman, Montana for 25 years. He 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, and similarly for the National Association of EMT.

Dr. Sanddal completed his undergraduate work at Carroll College, received his Master's degree in psychology from Montana State University and his doctorate in Health Science from Walden University. He has been a co-investigator for six state or regional rural preventable trauma mortality studies and has conducted research in the areas of

training for medical personnel, suicide, and rural injury prevention and control. Nels served on the Institute of Medicine's Committee on the Future of Emergency Care in the U.S. Healthcare System.

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

JOLENE R. WHITNEY, MPA

Jolene R. Whitney has worked with the Bureau of Emergency Medical Services and Preparedness, Utah Department of Health for 30 years. She spent the first 6 years of her career as a regional EMS consultant. She became Assistant Training Coordinator in1986. She has been a program manager for EMS systems and trauma system development since 1991. She is currently the Deputy Director for the Bureau, which includes managing 20 staff and several programs including Trauma System Development, state grants program, fiscal reporting, Chemical Stockpile Emergency Preparedness, EMS Strike teams, ED, Trauma and Pre-hospital databases, CISM, medical direction coordination, EMS Licensing and Operations, and EMS for Children.

Ms. Whitney has a Masters in Public Administration from Brigham Young University and a B.S. in Health Sciences, with an emphasis in Community Health Education from the University of Utah. She was certified as an EMT-Basic in 1979. She also obtained certification as an EMT instructor and became certified as an EMT III (Intermediate) in 1983. She has attended numerous conferences, courses, and workshops on EMS, trauma, and disaster planning and response.

Ms. Whitney is a co-author of five publications on preventable trauma mortality, domestic violence, challenges of rural trauma in the western states and medical surge capacity planning. She is the previous past Chair for the State Trauma Managers Council for the National Association of State EMS Officials. She is currently serving on the Highway Information and Traffic Safety Committee for NASEMSO and participated in the development of a rural MCI assessment tool. She is a member of the American Trauma Society and Utah Emergency Managers Association.

In 2010, Ms. Whitney participated on an Institute of Medicine planning committee and served as a panel Chair for a rural response to MCI workshop. She was recently nominated to serve on the Crisis Standards of Care Committee with the IOM.

Ms. Whitney spent 250 hours in the Olympic Command Center, serving as an EMS liaison for the 2002 Winter Olympics in Salt Lake City, Utah. Jolene has completed the ICS training for 100, 200, 300, 700 and 800 series. She is currently working on the development of the Utah DMAT-1 and serves as the acting planning chief for the team.

She has been involved with all aspects of EMS including ambulance licensure, EMS council implementation, certification and training, computer testing, and curricula development. She has experience in statute and rule development, grant writing, system plan development, coalition building, and disaster preparedness. She has served on several national committees and teams, including five state EMS system assessments for NHTSA, five trauma system consultations for ACS, reviewed rural trauma grant applications for HRSA, contributed to the HRSA model trauma system plan, the National Trauma Data Standards, the NASMESO trauma system planning guide, and the NHTSA curriculum for an EMT refresher course.

Appendix D: Needs Assessment Process and Tools

American College of Surgeons – Committee on Trauma

Trauma Systems Evaluation and Planning Committee

Trauma Center Needs Assessment Process and Tools

Version 1
May 1, 2013

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality:
Highest Standards, Better Outcomes

Trauma System Needs Assessment

Overarching Concept

Individual states ensure optimal care of injured persons in their State by establishing criteria through their executive and legislative branches that define a trauma system within the state's geographic boundaries. The state agency responsible for the trauma system translates the statutes by developing rules or regulations, policies, and procedures which are then implemented by the regional or state trauma system within the constraints of funding.

The American College of Surgeons Committee on Trauma (ACS-COT) represents surgeons with expertise in the optimal care of injured patients, inclusive of trauma system development, prehospital care, trauma center development, direct patient care, research, and injury prevention. The ACS-COT has established the guidelines that define the essential elements that identify a hospital as a trauma center, as well as trauma care within a system.

