



**AMERICAN COLLEGE OF SURGEONS COMMITTEE ON TRAUMA
Trauma Systems Evaluation and Planning Committee**

Trauma System Consultation Report

State of New Hampshire

Concord, NH

February 16 – 19, 2016



AMERICAN COLLEGE OF SURGEONS

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EXECUTIVE SUMMARY

Overview

New Hampshire is a small state, covering less than 10,000 square miles, with a population of about 1.3 million. Nevertheless, the emergency medical services (EMS) and trauma systems face significant challenges due to relatively limited highway access, mountainous terrain, and weather, particularly in the winter months where snowfall averages range between 60-100 inches. New Hampshire has a long-standing tradition of local rule and a limited set of powers granted to the state government, combined with a normative commitment to a spirit of self-reliance and of neighbor helping neighbor.

The New Hampshire trauma system has its roots in the 1970's, beginning with the establishment of the original five EMS regions. The broader systems approach dates to the 1990's, which was initiated with the help of a federal grant. Initially, the state's Department of Health and Human Services was the lead agency, but in 1999 the EMS and trauma system programs were transferred to Department of Safety, Division of Fire Service Training and Emergency Medical Services (FST&EMS). This is a relatively unique administrative structure, which seems to have resulted from system leaders working with the funding mechanisms and relationships available at the state level.

The Emergency Medical and Trauma Services Coordinating Board is the body authorized by statute to oversee the trauma and EMS systems, approve policy, and comment on rules proposed by the Commissioner of Safety. The Trauma Medical Review Committee (TMRC) is established in statute as an advisory body that reports to the Coordinating Board. The TMRC does not have direct authority to establish policy or provide oversight, but in practice it has been the primary source of direction and leadership of the trauma system.

At the present time, the New Hampshire trauma system functions as a collection of individual Level I and Level II trauma centers that work cooperatively with each other and with surrounding Level III trauma centers and smaller hospitals. However, this collection of trauma centers lacks significant system-wide coordination and oversight. As a result, the New Hampshire trauma system faces significant challenges in the provision of optimal care to injured patients. Though envisioned as an inclusive system, participation is voluntary, and only 11 of 26 hospitals currently participate in the state's trauma system. According to data provided by the TMRC, this number has fluctuated over the years, but the trend is down since 2001 when 18 of 26 hospitals had been reviewed as trauma centers.

Despite a very austere budget and limited support for central governance as a matter of state policy, the state trauma system made substantial progress over the years. This progress was largely the result of an exceptionally high degree of volunteer effort and cooperation among stakeholders, which is also consistent with New Hampshire tradition. However, it appears that progress under these circumstances has nearly reached its maximum capacity. Over the past few years, a resurgence of energy and interest in trauma system development has occurred with new TMRC leadership, leading to the revitalization of the core stakeholder community. The state trauma plan was completed in 2010. In addition, the dedicated group of providers and stakeholders across the spectrum of care remains strongly engaged. Under the current system, conditions are favorable for short-term gains, as well as for a re-evaluation of the long-standing

structure of the system, as a means to implement the trauma plan and forge a stronger system in the long-term.

Current Status

New Hampshire has 26 acute care facilities, 13 of which are critical access hospitals with 25 or fewer beds and at a distance of more than more than 35 miles from the nearest acute care facility (with some exemptions for terrain and travel conditions). Currently New Hampshire has 11 verified trauma centers, including one Level I, three Level IIs, six Level IIIs, and one Level IV. Each of these facilities has additionally made a commitment to the care of the injured pediatric patient. Though the New Hampshire plan supports the principle of an inclusive model, fewer than 50% of the state's acute care facilities actively participate in the trauma system. The New Hampshire trauma system relies on out-of-state resources in Massachusetts, Vermont and Maine, particularly for complex procedures like re-implantation and burns.

The New Hampshire trauma system has very limited funding, and minimal administrative infrastructure at the level of the lead agency. The responsibility for trauma system leadership, oversight, and policy development rests largely with the TMRC, though this volunteer body has no actual statutory authority to perform these functions. Progress in trauma system development has been made largely because of dedicated volunteer efforts and cooperation between and among the verified trauma centers. The recently completed trauma system plan is in place, but resources and lead agency personnel to support plan implementation are lacking. Without dedicated lead agency personnel with authority, progress will continue to be slow and limited, corresponding to the time and energy that volunteers can contribute.

While uniform field trauma triage guidelines consistent with national standards have been implemented, the choice of local hospital destination based upon triage level is left to the local EMS agency and to individual EMS provider discretion. Overall, few system level standards are in place, minimal integration of trauma system components exists, and little or no system-wide evaluation of EMS and trauma system performance occurs. This contributes to a high degree of variability in trauma care across the state.

Both the prehospital data and trauma registry data systems have amassed a large body of data, especially at the EMS level. To date, neither of these datasets has been used in a meaningful way for trauma system performance improvement.

Assets and Advantages

The New Hampshire trauma system benefits from a normative commitment to a spirit and long history of dedicated volunteerism from a core of engaged stakeholders, as well as the tradition of neighbor helping neighbor. This is embodied in a high degree of cooperation between and among the trauma centers and providers at all levels.

The natural distribution of hospitals has contributed to good coverage by verified trauma centers that serve the majority of the state's population. The New Hampshire Hospital Association is actively engaged and a supportive ally.

Primarily through the efforts of the TMRC and supporting stakeholders, the New Hampshire trauma system updated the Trauma System Plan in 2010, and continues to do so.

The New Hampshire EMS system is a very strong element of the state's trauma system, bolstered by EMS clinical protocols, and the adoption of the Centers for Disease Control and Prevention (CDC) field triage guidelines. The FST&EMS enjoys broad legislative and regulatory authority. The FST&EMS division is open to exploring other directions to promote further development of the trauma system within a commitment to better serve the injured patients of New Hampshire.

Information systems, which can be used for performance improvement on the impact of the trauma system, are currently in development. The prehospital data are more firmly established with a large number of prehospital records. The requirement for electronic collection of EMS data has resulted in a robust data set. Although the state is committed to a new data management system that will facilitate linkage of EMS and trauma registry data, the trauma registry is newer and less well populated. These data sets are supported by good access to population-based data.

A wide range of injury prevention activities are in place, typically at the local level.

Challenges and Vulnerabilities

Beyond the TMRC committee and a small group of stakeholders, there is no shared vision for trauma system development in New Hampshire. This is further hampered by the lack of financial support for the trauma system infrastructure and for support of system integration.

Very few rules concerning the trauma system exist, particularly when compared with set of rules and regulations for the EMS system.

Limited integration of many important agencies and groups into trauma system structure and operation currently exists.

The trauma system is heavily dependent on volunteer efforts. Many of these efforts are undertaken through the expanded role of the TMRC. However, the authority of the TMRC is not well defined in statute or rule. The stakeholders noted that the current level of volunteer effort is unsustainable in the long-term.

Prior inconsistencies in trauma center designation have contributed to variable perceptions by EMS providers of trauma center capabilities, leading to variability in local choice of destination. This challenge is further exacerbated by inconsistent EMS medical direction at the local level. Despite the adoption of CDC field triage guidelines, firm trauma center destination protocols are not tied to those guidelines.

The public has little awareness of the importance of the trauma system, and the challenges that it faces. As a result, it has been difficult to gain support, especially for funding, from the state's legislature.

While performance improvement (PI) activities occur at the Level I and Level II trauma centers, no system-wide PI activities have been initiated. The stakeholders are waiting for the statewide trauma registry to be fully functional in order to support the system-wide PI efforts.

The decision to adopt the American College of Surgeons' trauma center verification process for Level I and Level II trauma centers will improve the uniformity the state's verification process. However, the state's verification process for Level III and IV trauma centers remains variable. No designation process currently exists to verify trauma centers based upon the needs of the population served.

New Hampshire has no resources for coordination or cataloging of injury prevention activities across the system.

Themes

The trauma system must have a vision for current function and future development that is shared and widely embraced by the lead agency, stakeholders at all levels, the public, and the legislature.

The development of the New Hampshire trauma system has stretched the volunteerism to its limit. Increased leadership and administrative support at the lead agency level will be essential for the continued development and improvement of the trauma system. This will require either securing new personnel resources or reallocating existing resources within the lead agency to support the effort.

Excessive variability exists within the current trauma system. This can be addressed by the promulgation of additional rules to ensure consistency across the trauma and EMS systems, a process that is within the existing authority of the lead agency. The goal is not to replace regional leadership, but to establish minimum standards across the state.

Under the framework of an inclusive system, a defined role for all acute care facilities is needed, and all facilities should participate at an appropriate level as essential stakeholders. The role of each facility should be based on trauma system and local population needs. Facilities should not be designated at a higher level than local and population need requires, e.g. a Level III trauma center across the street from a Level II trauma center would not be needed.

The continued maturation of the trauma system in New Hampshire should not be held back by perceived barriers such as hesitation to work with acute care facilities and lack of funding support from the legislature.

Performance improvement should begin immediately and not be delayed because of lack of "perfect" data. Sufficient data resources are available to begin the PI process using the EMS dataset. The PI process will improve as the trauma registry data become available.