The ACS-COT has now proposed a strategy to help states to assess and consider the needed distribution of trauma centers within its boundaries, using an inclusive care model for the trauma system. Such an effort is important because of the need to prevent excessive duplication of Level I and Level II trauma centers that have high costs in which it is important to maintain adequate patient volume to promote optimal quality of care, cost-effectiveness of care, and the training mission. Equally important is ensuring that patients have access to trauma centers that are matched to their level of injury severity. Patients with mild and moderate injuries can have high quality care at a designated lower level trauma center that is closer to their community. Patients with severe injuries may be served by timely access to high level trauma centers, many times by transfer from a lower level trauma center that performs the initial resuscitation and stabilization.

Guidance for Trauma System Needs Assessment

Many factors are important to consider when determining an optimal geographic distribution (the number and location) of trauma centers within a state or region. Important considerations are terrain, the transportation infrastructure, local weather patterns, the mass casualty assessment (terror threat, industrial risk), and population (absolute count, dispersal). Capability (level of trauma care) includes important considerations such as population, the medical infrastructures in a region (trauma surgeons, surgeon subspecialists, availability for the call schedule, intensive care resources), transportation assets for interfacility transfer, and the communication systems.

The attached document provides individual assessment parameters that can be used to help a state or regional trauma system to conduct a needs assessment and estimate the number and location of trauma centers required for its population and visitors. Since this is the first version of the document, it is possible that more assessment parameters will be identified and developed in the future.

These assessment parameters fall into several categories such as patient access, discovery/ dispatch, training mission, education, EMS response, and capacity. The leaders of the regional or state trauma system should make an effort to use as many of the assessment parameters for which data are available; however, it is unlikely that a trauma system will be able to use all the parameters.

Each of the assessment parameters is stated as a benchmark or desired outcome. In many cases recommendations for a desirable outcome have been proposed, based either from the literature or common practice in other systems. As there are generally a range of potential values for each parameter, the desired outcomes will likely be different for each trauma system and must be determined by the trauma system's decision makers – choosing targets that are acceptable or desirable based upon local public opinion, policy, and infrastructure. For example, not every trauma system will have the resources to place trauma centers in every location necessary to achieve a goal of transporting 90% of patients to a level 1 trauma center within 1 hour, a goal that may well be achievable in some systems. In this case, the benchmark for system access might be better chosen to establish a threshold for transport to a level I or level II center, or transport to a participating system hospital within 1 hour.

When selecting a desired outcome, the potential gaps in the trauma system should be considered as they could potentially affect ability of the trauma system to meet the desired outcome. Additionally, trade-offs have been identified that should be considered when selecting a desired outcome.

Specific datasets are suggested to perform the assessment for each parameter, along with some strategies or considerations when analyzing the data. Several different datasets may be needed to assess each parameter, and some datasets can be used for several parameters. The list of datasets that have been identified to help perform this assessment includes the following:

- State trauma registry
- Individual trauma center registries
- State EMS registry
- Hospital discharge data (HDD)
- Emergency department data (EDD)
- State NEMSIS data
- State or Regional 911 data sets, local 911 data
- Trauma data reported by non trauma hospitals
- Computer-aided dispatch (CAD) registries
- Trauma system status management data (e.g. time hospitals are on diversion)

The following criteria represent the current state of an ongoing project to quantify metrics that are of potential utility in assessing trauma-related resource needs within a region. Further refinements are expected as the Committee continues its development efforts and various states and regions apply these metrics. Users are encouraged to check back with the Trauma System Evaluation and Planning Committee to ensure they have the most recent version of the tools.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category - Access	**Desired State**	**xx % of all injured patients meeting step one or two field triage criteria will receive care at a LI or LII trauma center within yy minutes of injury.**
	Parameters	xx - No data available for percentage of injured patients, suggested range 80%-100% yy - No data available for correct time to arrival, suggest 60 min
	Current State	Determine: • Injury time • Field triage step • Arrival time at facility • Destination facility, if other than level I or level II center, then need time to transfer ○ Arrival time at 2nd facility