PRIORITY RECOMMENDATIONS

Statutory Authority and Administrative Rules

- Adopt rules that provide authority to the Division of Fire Standards Training and Emergency Medical Services (FST & EMS) to develop, manage and evaluate the New Hampshire trauma system.
 - Include but do not limit rules to:
 - Field destination criteria
 - Trauma center designation criteria
 - Implementation of data collection
 - Implementation of system-wide performance improvement
 - Facilitation of injury prevention and public education programs

System Leadership

- Develop a shared vision for trauma system development between the Trauma Medical Review Committee (TMRC) and the lead agency.
- Create and staff clearly identifiable trauma system administrative infrastructure within the lead agency, with responsibility for operational oversight, data collection and analysis, and coordination of quality assurance functions.

Lead Agency and Human Resources within the Lead Agency

- Create and fund a trauma systems manager position (1.0 full-time equivalent [FTE]) within New Hampshire Division of FST&EMS that will have primary focus of managing the statewide trauma system.
 - Restore funding from the original position that was dedicated to trauma when the program was transferred from the Department of Health and Human Services.
 - Include in the job description qualifications of clinical and management experience in a trauma center.
- Create a position and hire a full-time state trauma registrar.

Trauma System Plan

- Develop a companion tactical plan to outline the steps, timelines and responsible committee or agency for implementation of *New Hampshire Trauma System Plan*.
 - Task the TRMC with a “final” review of the current *New Hampshire Trauma System Plan* to ensure that it is consistent with current concepts and trauma system development.

Financing

- Create an incremental and prioritized budget for trauma system development.
- Identify and secure sustainable funding to support the activities of a comprehensive state trauma system.

Prevention and Outreach

- Develop trauma system fact sheets for media relations, public officials, general public, legislators, thus ensuring a better understanding of the trauma system and the needs of the trauma system.
 - Capitalize on opportunities for impact messaging featuring the trauma system, e.g., great saves, trauma systems save lives, etc.

Definitive Care

- Adopt trauma center verification process of the American College of Surgeons Committee on Trauma (ACS-COT) for level I, II and III trauma centers.
 - Consider additional factors for trauma center designation, including the needs of the population in the designation of current and future trauma centers.
- Change the classification process for all other facilities to focus on technical assistance and facilitation of rapid triage and transfer of seriously injured patients that includes resuscitation protocols, pre-identification of patient and injury types that will be transferred, and pre-selection of destination hospitals.
- Require all acute care facilities to submit at least the minimum dataset for all injured patients, died, admitted or transferred.
 - Define a minimal dataset for use by all non-designated participating facilities, to provide a more comprehensive profile of trauma care in the state.

System Coordination and Patient Flow

- Work with Emergency Medical Services (EMS) regions and EMS medical directors to establish clear and specific regional destination protocols, including parameters for use of air medical transport.
 - Educate EMS providers and agencies about the New Hampshire trauma center levels and how to use this information in triage decisions.
- Establish clinical decision guidelines for inter-facility transfer.

System-wide Evaluation and Quality Assurance

- Create a trauma system Performance Improvement and Patient Safety (PIPS) subcommittee of the TMRC ensuring membership is multidisciplinary and representative of the trauma continuum of care.
 - Implement the trauma PIPS process immediately.
 - Utilize existing data sources, e.g., the prehospital database.
 - Select one trauma system audit filter and perform a focused audit inclusive of data analysis, corrective action – implementation, and evaluation

Trauma Management Information System

- Continue development of the statewide trauma registry, providing adequate resources in the lead agency to monitor and validate data submissions, to analyze data, and to provide standard and customized reports for the TMRC and participating EMS and acute care facilities.

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 populations). 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 *Injuries in New Hampshire 2001-2009* report, published in 2012, demonstrated that the injury program has good access to a large number of population-based databases to describe the morbidity and mortality associated with injury. Databases include vital records, fatality analysis reporting system (FARS), hospital discharge data, emergency department data, the Behavioral Risk Factor Surveillance System (BRFSS), and the Youth Risk Behavior Survey (YRBS). The injury report has specific focus on pediatric and geriatric age groups and specific mechanisms of injury, e.g., falls, motor vehicle crashes, and suicide. Some financial data are reported for various mechanisms of injury.

Currently no clinical injury databases are used to describe the state's injury problem as the state trauma registry has not yet been launched. A challenge was reported with regard to availability of current hospital discharge data, primarily due to changes in contracts for management of this data system. A new contractor is anticipated so that more current data will become available. This will be beneficial to both the trauma system and the injury prevention programs.

An injury surveillance coordinator was reported to be present in the injury prevention program housed in the Maternal and Child Health Bureau of the Department of Health and Human Services. An update to the *Injuries in New Hampshire 2001-2009* report was reported to be in planning stages.

The *Injuries in New Hampshire* report was used to guide priorities selected for the Injury Prevention Plan 2014-2018.

A recent change in leading cause of injury deaths is that poisoning (associated with opioids and other substances) was reported as the major mechanism of injury deaths for 2012-2014 in the 20-64 year age groups. This injury mechanism now exceeds mortality due to motor vehicle crashes. Information regarding impaired driving and injury morbidity and mortality is not yet available.

New Hampshire (NH) has an electronic data analysis query system and data dashboards called WISDOM, available to the public through the Injury Prevention Program website. The dashboards are valuable and provide rapid information about selected injury mechanisms for 2010-2014. It is also possible to ask for more customized queries about specific injuries from WISDOM; however, the process to make the request for such reports is not intuitive. It was reported that guidance about requesting a WISDOM report could be obtained through the Injury Prevention Program. A tutorial for the process to retrieve special request information from WISDOM would be beneficial for most public users.

It was reported that more current fact sheets for some specific injury mechanisms had been produced, but they are not posted on the state's Injury Prevention Program website. Better dissemination of these fact sheets, such as through links on the trauma system web page, would be valuable to the trauma system and injury prevention advocates.

Recommendations

- Update the *Injuries in New Hampshire* report to reflect the current injury problem.
- Ensure that all injury reports and fact sheets are accessible to the trauma community, such as through links on the trauma system web page.
- Develop and post a tutorial to guide novice users about performing a custom search on WISDOM.

Indicators as a Tool for System Assessment

Purpose and Rationale

In the absence of validated national benchmarks, or norms, the benchmarks, indicators and scoring (BIS) process included in the Health Resources and Services Administration's *Model Trauma System Planning and Evaluation* document provides a tool for each trauma system to define its system-specific health status benchmarks and performance indicators and to use a variety of community health and public health interventions to improve the community's health status. The tool also addresses reducing the burden of injury as a community-wide public health problem, not strictly as a trauma patient care issue.

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

Optimal Element

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

Current Status

Most of the stakeholders in the audience were not familiar with HRSA's (2006) Model Trauma System Planning and Evaluation (MTSPE) document. Even fewer were familiar with the system assessment measure referred to as the Benchmark, Indicators, and Scoring (BIS) tool contained in the MTSPE.

The New Hampshire trauma leadership is encouraged to become familiar with the MTSPE and BIS and to determine if completion of the entire BIS is a priority at this point in the development of the state's trauma system. The benefit of the BIS is twofold. First and foremost it provides a focal point to generate discussion between and among the stakeholders across the entire spectrum of trauma system structure and process. Second, it provides a baseline score that can be monitored during repeated measures over time that can be used to document the incremental progress in trauma system maturation. The changes in score can be used to convince policy makers that resources are being appropriately used.

Recommendations

- Task the Trauma Medical Review Committee with a high level review of the Benchmarks, Indicators, and Scoring tool (BIS) to determine if it would be useful to complete at this point in the development of the New Hampshire trauma system.
- Identify an expanded group of trauma system stakeholders to complete the BIS if deemed to be a priority.
- Select a qualified facilitator, knowledgeable with the BIS, trauma systems, and the processes associated with administering the BIS.

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

The New Hampshire trauma system began in 1995 with the Department of Health and Human Services as the lead agency. In 1999 the EMS and trauma services were transferred to Department of Safety, Division of FST&EMS.

The statutes and rules on EMS and trauma that existed under Department of Health and Human Services were transferred to the Department of Safety. The statutes and rules were subsequently readopted and renumbered. It is presumed that the scope and content of the statutes and rules remained intact during these revisions.

The General Court of the state of New Hampshire recognized that injury is a state health problem. The General Court declared that the establishment of a coordinated statewide trauma and injury prevention system would benefit all state residents and visitors.

Provisions of New Hampshire Revised Statutes Annotated (RSAs) 153-A: 1 through 153-A: 34 inclusive provide descriptive language and authority for EMS and trauma services within the state. The Commissioner of Safety is empowered by RSA 153-A-7 to adopt rules, with the advice of the EMS Medical Control Board and the TMRC.

The Bureau of EMS within the Department of Safety, Division of FTS&EMS is defined in RSA 21-P.

The Bureau of EMS has adopted extensive administrative rules for the coordination and standards of EMS care provided in this state. Conversely, administrative rules pertaining to similar provisions of a trauma system have not been adopted or drafted.

The stakeholders raised the following concerns about statutes and supporting administrative rules.

- Roles, responsibilities and authority of the Trauma Medical Review Committee (TMRC) have not clearly been articulated.
- Out-of-hospital triage destination decisions are included in the *EMS Provider Manual*. However, they have been modified from Centers for Disease Control and Prevention (CDC) field triage criteria and are open for interpretation by individual providers or medical direction.