	Data Sources	• EMS registry
		• Trauma registry at receiving trauma centers
		• Trauma data from intermediate facilities:
		  ○ Trauma specific data
		  ○ HDD or EDD data

	Gaps	• Delay in EMS dispatch • Delay in EMS arrival • Long transport time • No appropriate center
	Strategies	Include both ground and air medical transport time/ distance in calculations (add no-fly days into the calculations)
	Trade-Offs	Over designation likely to improve access but increases cost and volume at individual trauma centers Under-designation will maintain higher volume at individual trauma centers but potentially decreases access and places greater burdens of transport resources, both for field and inter-facility transports.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category - Access	**Desired State**	**xx % of patients meeting step three triage criteria will receive care at a level III or higher trauma center within yy minutes of injury**
	Parameters	xx - No data available, suggested range 80%-100% yy - No data available, suggest 60 min
	Current State	Determine: • Injury time • Field triage step • Arrival time at facility • Destination facility, if other than level I or level II center, then need • Time to transfer • Arrival time and 2nd facility • Destination facility

	Data Sources	• EMS registry
		• Trauma registry at receiving trauma centers
		• Trauma data from intermediate facilities:
		  ○ Trauma specific data
		  ○ HDD or EDD data

	Gaps	• Delay in EMS dispatch • Delay in EMS arrival • Long transport time • No appropriate center
	Strategies	Determine the number of injured patients without head injury to verify that a Level III trauma center is warranted. Ensure institutional commitment to trauma.
	Trade-Offs	Level III trauma centers improve access for minor to moderately injured patients. Essential in rural areas for immediate stabilization prior to transfer. Level III centers in urban and suburban areas may adversely affect both system efficiency and cost without significantly improving access

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category - Access	**Desired State**	**xx % of patients not meeting any field triage criteria treated at an appropriate facility without inter-facility transfer**
	Parameters	xx - No data available, suggested range 80%-100%
	Current State	Determine: • Injury time • Field triage step • Arrival time at facility • Disposition

	Data Sources	• EMS registry
		• Trauma registry at receiving trauma centers
		• Injury data from non-trauma centers (community hospitals)
		  ○ Trauma registry specific data
		  ○ Hospital discharge or ED discharge data

	Gaps	• Over-utilization of transfer • Failure to transfer • Under-triage
	Strategies	This approach requires injury data from all acute care centers. It must be monitored to ensure minimal under-triage or miss-triage. Outcomes must also be monitored to ensure that patients are getting appropriate care in a timely manner.
	Trade-Offs	In an inclusive and integrated trauma system it is acknowledged that most minor injury is treated appropriately at Level IV-V trauma centers and community acute care hospitals.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category - Access	**Desired State**	**xx% of injured patients with ISS > 15 treated without transfer at facilities other than designated trauma centers**
	Parameters	xx - no data, suggest < 5%
	Current State	Determine: • % of patients with ISS > 15 treated in designated trauma centers compared with total number of injured patients with ISS >15 in the state
	Data Sources	• State trauma registry • Facility trauma registries • Hospital discharge data • Vital records (death certificates)
	Gaps	Limited enforcement of system guidelines for interfacility transfer
	Strategies	Identify hospitals not appropriately transferring seriously injured patients on a consistent basis (e.g., keep paying patients or neurosurgeon available daytime hours only). Identify as a potential location where trauma center or trauma participating hospital is needed. Monitor and enforce transfer guidelines and policies.
	Trade-Offs	In rural areas access to specialty care, e.g. neurosurgeon, may be occasionally life-saving. However, the resources supporting that sporadic care such as a qualified ICU may be lacking and the lack of their inclusion in the trauma center through a designation/verification process reduces oversight and performance improvement monitoring. Selective triage by ability to pay places a greater burden on higher level centers. Failure to recognize that all acute care facilities treat some level of injury negates the opportunity to collect data from those facilities and to more fully integrate them into an inclusive trauma system designed to meet the needs of the entire spectrum of injured patients.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category – Access	**Desired State**	**xx% of injured patients meeting step one or step field triage criteria are appropriately transported to the closest designated or verified trauma center regardless of state boundaries**
	Parameters	xx - no data, suggest transfer to out-of-state trauma center is it is more than 15 minutes closer than a trauma center designated or verified at the same or higher level in-state.
	Current State	Determine: • Number of trauma patients receiving care in surrounding states • Document and analyze transport time differences against in state resources
	Data Sources	• State trauma registry data from neighboring state • Trauma registry data from home state • HDD from neighboring state • EMS registry in home state • Vital records from home and neighboring states (death certificates)
	Gaps	• Need to dual recognition of border facilities as part of the trauma system in both states • Need for contributions to trauma registry data in both states • Reciprocal support for non-paying patients • Structured plan for repatriation to an in-state facility, if appropriate
	Strategies	Identify patients receiving appropriate care at out-of-state trauma centers. May reduce the need for duplication of resources within near proximity.
	Trade-Offs	In the neighboring center is not part of the home state's trauma system, there may be limited opportunities for formal confirmation of capabilities during verification or designation reviews. Likewise there may not be ongoing monitoring through system performance improvement processes. Out-of-state facilities may represent the only logical option for access to timely care if they abut rural areas in the home state.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category – Training Mission	**Desired State**	**Each level I center will see a sufficient volume of injured patients to support continued competence of trauma staff and the training mission of the center**
	Parameters	• Limit by admissions: COT 1200 • Limit by severe injuries: COT 250 with ISS > 15 • Limit by geographical proximity: One LI per region or catchment area
	Current State	Determine: • Required volume for competency mission • Required volume for training mission