Recommendations

- Create a subcommittee under the Trauma Medical Review Committee (TMRC) to review all statues and regulations pertaining to the trauma system with a focus on updating and/or revising sections needing attention.
 - Initiate this committee within one year.

- Adopt rules, with the approval of the Emergency Medical and Trauma Services Coordinating Board and the TMRC, as authorized by RSA 153-A: 20.
- **Adopt rules that provide authority to the Division of the Fire Standards Training and Emergency Medical Services (FST&EMS) to develop, manage and evaluate the Trauma System.**
 - **Include but do not limit rules to:**
 - **Field destination criteria**
 - **Trauma center designation criteria**
 - **Implementation of data collection**
 - **Implementation of system-wide performance improvement**
 - **Facilitation of injury prevention and public education programs**

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 primary leadership for the trauma system arises from the TMRC. The TMRC is established in statute as an advisory body that reports to the Emergency Medical and Trauma Services Coordinating Board which is authorized by statute to oversee the trauma and EMS systems, approve policy, and comment on rules proposed by the Commissioner of Safety. The Coordinating Board consists of 22 gubernatorial appointees representing a broad spectrum of stakeholder groups. Although the Coordinating Board holds statutory authority, it has not historically provided vision or policy leadership for the trauma system. As established in statute, the TMRC does not have direct authority to establish policy or provide oversight, but in practice the TMRC has been the primary source of direction and leadership of the trauma system. The voting members of the TMRC are established in statute, consisting of at least 5 physicians representing various specialties, as well as a broad representation of other trauma stakeholders. The members are appointed by the Commissioner of Safety, and serve 3 year terms. The membership of the TMRC is similar in makeup to the 22 member coordinating board.

The TMRC had a single chair and fairly constant membership over a long period through the 1990's and early 2000's. After a short period of relative inactivity, the TMRC is newly revitalized under a new chair, and a broader group of system stakeholders has become interested. The membership list has been updated, and the participation of non-voting members is actively encouraged, giving the committee a broader group of active stakeholders. Within the past year, the TMRC created specific subcommittees to accelerate the pace of work in specific areas and to further encourage the participation of non-voting members. Most recently the energy of the TMRC has focused largely on the trauma center designation process, including establishing standards and conducting site visits. Work has also focused on the recruitment of additional trauma centers to participate in the trauma system, The TMRC has historically been the body to verify or designate trauma centers, but it does not have authority in rule or statute to do so. In practice, the TMRC has successfully provided leadership and guidance, primarily through a process of consensus and mutual agreement among participating trauma centers and EMS providers. Because very few administrative rules are in place, little or no enforcement authority exists for actions recommended by the TMRC, the Coordinating Board, or the Commissioner, especially in areas not directly tied to EMS licensure and standards.

Outside the TMRC, much of the stakeholder leadership arises from small ad-hoc groups focused on specific issues, and much of the progress made during the life of the trauma system was achieved through such channels. Historically, the New Hampshire Committee on Trauma (NH COT) has not been a strong force, largely because of the extensive overlap with the TMRC membership. This leaves little perceived need for independent work by the NH COT. Within the last year, the NH COT was reconstituted around the mission to bring the ACS Rural Trauma Team Development Course (RTTDC) to smaller hospitals in the state.

The trauma program managers reported working together, but no evidence of a formal or informal association was provided. A more formal association could be beneficial for communication, outreach, and support to the TMRC.

To date, the Division of FST & EMS, though nominally the lead agency, has not assumed an active role in leadership or operational oversight of the trauma system. It acts primarily to facilitate the work to the TMRC, but without a strong vision regarding the optimal function or future direction of the trauma system. As a result, the vision and direction for development of the state's trauma system are not clearly articulated or understood outside of a fairly small group, and little or no administrative authority exists to enforce policy and guidelines. Further, challenges include no regular operational oversight of system function, no working systems for data collection or analysis, and no framework for ongoing system quality monitoring and improvement.

The state trauma system made substantial progress over the past 20 years based almost entirely upon the energy and commitment of its volunteer stakeholders and the willing cooperation and participation of people and institutions. However this approach has largely reached the limits of what it can accomplish. To further improve the trauma system, it will be necessary for the lead agency to establish a stronger sense of ownership and a more supportive infrastructure, and to establish administrative authority for basic system functions.

Recommendations

- Create and staff a clearly identifiable trauma system administrative infrastructure within the lead agency, with responsibility for operational oversight, data collection and analysis, and coordination of quality assurance functions.
- Develop a shared vision for trauma system development between the Trauma Medical Review Committee and the lead agency
- Increase the visibility of the lead agency as focal point of trauma system operation
- Develop the role of the New Hampshire Committee on Trauma within the trauma system leadership
- Develop roles of other stakeholder groups, such as trauma program managers, within the system leadership.

Coalition Building and Community Support

Purpose and Rationale

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

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

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

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

Optimal Element

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

Current Status

The primary stakeholders for the New Hampshire trauma system are the TMRC and interested individuals who attend TMRC meetings. The TMRC voting membership includes representatives from appropriate state chapters of national organizations (e.g., emergency medical technicians, fire chiefs, fire fighters, emergency nurses, and emergency physicians) as well as surgeons, the state hospital association, medical examiner, a trauma program manager, and a paramedic. A pediatric surgeon is specified in the voting membership. Non-voting

members that attend regularly include the state's Emergency Medical Services for Children (EMSC) program manager, trauma program managers, and interested physicians. In recent months the TMRC reached out to invite injury prevention and rehabilitation representatives to TMRC meetings. These representatives are important for expanding the stakeholder group for the trauma system.

Some recent changes have occurred within the TMRC to encourage less active voting members to resign and to appoint new members. This has helped to re-energize the TMRC. Additionally, subcommittees were formed that help engage the voting and nonvoting membership, and these subcommittees are more effective in addressing important issues for full TMRC consideration.

It may be helpful to invite other stakeholders representing other groups (e.g., law enforcement, disaster preparedness, rural health, elected officials, and the media), especially when seeking support and fresh ideas to advance trauma system development.

The injury prevention program has many different coalitions focused on different injury mechanisms; however, it is not clear that a statewide injury prevention coalition is active and meeting regularly at this time. Many interested injury prevention advocates representing various injury prevention groups did collaborate on development of the *Injury Prevention Plan 2014-2018*. Injury prevention information is linked to the trauma system's web page.

The state would benefit from a strong injury prevention and control coalition that has linkages with a state agency, but it could potentially be associated with an organization, agency, or hospital. However, it should be positioned so that it is sustainable and functional. A focus on primary, secondary, and tertiary injury prevention may be valuable if that would enhance awareness of the trauma system's role in injury prevention. This group could be tasked with focusing efforts on achieving the goals and objectives of the state's injury prevention plan. Regular meetings through teleconferences and periodic face-to-face meetings may encourage more active participation. As this coalition develops, events such as educational conferences, public messaging, injury prevention activities can be matured. Templates and best practices can be obtained from other States and Regions.

Communication with stakeholders outside of the TMRC group is minimal. A trauma system program page exists on the NH.gov website, but minimal information is posted that could help educate the public and elected officials about the trauma system and current activities of the TMRC. For example, the TMRC meetings are open to the public, but it is not apparent that meeting minutes are posted on the website for public review. No other means of communication was reported, such as a newsletter.

A prior radio broadcast about the New Hampshire trauma system by Dr. Sutton was mentioned (see the Prevention and Outreach section for more information). No other methods of public education were described that could help inform the public, elected officials, and even key trauma system participants about some of the challenges and changes occurring within the trauma system. For example, it was reported that EMS providers were not informed about the changes with regard to criteria for verification of Level I and II trauma centers or the resources each trauma center has that are important when making trauma destination decisions.

Recommendations

- Identify additional stakeholders representing other groups to attend the Trauma Medical Review Committee (TMRC) and learn about the trauma system.
 - Offer opportunities to participate on subcommittees to raise their interest and ongoing participation.
- Recruit the New Hampshire Committee on Trauma and other groups to promote public education about the trauma system and support that is needed for implementation of the trauma system plan, aligning with the TMRC goals.
 - Review the radio broadcast recording to determine whether it is still accurate or needs modification
 - Determine a method for its dissemination to the public and elected officials.
 - Develop additional information for public education and identify best methods for dissemination.
- Identify an individual in the state with past leadership success in forming a coalition of interested residents in support of a health or social issue.
 - Obtain guidance about coalition building strategies
 - Identify an advocate with time and interest in developing a trauma system coalition.
 - Develop the trauma system coalition to promote public education and to gain support for trauma system development

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 Division of FST&EMS in the Department of Safety is the lead agency for trauma system development and day-to-day operation. A full time equivalent (1.0 FTE) position dedicated as trauma manager came with the trauma system program when it was transferred from Department of Health and Human Services. The trauma system currently has no clearly identified single full time person who is focused on trauma system. After the resignation of the trauma manager, the FTS&EMS reported splitting this full time equivalent among three or more individuals within the EMS bureau. Salary support for the FST&EMS, including the 0.56 FTE is currently allocated to trauma system program from the dedicated Fire Academy funds.

Leadership of the trauma system within the FST&EMS has been passed between Bureau Chief, Deputy Chief, and now the Clinical Systems Coordinator (CSC). This is an indication that the FST & EMS has not invested itself as the lead agency. The CSC is reported to be dedicating 0.4 FTE to trauma system program. Other staff members within lead agency are often called upon to assist with trauma system activities. The current allocation of personnel to the trauma system is not adequate to assist the FST&EMS to address and expand its focus on trauma system development. A 1.0 FTE trauma system manager is essential to support trauma system development. See appendix D for a sample trauma systems manager position description.