	Data Sources	• EMS registry
		• Trauma registry at receiving trauma centers
		• Trauma data from intermediate facilities:
		  ○ Trauma registry specific data
		  ○ Hospital discharge or ED discharge data

	Gaps	• Over-triage to LI center • Underutilization and commensurate experience at LII-III trauma centers
	Strategies	If the training need cannot be met by standard patient flow, the field triage criteria may need to be adjusted to ensure the agreed upon volume. If patient transport is determined by geographic catchment area, boundary modifications may be necessary. The training mission should be factored into the model for trauma center number, location, and level.
	Trade-Offs	May result in under-designation of supporting facilities that would be necessary for surge or large scale events. This could, potentially, reduce redundancy in the event of a LI facility catastrophe such as a flood, tornado, earthquake, fire or act of terrorism.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category – Discovery/	**Desired State**	**xx% of population covered by E911 or Next Generation 911, yy% of geographical coverage by E911 or Next Generation 911**
	Parameters	xx - no data available, suggested 95-100% of population yy - no data available, suggested >90% of geography
	Current State	Determine: • % of population covered • % of geography covered
	Data Sources	• State 911 Office • Regional/Local 911 Offices
	Gaps	• Delay in ability to notify dispatch by cell phone • Inability to locate caller results in delayed response
	Strategies	Continued national and statewide efforts to upgrade 911 capacity is ongoing. Trauma stakeholders should be knowledgeable of such efforts in their state or region and should support legislative or grant efforts to secure sufficient funding for such improvements.
	Trade-Offs	While delays in discover do occasionally occur, delays in notification are far more common and may affect need for additional trauma centers in order to meet time to definitive care guidelines. Failure to identify caller location (E911 and Next Gen 911) may delay response times and may also suggest the need for additional trauma centers.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category – EMS Response	**Desired State**	**xx% of population covered by advanced life support personnel within zz minutes;** **yy% of population covered by basic life support ambulance within aa minutes**
	Parameters	xx - no data available, zz - in urban systems fractal response time of < 9 minutes >95% yy - no data available aa - in rural systems fractal response time of <20 minutes >90%
	Current State	Determine: • % of urban population covered by ALS within established response times parameters • % of rural population covered by ALS within established response times parameters • % of rural population covered by BLS within established response time parameters
	Data Sources	State EMS Office: • State NEMSIS databases • Computer aided dispatch (CAD) databases

	Gaps	• Limited availability of ALS resources in rural areas
		  ○ Can be of high value due to extended transport or transfer times.
		• Local agencies may be reluctant to transport patients to distant trauma centers
		  ○ Takes limited resources out of primary response area
		  ○ If volunteer staffed takes people away from primary vocations

	Strategies	Computer aided dispatch may help identify the correct response type/mode. Pre-arrival instructions are essential in areas with extended response times but rural dispatch centers often do not have the resources to provide certification for their dispatchers. Trained emergency medical responders (EMR) such as law enforcement, fire department or freestanding quick response units may be essential to provide immediate medical care prior to the ambulance arrival in rural and remote areas.
	Trade-Offs	Properly positioned EMS agencies reduce response time. It may not be practical to expect high level prehospital resources in every community. Regionalization of EMS systems may help control costs and helps keep local resources within standard response areas. ALS rendezvous and hand-offs may improve system efficiency.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category – Air Medical Response	**Desired State**	**Use of air medical resources reduces initial transport time by xx minutes for patients meeting step one or step two field triage criteria beyond a yy ground transport radius. Use of air medical resources reduces inter-hospital transport time by aa minutes for patients meeting step one or step two field triage criteria beyond a bb ground transport radius.**
	Parameters	xx - no data available, suggest 15-30 minutes yy - no data available, suggest a 20-30 mile radius aa - no data available, suggest >30 minutes (assumes full ALS ground capabilities) bb - no data available, suggest greater than 50 mile radius (assumes full ALS ground capabilities)
	Current State	Determine: • Number, location and type of air medical resources in the region or state • Average length of time from dispatch to airborne • Average length of time for patient preparation for flight (scene and inter-hospital) • Average time savings by distance from the nearest appropriate trauma center (may not be the air medical assets home base). ○ Requires assessment and comparison of ground transport times
	Data Sources	• Statewide trauma registry • Individual trauma registry • Acute care facility ED discharge data • NEMSIS statewide database
	Gaps	• Overabundance of resources in some metropolitan areas • Paucity of resources stationed or immediately available in rural/remote areas • May not operate in a manner that best supports the trauma system
	Strategies	Establish clear expectations through rule, regulation or policy concerning the use of air medical resources for the initial transport or transfer of trauma patients. Ensure that data are collected and analyzed and that air medical providers are fully engaged in performance improvement activities.
	Trade-Offs	The use of rotor wing aircraft may result in the ability to increase the time/distance radius surrounding high level trauma centers. If "stationed" at the trauma center results in fly out – fly back time considerations that lessen the radius. Rotor wing aircraft affiliated with a hospital may result in over flights of closer appropriate trauma centers resulting in delays to care. Minor/moderate injuries may be transported resulting in increased individual and systems costs and significant risks to providers and patients. Fixed wing aircraft often take significant time from dispatch to launch but may be the only reasonable alternative for remote transfers. Air medical data are often not available for incorporation into other trauma data sets, for system planning, or performance improvement activities.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category – Triage/Trauma Activation	**Desired State**	**xx% of time EMS takes patients meeting field triage criteria to the correct facility and yy% of time step one or step two criteria notification by EMS results in trauma team activation.**
	Parameters	xx - no data available yy - no data available ACS Resources for Optimal Care of the Injured Patient suggests • xx <50% over-triage • xx <05% under-triage • yy Trauma surgeon immediately (<15 minutes) available (LI and LII trauma centers, promptly [<30 minutes] for LIII) for the highest level of trauma team activation upon prior notification by EMS.
	Current State	Determine: • % of over-triage • % of under-triage • % of mistriage • Percent of failure to require the highest level of trauma team activation for patients meeting step one or step two trauma triage criteria with appropriate notification by EMS prior to arrival.
	Data Sources	• State trauma registry • Facility trauma registries • State NEMSIS database • Hospital discharge data • Vital records (death certificates) • System (multi-disciplinary) performance improvement minutes

	Gaps	• Establish and enforce field triage guidelines
		  ○ Adopt or refine CDC/ACS guidelines
		• Ensure facilities adopt and adhere to trauma team activation policies
		  ○ Continuously monitored through PIPS processes

	Strategies	Develop "Cribari grid" for each facility to determine rates of over- and under-triage. Develop model criteria for trauma team activation at the regional or state level. Monitor compliance of both triage and activation.
	Trade-Offs	Over-triage ensures injured patients do not have occult injuries, however it increases system costs. Under-triage/mistriage contributes to poorer outcomes. Failure to initiate trauma team activations delays access to care.