The FST&EMS also extended its limited internal staffing to support the trauma system through trauma-related educational opportunities for EMS providers. The Injury Surveillance Program at the Department of Health and Human Services (DHHS) Division of Public Health Services provides limited research support to the trauma program.

Benchmarking of the trauma system has not been a priority to date. A strong trauma registry is the foundation for measuring trauma system quality. Along with the initiation of data submission into a central repository data quality must be assured. A state trauma registrar with the ability to monitor data submission quality, provide technical support, and develop timely reports is essential. See appendix E for a sample trauma registrar position description.

Given the infrastructure needs to support trauma system development, the lead agency should acknowledge its role in promoting and supporting trauma system development for the state's citizens and work to ensure adequate resources for that purpose.

Recommendations

- **Create and fund a trauma systems manager position (1.0 fulltime equivalent [FTE]) within New Hampshire Division of Fire Standards Training and Emergency Medical Services that will have primary focus on managing the statewide trauma system.**

- **Restore funding from the original position that was dedicated to the trauma system when it was transferred from the Department of Health and Human Services.**
 - **Include in the job description qualifications of clinical and management experience in a trauma center.**
- **Create a position and hire a full-time state trauma registrar**
- Create and staff clearly identifiable trauma system administrative infrastructure within the lead agency, with responsibility for operational oversight, data collection and analysis, and coordination of quality assurance functions.

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 *New Hampshire Trauma System Plan* was drafted in 2010 with some minor updates since that time. The plan is well conceived as written, and it is consistent with the current philosophical underpinnings of trauma system development. Key among these principles is inclusiveness, meaning that every acute care facility has a role to play in the treatment of injured patients. Some have the ability to treat only minor to moderate injuries while others have the resources and commitment to treat the most complex trauma. The plan describes triage mechanisms to match the needs of injured patients with the resources of individual facilities, operationalizing the notion of “right patient, right place, and right time”. Some limitations of this triage construct exist in New Hampshire because of the unequal distribution of higher level trauma care facilities and travel challenges associated with geography and weather.

The trauma system plan describes injury as a significant public health problem that is amenable to the public health approach of assessment, policy development, and assurance. The framers of the trauma system plan leaned heavily on the Health Resources and Services Administration’s (HRSA) *Model Trauma System Planning and Evaluation* (2006) document was the first to encourage use of the public health framework as an approach to injury prevention and control.

The *New Hampshire Trauma System Plan* addresses the entire continuum of injury care, including: injury prevention, event identification and notification, prehospital response, determination and matching patient needs with available resources, transport (ground or air), hospital readiness and care, secondary transfer if needed, data collection, and performance improvement. A description of the oversight and management of the trauma system is provided identifying the Department of Safety’s Division of FST&EMS as the lead agency and the supporting role played by the 15-member TMRC. In addition to the TMRC’s voting members, other interested stakeholders are encouraged to participate during TMRC meetings as non-voting members. Much of the implementation of the concepts contained in the trauma system plan will be the responsibility of the TMRC.

Even though the *New Hampshire Trauma System Plan* was revised in 2010 and minor updates were made as recently as 2015, an additional review by the TMRC and the FST&EMS is encouraged to ensure concordance with desired initiatives already identified and those that may become important after the trauma system consultation (TSC). Examples of needed updates include a review of requirements for all levels of trauma centers, the relationship with the ACS for Level I and Level II trauma center reviews, and the use of Trauma Quality Improvement Program (TQIP) reports and data in system-wide evaluation. A companion tactical plan should outline the specific strategies and timelines for addressing specific activities outlined in the trauma system plan.

Recommendations

- **Develop a companion tactical plan to outline the steps, timelines and responsible committee or agency for implementation of *New Hampshire Trauma System Plan*.**

- **Task the Trauma Medical Review Committee with a “final” review of the current version of the *New Hampshire Trauma System Plan* to ensure that it is consistent with current concepts for trauma system development.**
- Create an incremental and prioritized budget for tasks requiring financial resources.

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 TRMC has several opportunities to enhance trauma system integration with other public health programs and issues. The TMRC role, as established in statute is to develop a trauma system plan, monitor care delivery, and make recommendations to the Emergency Medical and Trauma Services Coordinating Board. The membership of the TMRC is relatively inclusive for integration with five physicians and representatives from the NH chapter of the American College of Emergency Physicians, the Paramedic Association, the NH chapter of the Emergency Nurses Association, a trauma coordinator, the Emergency Medical Technician Association, the Medical Examiner, the NH Hospital Association, the EMS Medical Control Board, the NH Association of Fire Chiefs, and the NH Professional Fire Fighters. This committee recently recognized the need to broaden their stakeholder group, and new nonvoting participants include representatives from injury prevention and rehabilitation. These additional representatives help complete participation from the trauma system continuum of care. Pediatric issues are addressed by the requirement of a pediatric surgeon as a voting member and the regular attendance by the state's EMSC program manager.

As an advisor to the FST&EMS, the TMRC is naturally integrated with prehospital provider agencies. Several of the current members also have ties with the emergency preparedness network; however, no formal representation from disaster preparedness is currently attending TMRC meetings. Additionally, no representation from law enforcement, mental health, elected officials, social services, child protective services, or other emergency response programs such as mountain rescue and ski patrol. The addition of representatives from many of these disciplines would significantly increase integration efforts and help communicate the role of the injury prevention and control system (trauma system) in caring for state residents. Another potential but nontraditional linkage may be with advocates for addressing the opioid poisoning epidemic. Substance abuse is often linked to injuries and motor vehicle crashes. Consider adding some of these advocates to the trauma system coalition.

The FST&EMS does not formally have a role in addressing or developing programs for other time sensitive medical conditions such as ST-elevation myocardial infarction (STEMI) or stroke. Very similar issues regarding facility recognition, triage and destination decisions, and protocols for EMS providers, data collection, and quality improvement are important elements of these programs. In some cases the efforts to build, develop, and enhance the effectiveness of the trauma system can serve as a model for development of state programs for these time-sensitive medical conditions. Often a partnership of the leadership of these programs is helpful in raising awareness of the need for legislative support and funding for an infrastructure for system development. Collaboration versus competition with elected officials is essential in an environment of fiscal limitations.

Recommendations

- Build new coalitions with other public health programs within the Department of Health and Human Services and the Department of Safety, such as injury prevention, injury surveillance, child protective services, disaster preparedness, and fire safety to share data, focus priorities, and pursue funding opportunities.
- Continue efforts to engage nonparticipating Level IV capable hospitals as part of an inclusive trauma system, even if they do not pursue designation.

- Partner with other groups representing time-sensitive medical conditions, such as ST-elevation myocardial infarction and stroke, along with emergency medical services to pursue legislative support and sustainable funding for optimal care delivery.
- Explore collaborations and alliances with nontraditional partners, such as law enforcement, mental health, and social services to advocate for coordinated care of high public profile conditions such as opioid abuse/overdose, both to optimize care delivery and raise awareness its impact on the injury control (trauma) system.
- Create other links as outlined in the *New Hampshire Trauma System Plan* introductory paragraphs on “Emerging Linkages and Trauma System”.

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

The FST&EMS reported spending about \$148,000 annually in support of the trauma system. These funds cover salaries, travel, the medical record database, and trauma registry. Additional activities such as trauma conference support and education of EMS personnel were reported. However, the additional expenditures reported were not delineated by line item or clearly identified. Rather than an annual appropriation by the legislature for the FST&EMS and its EMS and the trauma system, financial support comes from a Fire Academy dedicated fund. This fund is supported by the fee charged to insurance companies for access to driver license records. Competition for program financial support within this fund is most likely challenging. Additionally, revenues from fees charged for activities such as initial EMS licensure and licensure renewal go to the general treasury rather than to the program associated with the fee.

The FST&EMS has leveraged funding from various grants from other state programs (Highway Safety, DHHS, and the Fire Fund) to support some trauma-related initiatives such as training activities (e.g., teaching administration of naran and infection control), equipment, the trauma registry, and the TEMSIS (New Hampshire's electronic EMS patient record).

The FST&EMS does not calculate and report the cost of implementing and operating the trauma system for the public or trauma system stakeholders. Costs that could be reported include administrative services, support of the TMRC, trauma center site visits for verification, development of relationships with trauma care facilities, and technical support for and maintenance of the trauma registry. Consequently, no budget or projected cost data exist regarding the funds needed to develop, sustain or improve the trauma system are available for use to raise public awareness. Individual hospitals track their own trauma care costs, but this information is not reported or collected at the state level.

The Commissioner of the Department of Safety has responsibility for adopting rules relative to the classification of hospitals that provide trauma services. However, no application or other fee is associated with this categorization despite the staff time and effort associated with the verification process. It could be proposed that achieving classification as a Level I, II or III trauma care facility has inherent advantages to hospital's patient referral patterns. Verification as a trauma center also offers the opportunity to collect trauma team activation fees, and improving patient referral patterns may lead to a larger number of patients for which activation fees may be charged.

New Hampshire does not have a dedicated revenue source that is stable and reliable to support the trauma system infrastructure. Many states have sought trauma system funding through a variety of fees, surcharges, fines, or other funding sources with relationship to trauma. Examples include safety belt fines, motor vehicle registrations, driver's license fees, moving traffic violation fees, and facility verification fees. Implementing a dedicated revenue source may be challenging in New Hampshire with the current fiscal restraint environment and legislature preference to avoid special funds. Engaging both legislative and administrative champions along with clear and unambiguous information about the need for funds and how they will be used has been met with success in other states.

All trauma stakeholders (e.g. EMS agencies and providers and hospitals) as well as other time-sensitive condition stakeholders must also understand the need for and support proposal for funding if such an initiative is to succeed. An essential step in the process is reaching understanding and agreement on what trauma system infrastructure costs should be covered.

An important strategy is to plan the distribution of funds in a way that benefits all key stakeholders who will be asked to support the proposal for trauma system funding.

The membership of the TMRC and its subcommittees should communicate the need for sustainable funding within their trauma care facilities and professional associations to promote support for the initiative. The FST&EMS should prepare an annual budget for the trauma system infrastructure with costs tied to each component of the trauma system. The TMRC should have an opportunity to review the proposed budget with ample time to analyze it for the purpose of advising the Bureau of EMS on potential changes and to seek stakeholder support.

Recommendations

- **Create an incremental and prioritized budget for trauma system development.**
- **Identify and secure sustainable funding to support the activities of a comprehensive state trauma system. (See appendix F for examples of funding sources used by other states).**
- Adopt a process to review, approve and monitor the expenditures and revenues by line item pertaining to state trauma system within the Division of Fire Standards Training & Emergency Medical Services.
- Assure that the Trauma Medical Review Committee has the opportunity to review, analyze and contribute suggestions for the proposed budget and financial information pertaining to 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

Prevention

The *New Hampshire Injury Prevention Plan (2014 – 2018)* was developed in 2013 by the Injury Prevention Advisory Council (IPAC). The IPAC membership is multidisciplinary and has representation from multiple agencies, coalitions, and partners, including a trauma center representative. The data driven plan includes goals, objectives, and activities and provides a compass for injury prevention activities. This plan should serve as a foundation and compass for the NH trauma systems injury prevention and control activities.

The state has many organizations that focus on injury prevention, e.g., Safe Kids, the Child Safety Network, and multiple programs within the DHHS, including the injury prevention program. The trauma centers are also required to offer injury prevention activities as a condition of verification. It was reported in the pre-review questionnaire (PRQ) that 13 NH Public Health Networks are identified as lead agencies for injury prevention. However, upon clarification, it was reported that these networks are mainly focused on non-injury related activities, such as pandemic planning and immunization. It was reported that minimal or no integration of these networks with the trauma system or trauma centers has occurred. More trauma system integration with organizations and public health programs that focus on primary injury prevention would be beneficial to foster collaboration to help the state achieve injury prevention objectives.

Dartmouth Hitchcock Medical Center was reported to have a strong injury prevention program. Numerous injury prevention programs taking place at the local level, such as through the schools and Parent Teacher Associations. Most of the injury prevention activity is either grant funded, supported by volunteers, or a requirement of the designated trauma centers. While it was reported that some small grants are offered on occasion, the time and effort associated with grant writing and reporting requirements sometimes results in no response to requests for proposals.

The current requirements of injury prevention activities for trauma center verification are not consistent with the ACS 2014 *Optimal Care of the Injured Patient* requirements. The trauma

system is encouraged to update the trauma center injury prevention requirements to make them consistent. Several trauma center trauma program managers (TPMs) provide mentoring for new TPMs, and leadership in the areas of injury prevention.

Recently, the TMRC reevaluated its non-voting membership, and subsequently invited an injury prevention representative to attend meetings. Having an injury prevention representative provides a mechanism to disseminate information on effective injury prevention initiatives and activities and an opportunity to encourage participation in a statewide injury prevention coalition. A clearinghouse with information about effective and evidence-based injury prevention strategies would be valuable to injury prevention advocates in the state. The DHHS injury prevention program is encouraged to establish an injury prevention clearinghouse, and a link to this resource should be made on the trauma system's web page.

The state trauma registry needs to become fully functional as soon as possible so that clinical data can be provided to the injury prevention coalition. All efforts must be made to ensure a consistent and optimal trauma system data process. The 2014-2018 Injury Prevention Plan lists their data sources, and only one trauma center contributed data. The FST&EMS is strongly encouraged to assure they build a sustainable state trauma system registry that is consistently staffed, and has consistent technical support in order to be able to provide clean, validated data for all injury prevention efforts. This is fundamental to any trauma systems injury prevention activity.

Outreach

The new ACS State COT Chair is planning to implement the Rural Trauma Team Development Course (RTTDC). The RTTDC should be implemented within the next 3 to 6 months, and operationalized in such a way that it is consistently delivered and sustainable during leadership and course instructor transitions. This educational program provides multiple opportunities for trauma system outreach, including education to trauma care providers and media opportunities as the program is promoted. The FST&EMS should take the lead on seeking grant funding, such as from the Office of Rural Health Rural Flexibility Program, and to assist with promoting the program.

No other active coordinated efforts for trauma outreach were reported, specifically related to trauma system public awareness. It was reported that an interview on National Public Radio was conducted with the immediate past chair of the TMRC that described the value of a trauma system. This interview was recorded and a copy could be obtained. This interview could be a starting point for a public awareness outreach effort, by reviewing the tape and updating content as necessary. Going forward, a task force of the TMRC or the State COT chapter could focus on developing a robust public awareness outreach program. This would include talking points for trauma system leadership to use when speaking with policy makers, financial donors, and stakeholders. Additionally, a trauma system report should be developed and widely distributed. This report should be updated every 2 years with new data from the trauma registry.

It was reported that little or no media interest in "trauma" had been expressed other than the occasional coverage based on a situational event. Trauma system leaders are encouraged to take advantage of media opportunities to educate the stakeholders and the public about the fact that trauma centers and trauma systems save lives. A few examples and caveats for outreach include:

- Basic media training is important so trauma system spokespersons are confident, trained, and comfortable being interviewed by journalists and appearing on camera.
- Basic training for communicating with elected officials and their staff can be accomplished by inviting legislative staff to be guest speakers at a meeting and encouraging discussion.
- Working collaboratively with trauma center public relations staff may help identify suggestions for and solicit their support for potential media opportunities, such as stories about great saves, new trauma research findings, seasonal injury prevention messaging, etc.
- Working collaboratively with police and fire agencies may offer opportunities for joint media events focused on issues such as distracted driving, driving while intoxicated, seat belt safety, fall prevention, and home safety. The role of the trauma system in response to resulting injuries could be highlighted.
- Organizing a testimonial day for the trauma system leaders to meet with elected officials and or their staff may be an effective strategy.
 - Providing information about the need for action on an injury-related bill offers an opportunity to share information on the trauma system and its role in saving the life of those affected by the injury mechanism.
- Preparation of press release templates with injury prevention and outreach messages can help make it easier for stakeholders to share a consistent message.

Another mechanism to promote community support and media attention for the trauma system is to encourage the trauma centers to organize trauma survivor reunions or an annual trauma survivor day. The month of May, during National Trauma Awareness Month, may be a good time for this activity. Templates for these events are available from various national trauma organizations, and various trauma centers throughout the country.

The lead agency could also work toward planning an annual event featuring the state trauma system in association with multiple agencies such as fire, law enforcement, injury prevention, and trauma centers. This event could be offered anytime of the year or attached to special events such as graduations/prom night, recreational sports activities, or National Trauma Awareness Month. Planning could be centralized for local implementation to garner more public awareness and media support.

It reported that New Hampshire has experienced an alarming increase in poisoning mortality associated with opioid prescription drugs. These data provide the trauma system leadership and stakeholders with an opportunity to partner with other organizations to deliver injury prevention and trauma system information. For example, trauma centers are required for ACS verification to perform screening, brief information, referral and treatment (SBIRT) for their trauma patients who screen positive for alcohol/drugs. This is an evidence-based program. A combination of the data, a patient experience, information on the SBIRT program, and trauma center requirements could be meshed to formulate a media message.

Recommendations

- Implement a statewide injury prevention coalition ensuring a multidisciplinary, multi-agency approach.
- Develop a web-based injury prevention program clearinghouse and update this annually.

- Create a link on the trauma system web page to this resource.
- Develop injury prevention fact sheets for distribution to the public that are consistent with the injury prevention plan priorities.
- Develop a report about trauma system and its importance to the residents of New Hampshire for dissemination to policy makers, the media, and the general public.
 - Revise the trauma system report at least every 2 years with new data from the trauma registry.
- **Develop trauma system fact sheets for media relations, public officials, general public, elected officials to promote a better understanding of the trauma system and its value to the residents of New Hampshire.**
 - **Capitalize on opportunities for impact messaging featuring the trauma system, e.g., great saves, trauma systems save lives, etc.**

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 First Responder, Emergency Medical Technician (EMT) Basic, EMT-Intermediate, EMT Paramedic, and other levels of prehospital personnel have an essential orientation to trauma care for all ages. However, trauma care knowledge and skills need to be continuously updated, refined, and expanded through targeted trauma care training such as Prehospital Trauma Life Support®, Basic Trauma Life Support®, and age-specific courses. Mechanisms for the periodic assessment of competence, educational needs, and education availability within the system should be incorporated into the trauma system plan.