American College of Surgeons – Trauma Center Needs Assessment Tool		
Category - Capacity	**Desired State**	**xx% of time trauma centers are on diversion; yy% of time trauma centers are 10% over capacity**
	Parameters	xx - no data available - suggest <5% total time on diversion yy - no data available - suggest <10% total time over-capacity
	Current State	Determine: • % of time on diversion • % of time overcapacity
	Data Sources	• Individual trauma registries • Statewide or regional system/bed status management data
	Gaps	• Limited trauma centers may result in excess diversion and subsequent delays in care. • Persistent overcapacity issues may result in inability meet unexpected demands during catastrophic events.
	Strategies	Establish and monitor diversion and capacity benchmarks as part of verification/designation process. Monitor system/bed status management data (such as EMSystem installed for use during catastrophic events) on an ongoing basis.
	Trade-Offs	Excessive diversion or over-capacity issues impact the system's ability to flex for surges and large scale events. It may indicate a need for additional trauma centers in an region or state. This could include lower level centers to relieve some burden for minor and moderate injuries.

Appendix E: Participant List

Last Name	First Name	Organization
Anderson	Mark	Regional Medical Center Bayonet Point
Ang	Darwin	Ocala Regional
Armstrong	John	Department of Health
Aucutt	Brittney	Department of Health
Barnhill	Kim	Department of Health
Barquist	Erik	Osceola Regional Medical Center
Behmke	Bernadette	Department of Health
Bifler	John	Department of Health Emergency Medical Services
Bixler	John	Florida Department of Health Emergency Medical Services
Blank	Phill	Blank & Meenan
Block	Ernest	Health First Holmes Regional Medical Center
Card	Karen	Department of Health
Carrillo	E.M.	Memorial Regional Hospital
Collins	Janet	Trauma Program
Cookro	Dennis	Department of Health
Cummings	Dylan	Department of Health
Daughtery	Stephanie	Department of Health/BEMU
DeCastro	Martha	Florida Hospital Association
Ecenia	Steve	Rutledge Ecenia
Emmanuel	Stephan	Ausley McMullen
Epstein	Steven	Bayfront Medical Center
Fennell	Jennifer	Core Message
Frazier	Seann	Parker Hudson Rainer & Dobbs
Frehn	Jeff	Radey Thomas / Tampa General Hospital
Garrino	Eddy	Memorial Regional Hospital
Gill	Karan	Sacred Heart Hospital
Glazer	Michael	Ausley McMullen
Harman	Aaron	Department of Health
Harper	Genevieve	Sacred Heart Hospital
Harvey	Carma	Department of Health
Hilsenbeck	Julie	Tenet Health
Kay	Nathan	SHS
Kushner	David	UMJ Chair
Lyon	Freda	Tallahassee Memorial Hospital
Macvezzi	Leopoldo	Miami Children's Hospital
McCoy	Steve	Department of Health
McHargue	Mike	Department of Health
McKenney	Mark	HCA Healthcare
Moore	Frederick	UF Shauds
Newsome	Bonnie	Department of Health
Norwood	Scott	Regional Medical Center Bayonet Point

Osborne	David	Blank & Meenan
Richter	Cory	Indian River Fire Rescue/EMS Advisory Council
Roberts	James	Shands JAX & Shands Gailesulle
Roberts	James	Shands Healthcare
Shouppe	Clint	Baycare Health System
Smith	John	City of Kissimmee
Smith	John	City of Kissimmee
Stadler	Patricia	Tallahassee Memorial Hospital
Tepas	J.J.	University of Florida
Tyndall	Joseph	University of Florida, Department of Emergency Medicine
Warren	Gabriel	Rutledge Ecenia
Zhang	Roy	Department of Health
Ziglan	Michele	HCA Healthcare