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

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

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

Integration of EMS within the Trauma System

In addition to its critical role in the prehospital treatment and transportation of injured patients, EMS must also be engaged in assessment and integration functions that include the trauma system and also public health and other public safety agencies. EMS agencies should have a critical role in ensuring that communication systems are available and have sufficient redundancy so that trauma system stakeholders will be able to assess and act to limit death and disability at the single patient level and at the population level in the case of mass casualty incidents (MCIs). Enhanced 911 services and a central communication system for the EMS/trauma system to ensure field-to-facility bidirectional communications, inter-facility 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, inter-facility 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

New Hampshire's 234 municipalities choose their ambulance provider based on local need or particular structure. The state has 169 transporting units, of which 154 provide advanced life support at either the advanced emergency medical technician (AEMT) or paramedic level. The state has 139 non-transporting units that provide care ranging from the emergency medical responder (EMR) to the paramedic level, and these units account for more than half of the licensed EMS providers in the state. Most of the non-transporting units are volunteers. Dartmouth Hitchcock Medical Center has two air medical units, one stationed in Dartmouth and one in Manchester. Both are available 24 hours a day 7 days a week. New Hampshire has statewide 911 coverage, using both E911 and wireless E911.

All EMS services come under the Department of Safety's Division of FST&EMS. EMS providers function under statewide protocols developed and maintained by the EMS Medical Control Board. All services utilize a National EMS Information System (NEMSIS) compliant electronic patient care record. Each EMS service is required by administrative rule to obtain a written Resource Hospital Agreement as a condition of licensure. The Resource Hospital then provides online medical direction when requested. The online medical director is also responsible for making recommendations for re-licensure of the EMS providers in his or her system.

Medical director EMS system involvement is variable across the state concerning off-line medical director activities such as training, quality improvement, and planning. Compensation for the medical director's time to perform these functions is also variable. New Hampshire does have a state EMS medical director to provide advice to and oversight of resource hospital medical directors.

EMS training is available in the more populous areas of the state through the Fire Academy. The opportunity for EMS education decreases in the more rural areas of the state. The trauma-

specific required training is what is identified in the initial certification and recertification required by the National Registry of EMTs (NREMT). New Hampshire is also piloting the NREMT recertification program. Funding exists for a series of Prehospital Trauma Life Support (PHTLS) courses, but these may end when the funding ends.

Recommendations

- Develop standards for Resource Hospital Emergency Medical Services (EMS) medical directors to include medical director training or demonstration of knowledge in trauma medical direction concepts and responsibilities.
- Evolve the Trauma Medical Review Committee to provide medical oversight integrating the specialty needs of the trauma system with the medical oversight for the overall EMS system.
- Develop and adopt performance improvement indicators for training and quality improvement activities.
 - Include indicators for medical director interaction with EMS providers
 - Conduct quarterly and annual reviews
- Provide medical director training opportunities, and consider mandatory basic online medical director instruction.
- Develop a statewide plan for volunteer EMS provider recruitment, training and retention.
- Evaluate potential of distance learning technology to increase availability of advanced EMS training in areas that lack ready access to a physical educational facility.

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 inter-facility 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

New Hampshire has 26 acute care facilities, of which 13 are critical access hospitals. Eleven hospitals participate formally in the trauma system. The state's single adult Level I center is at the Dartmouth-Hitchcock Medical Center, located on the western border of the state. A significant amount of this trauma center's volume comes from neighboring Vermont. The 3 Level II adult trauma centers are located in the larger metropolitan areas in the southern portion of the state. The state has 6 Level III trauma centers, also largely in the southern half of the state in the smaller communities. The state has one Level IV adult trauma center.

Participation in pediatric trauma care is robust. All state-verified trauma centers must also be categorized as a pediatric trauma center. Dartmouth-Hitchcock Medical Center has ACS-COT

verification as a Level II pediatric trauma center. An additional 5 pediatric Level III centers and another 5 Level IV pediatric centers exist in the remaining trauma centers.

The state has no burn center and no rehabilitation hospital with expertise in caring for spinal cord injuries, particularly those patients who are ventilator dependent. No trauma center in the state performs replants. Appropriate transfer facilities are available in Boston, MA, and Portland, ME, and these facilities are used routinely. Neurosurgical coverage is also a challenge. The trauma centers in Concord and Manchester use the same group for coverage, and it is uncertain whether this allows for appropriate call coverage at both centers.

The New Hampshire trauma system categorizes trauma centers through two pathways. Facilities may choose to undergo ACS-COT verification voluntarily or they may undergo state verification. The state verification process is conducted under the auspices of the TMRC, using volunteer in-state trauma surgeons and trauma program managers. The state verification process is based on the standards outlined in the *Resources for the Optimal Care of the Injured Patient*, but some notable exceptions to ACS criteria were noted by the TSC team. The reviewers participate as volunteers.

New Hampshire recognizes four levels (I, II, III, and IV) of trauma center categorization. The trauma system seeks to be inclusive, but participation is voluntary. The state verification process permits conditional approval in certain cases when the deficiency is minor or correction can be demonstrated via correspondence with the TMRC.

ACS-COT verification has always been required for Level I categorization, and this requirement was recently expanded for Level II trauma centers due to perceived variability in state verification processes. During the transition period to ACS verification for Level II trauma center, the dual verification process has the potential to create different standards among the Level II trauma centers and the trauma system as a whole. This can lead to unequal care and an inability for prehospital providers and the public to discern differences between trauma centers. It also may foster distrust in the verification process by the hospital community. Similar challenges may exist with the state verification process for Level III trauma centers. An external verification system for Level I through Level III categorization would promote uniformity in the verification process. Removing this responsibility from the TMRC would also enable the trauma system leaders to concentrate on other elements of trauma system development.

The history of the trauma system lends insight into some of the challenges toward its improvement. In the last decade, New Hampshire had nearly 30% of its participating centers opt out of trauma center categorization. Those opting out were largely Level III and IV trauma centers, such as the critical access hospitals (CAHs) located in the northern and more rural areas of the state. These non-classified acute care facilities are important to the trauma system. All serve as sites for the initial resuscitation and stabilization of injured patients by default since they are the access point to the trauma system for that region of the state. An analysis of the patient volume, acuity, and transfer patterns of these facilities, as well as a needs assessment would be helpful to identify what would help them become active participants in the trauma system. An instructor for the RTTDC is now available in the state, and plans exist to make this program available to the CAHs.

The state's trauma centers appear to be roughly located in the distribution of the state's population. The trauma system has no ability, both from a lack of data and no provision in the verification process, to account for needs of the population in terms of current assessment or

future planning. A minimal dataset reported by all participating and nonparticipating acute care facilities would be valuable in planning improvements to the trauma system.

Transfer agreements between different levels of trauma care appear to be variable, and destination guidelines are not routinely followed. Outreach to non-categorized acute care facilities by the trauma centers appears to be limited, although some movement in that direction occurs through mentoring offered by the Level I center TPM and one Level II trauma center TPM.

Recommendations

- **Adopt the trauma center verification process of the American College of Surgeons Committee on Trauma (ACS-COT) for Level I, II and III trauma centers.**
 - **Consider additional factors for trauma center designation, including the needs of the population in the designation of current and future trauma centers.**
- **Change the classification process for all other acute care facilities to focus on technical assistance and facilitation of rapid triage and transfer of seriously injured patients that includes resuscitation protocols, pre-identification of patient and injury types that will be transferred, and pre-selection of destination hospitals.**
- **Define a minimal dataset for use by all non-categorized trauma-participating acute care facilities, to provide a more comprehensive profile of trauma care in the state.**
- **Require all acute care facilities to submit at least the minimum dataset for all injured patients died, admitted or transferred.**
- **Assess the volume, acuity, transfer patterns and outcomes of non-participating hospitals involved in caring for the injured.**

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 inter-facility transfers, the time to transfer, as well as the rates of primary and secondary over-triage 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 inter-facility 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, inter-facility 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 inter-facility transfers, including contingencies for radio or telephone system failure. **(I-302.9)**
- II. Acute care facilities are integrated into a resource-efficient, inclusive network that meets required standards and that provides optimal care for all injured patients. **(B-303)**
 - a. When injured patients arrive at a medical facility that cannot provide the appropriate level of definitive care, there is an organized and regularly monitored system to ensure that the patients are expeditiously transferred to the appropriate system-defined trauma facility. **(I-303.4)**

Current Status

The New Hampshire trauma system lacks strong administrative authority to control or oversee patient flow within the system. As a result, patients are transported according to established referral patterns and the judgment of EMS personnel. New Hampshire adopted statewide field trauma triage guidelines based upon the most recent CDC recommendations; however these guidelines are not associated with strong protocols regarding selection of destination hospital. The ultimate direction to EMS personnel is to transport the injured patient to the “most appropriate facility” in consultation with their medical control. In more remote parts of the state, where no Level I or Level II trauma center is rapidly available by ground, EMS personnel make use of air medical services to provide primary transport for severely injured patients. This reliance on the judgment of individual EMS providers is complicated by a reported lack of widespread understanding about the state’s trauma center verification levels and some inconsistencies that resulted from the prior state-based verification process for Level I and II trauma centers. It is hoped that the decision to require future ACS verification for Level I and II

trauma centers will improve the understanding EMS providers have about individual facility capabilities.

Historically, New Hampshire had only a single Level I trauma center, and so severely injured patients from other areas of the state were often transported by air to Level I trauma centers in other states, either directly from the field or transfer from smaller hospitals. More recently Level II trauma centers developed in the central and southern parts of the state. However, no systematic approach has led to redefinition of the EMS criteria for determining the most appropriate receiving facility.

Currently no oversight or systematic monitoring of the field triage of trauma patients occurs at the state or regional level. Therefore, no mechanism exists to determine the degree to which injured patients are being transported to the most appropriate trauma center. No data exist to identify or implement possible improvements in destination protocols.

The trauma system has no established standards for inter-facility transfer of trauma patients, and these transfers are not monitored for timeliness or appropriateness. Stakeholders report that the trauma system provides a generic list of injuries that might be appropriate for transfer, but that the decision to transfer is at the discretion of the individual transferring facility. Likewise, stakeholders report that a discussion about which injury patterns to transfer is a part of mentoring visits to smaller hospitals, but no specific guidance is provided.

The state has heavy reliance upon air medical resources for long-distance transports, both from the field and for inter-facility transfer. Resources for long-distance ground transport are limited, especially for critically ill patients. Due to the significant number of days when air medical transport is unavailable, it will be necessary to continue work on developing ground critical care transport resources.

Recommendations

- Work with EMS regions and EMS medical directors to establish clear and specific regional trauma destination protocols, including parameters for use of air medical transport.
- Monitor the field destinations of injured patients to ensure compliance with field triage and destination guidelines and to provide data to optimize the guidelines.
- Establish guidelines for inter-facility transfer.
- Monitor inter-facility transfers for timeliness and appropriateness in order to ensure compliance with developed guidelines and to provide data to optimize the guidelines.
- Educate EMS providers and agencies about the New Hampshire trauma center verification levels and how to use this information to make destination decisions.
- Continue to develop additional resources for ground-based critical care 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 inter-facility 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

The state currently has nine rehabilitation centers to which trauma patients can be referred patients. Five of those centers have achieved Commission on Accreditation of Rehabilitation Facilities (CARF) status. According to the most recent DHHS assessment for Certificate of Need purposes, the state has a surplus of 162 rehabilitation beds. This information was discordant with the views of TSC participants. Based on the wait times experienced by trauma care providers, a shortage of beds is likely, especially for trauma rehabilitation. Rehabilitation services were reported to be less available in the northern portion of the state. The trauma system has made no assessment of the rehabilitation capabilities located within the state. No statewide assessment or performance improvement effort has been initiated to identify problems with the rehabilitative phase of trauma care. It was reported that insurance status is an impediment to patient transfer to rehabilitation facilities.

Four of the state's rehabilitation facilities are capable of caring for traumatic brain injuries; however, no center in the state cares for spinal cord injuries. Patients with this need are routinely transferred to Boston. Follow up on patients transferred out of state is not routine. Four of the state's rehabilitation centers care for children.

Recently, the TMRC added a rehabilitative medicine representative to the TMRC, who is an administrator at one of the state's rehabilitation centers. An opportunity exists to improve knowledge about rehabilitation resource needs, resource availability, and patient outcomes. Addressing this should be the priority, and it is an essential step in establishing a rehabilitation-oriented data repository, conducting rehabilitation-centered performance improvement, and improving the in-state and out-of-state feedback to referring trauma centers. This would be a start to fully integrating rehabilitation into the trauma system.

Recommendations

- Conduct an audit of the state's trauma centers focusing on rehabilitation-related delays in discharge.
- Determine and distribute detailed information on the capability of the various rehabilitation facilities to manage trauma patient rehabilitation.

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 non-designated 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

No large scale disaster exercise has occurred that would evaluate New Hampshire's trauma system response. Hospitals are required to exercise twice a year and to include the local trauma system during their exercises on a routine basis. No information on the extent of involvement by the local trauma centers during these exercises was provided to the TSC team. The New Hampshire DHHS contracts with the state Hospital Preparedness Program to expand hospital medical surge capacity and resources. The TMRC currently has no representative from disaster preparedness, and no reported representative from the trauma system participates in statewide disaster planning, despite the high incidence of trauma associated with disaster events.

All hospitals use a web-based information system called the Knowledge Center to coordinate state and hospital response to disaster. Knowledge Center is the application used by New Hampshire Hospital Association to achieve HAvBED reporting status and this information system is funded through a federal DHHS grant. The data are voluntarily uploaded by hospitals, but current status may not be updated on a daily basis. The FST&EMS, EMS agencies, and EMS providers do not participate in the Knowledge Center.

Statewide 911 is available via landline or cell phone. The hospitals have internal and external emergency communications systems. No information about recent test results of hospital communications systems to determine effectiveness was provided, and it is unknown if any opportunities to improve communication capability are needed.

Most EMS providers have some level of National Incident Management System (NIMS) training. Courses such as Basic and Advanced Disaster Life Support courses are not currently offered.

Recommendations

- Evaluate and update current communications capability, ensure redundancy and measure effectiveness.
- Add a Disaster Preparedness representative to the Trauma Medical Review Committee.
- Include trauma system resources in the Knowledge Center.
- Return to having mandatory, daily updates to the Knowledge Center.

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

Currently, no statewide trauma system performance improvement – patient safety (PIPS) program or activity is taking place. No formal or informal trauma system PIPS committee has been formed. No trauma system PI master plan exists. The trauma system database (trauma registry) to support the trauma PIPS process is just getting launched. It is essential to dedicate significant time and effort to the state trauma registry so all trauma centers may begin submitting data.

The FST&EMS is strongly encouraged to build a sustainable state trauma system registry that is consistently staffed, and has consistent technical support in order to be able to provide clean, validated data for all trauma performance improvement (PI) activity. Currently, no FST&EMS personnel are available to support a trauma system PIPS program. As data are the foundation of all PI activity, the priority is a state trauma registrar/data-IT employee (1.0 FTE) to ensure both the quality of data submitted and to provide technical support to the trauma centers. This individual also has a role in the TMRC PI activity by attending all trauma PIPS meetings and trauma data work group sessions.

A staff member to support the PIPS process is the next person needed once the trauma registry is operational. Qualifications for a statewide PI coordinator should include a registered nurse with a clinical background in trauma (emergency department, operating room, or intensive care unit) as well as performance improvement. This 1.0 FTE position should eventually be additional to the state Trauma Program Manager position.

The trauma system leadership is interested in establishing a trauma system PIPS process. In order to move the trauma PIPS process forward, a Trauma PIPS Subcommittee should be added to the TMRC structure. Membership on this subcommittee should be multidisciplinary to ensure optimal trauma system PIPS.

Many trauma center leaders have education and experience in trauma PIPS and opportunities exist to provide education about the PI process for FST&EMS personnel, EMS, and hospital providers. An informal sharing of general trauma PIPS information and documents occurs through the state's informal TPM network. The TPMs reported providing education and mentoring to other trauma center colleagues. The FST&EMS and the TMRC should partner to ensure that quarterly educational activity is available, perhaps during TMRC meetings or at regional meetings. Examples of potential educational events include but are not limited to:

- Offering the Trauma Outcomes & Performance Improvement Course (TOPIC) periodically

- Distributing PIPS best practices during meetings, electronically, or posting them on the trauma FST&EMS web site
- Quarterly webinars
- Education from trauma system leadership from other states/regions (sharing best practices)
- Participating in national webinars
- Networking with other states and regions to learn their best practices (then adapting these best practices to fit with the NH system)

Once the trauma systems PIPS process is firmly established, the educational forums could be decreased, or altered and directed toward discussions of audit filter development, case reviews, TQIP, etc. However, education on system PIPS should occur on an as needed basis.

The trauma system web page should post trauma PIPS templates, toolkits, how to manuals, PI master plan templates, etc. Sample documents to build these resources can be obtained from trauma organizations such as the Society of Trauma Nurses (STN), Trauma Center Association of America (TCAA), National Association of State Emergency Medical Systems Officials (NASEMSO), and other states/regions with established trauma systems.

The Level I and II trauma centers have PIPS programs, and the quality of these PIPS programs are evaluated during the ACS trauma verification visits. These 6 trauma centers are submitting data to the National Trauma Databank (NTDB). These data could be a potential starting point for some trauma system PIPS projects / activities. Evaluation of the trauma PIPS activity occurs during the Level III and IV site surveys currently completed by the in-state survey team members.

It was reported that the Level I and II trauma centers are participating in the ACS TQIP, but the Level III trauma centers are not participating. The Level III trauma centers should be encouraged to participate in this national risk adjusted benchmarking program. As the state trauma PIPS process matures, the leadership should create a statewide TQIP consortium, meshing it with the state trauma system PIPS processes.

While no hospital trauma data are available at the system level, TEMSIS, the EMS system database is available. The TMRC should become informed about the TEMSIS data elements and data definitions and the routine reports currently generated. In addition to this, the FST&EMS leadership, TMRC members, and TEMSIS registrar should meet informally to discuss and mutually agree upon routine and ad hoc reports that would be useful to begin a PIPS program. As the trauma system registry becomes functional more comprehensive reports can be generated, especially when linked to TEMSIS. The FST&EMS should work closely with the TMRC and trauma system registrar to agree upon the type of reports to be presented as a standing agenda item at the TMRC meetings. The FST&EMS is responsible for creating meaningful reports, e.g., trauma data graphed clearly and appropriately to ensure accurate audience interpretation.

Because no trauma system PIPS process has been taking place, some stakeholders are uncertain about the strength of peer review protection for documents, meetings, discussions during meetings, and meeting minutes. The FST&EMS, in collaboration with the TMRC, should obtain a ruling from the NH State Attorney General on the strength of peer review protection

laws for the trauma system PIPS process in the next 6 months to allow the trauma PIPS process to proceed unencumbered.

The Past Chair of the TMRC completed a focused audit on the cricothyroidotomy procedure performed in the field. Although the project involved a small sample size and no formal database, this focused audit was still completed. This shows that, although difficult, trauma PIPS can start with a basic project using available data sources.

Trauma system PIPS audit filters (core measures) should be developed. To start, these audit filters could be basic, based on available data sources. These data filters can be revised as the trauma system matures and as more data sources become available. The FST&EMS, working collaboratively with the TMRC and trauma PIPS subcommittee, should approach other state trauma systems to learn about audit filters.

Some examples of trauma system audit filters to consider include:

- The number of injured patients transported to a trauma center
 - The number of injured patients transported to a non-trauma hospital
- The number of injured patients transported from the scene to a trauma center
- The number of patients transported to a non-trauma hospital, and then transferred 2 more times, e.g., a patient who is transported to a non-trauma hospital, then transferred to a Level III or Level II trauma center, who was then subsequently transferred to a Level I trauma center
- The number of injured patients who had a scene time greater than ____ minutes without documentation of the reason for the prolonged scene time
- The number of injured patients who died, and were pronounced in the field (data source: TEMSIS and the office of the medical examiner)
- Multiple and mass casualty incidents:
 - The number of injured patients
 - The number of patients transported to a trauma center (including level of the trauma center)
 - The number of injured patients transported to non-trauma centers
 - The number of injured patients pronounced in the field
- Number of injured patients with all vital signs recorded

Other trauma system PIPS activity that could be initiated within the next 3-6 months could involve all TPMs contributing their own facility data for discussion, to include:

- System case review:
 - All deaths at a trauma center that had a PI issue identified
 - The trauma medical directors (TMDs) and TPMs could discuss and agree upon an audit filter that they are all reviewing at the hospital level; then bring such an audit filter (cases that fall out with an action item taken) to the trauma system PIPS meeting

- Participants could be the TMD and TPM's from the trauma centers, leadership from the FST&EMS, and prehospital provider leadership, and other appropriate participants
- Trauma system case review / grand rounds (for educational purposes):
 - Blinded cases
 - Select cases that have been impacted by system issues, e.g., 2 or 3 inter-facility transfers
 - Great saves
 - Any trauma case that would have key learning points for any care provider working in the trauma system

Recommendations

- **Create a trauma system performance improvement and patient safety (PIPS) subcommittee of the Trauma Medical Review Committee ensuring that membership is multidisciplinary and representative of the trauma continuum of care.**
- **Implement the trauma PIPS process immediately.**
 - **Utilize existing data sources, e.g., the prehospital database**
 - **Select one trauma system audit filter and perform a focused audit inclusive of data analysis, corrective action – implementation, and evaluation**
- Obtain and distribute sample performance improvement (PI) toolkits for trauma system care providers, e.g., trauma center PI master plan, review forms/ templates, selection of audit filters for both prehospital and trauma centers, links, articles, PI courses, etc.
- Provide routine (quarterly) education on trauma system PIPS.
- Develop a trauma system PI master plan to serve as a compass for the Trauma PIPS Subcommittee and trauma system stakeholders.

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

Multiple sources of data exist to assist with the development and evaluation of the New Hampshire trauma system. Many of these data sources were used to inform the injury epidemiology section of the PRQ that was completed as part of this trauma system assessment.

Two important data sources have not been fully realized or used in the trauma system development and assessment processes. These include the prehospital electronic patient care records, which are required for every patient transported by EMS. These records are uploaded and captured in a central database called TEMSIS; these data have been available since 2006. The database currently houses more than 1.3 million records. These records are compliant with the National EMS Information System (NEMSIS) data standard. The underlying program for TEMSIS was developed and is maintained by ImageTrend™.

New Hampshire has recently invested in trauma registry software and infrastructure, also developed by ImageTrend™. Due to the recent acquisition of this program, wide-spread data are not currently available to help monitor or measure trauma center details. Each “verified” Levels I, II, III, and IV trauma center is required to submit data to the central trauma registry. These data are compliant with the National Trauma Data Standard (NTDS).

Linkage between the TEMSIS and trauma registry data sets is anticipated, particularly since both systems have been developed by the same vendor. This linkage remains untested in NH. A rehabilitation database reflective of NH inpatient facilities has not been identified. Other data linkage may also be possible in the future.

Currently, there is not a trauma registrar position included within the FST&EMS. Such a position will be essential to the continued implementation, training, data quality assurance, and analysis and reporting.

Recommendations

- Begin analysis of existing data sources now to help inform trauma system planning and evaluation, don’t wait for perfect data.
 - Frame and answer simple questions using data available within TEMSIS, continue to evolve additional questions as familiarity with the process increases.
- Identify resources to support and hire a state trauma registrar.
- **Continue development of the statewide trauma registry, providing adequate resources in the lead agency, to monitor and validate data submission; analyze data to provide standard and customized reports for the TMRC, and participating EMS and acute care facilities.**

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

The FST&EMS currently has no process or procedures for obtaining information from the newly created state trauma registry. ImageTrend™ is the software vendor for both TEMSIS and the new trauma registry, offering future opportunities for data linkage of EMS and acute hospital patient level data for research. The existing TEMSIS database, which contains over 1.3 million EMS records, has not been utilized to evaluate the existing trauma system. The Level I trauma center has not focused on trauma system research to this point.

Recommendations

- Use the existing Electronic Emergency Medical Services Patient Care Record (TEMSIS) with more than 1.3 million patient records, in collaboration with the Quality Management section of the FST&EMS, to evaluate current prehospital processes of care for injured patients across the state
- Continue development of the statewide trauma registry, providing adequate resources in the lead agency to monitor and validate data submission, analyze data to provide standard and customized reports for the Trauma Medical Review Committee (TMRC) and participating EMS and acute care facilities
 - Create a minimal dataset for use by Level IV trauma facilities and nonparticipating hospitals to provide a more comprehensive profile of trauma care in the state.
- Partner with the existing research expertise and infrastructure of the Level I trauma center at Dartmouth to conduct research projects designed to profile and evaluate the

current state of the New Hampshire trauma system, using existing TEMSIS data now and the state trauma registry in the future.

- Develop a research subcommittee of TMRC to design a process for sharing Trauma Quality Improvement Program data from participating Level I and II trauma centers, and the pilot Level III trauma centers, to identify “best practices” in both prehospital and acute care trauma delivery.

Appendix A – Acronyms

ACS – American College of Surgeons

AEMT – advanced emergency medical technician

BFRSS – Behavioral Risk Factor Surveillance System

BIS – Benchmark, Indicators, and Scoring

CAH – critical access hospital

CARF – Commission on Accreditation of Rehabilitation Facilities

CDC – Centers for Disease Control and Prevention

COT – Committee on Trauma

DHHS – Department of Health and Human Services

EMS – emergency medical services

EMSC – Emergency Medical Services for Children

EMT – emergency medical technician

FARS – fatality analysis reporting system

FST&EMS – Fire Standards Training and Emergency Medical Services

FTE – fulltime equivalent

HRSA – Health Resources and Services Administration

IPAC – Injury Prevention Advisory Council

MTSPE – Model Trauma System Planning and Evaluation

NEMSIS – National EMS Information System

NH – New Hampshire

NIMS – National Incident Management System

NREMT – National Registry of EMTs

NTDB – National Trauma Data Bank

NTDS – National Trauma Data Standard

PHTLS – Prehospital Trauma Life Support

PI – performance improvement

PIPS – Performance Improvement and Patient Safety

PRQ – Pre-Review Questionnaire

RSA – Revised Statutes Annotated

RTTDC – Rural Trauma Team Development Course

SBIRT – screening, brief information, referral and treatment

STEMI – ST elevation myocardial infarction

TEMSIS – NH Electronic EMS Patient Care Record

TMRC – Trauma Medical Review Committee

TOPIC – Trauma Outcomes and Performance Improvement Course

TMD – trauma medical director

TPM – trauma program manager

TQIP – Trauma Quality Improvement Program

TSC – trauma system consultation

YBRS – Youth Risk Behavior Survey

Appendix B – Methodology

The New Hampshire Bureau of EMS requested this trauma system consultation, which was conducted under the auspices of the American College of Surgeons (ACS), Trauma System Consultation (TSC) program. The multidisciplinary trauma system consultation team consisted of: two trauma/general surgeons, one emergency physician, a state EMS/trauma director, a trauma program manager, two trauma systems consultants, and the ACS trauma systems program manager. 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 New Hampshire. 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 Bureau, along with a number of related supporting documents provided by Bureau and information available on government websites.

The TSC team convened in Concord, NH, on February 16 – 19, 2016, to review the New Hampshire 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 team consensus on the various issues, preparing a report of their findings, and developing recommendations for future development of the trauma system in New Hampshire. This report was developed independently of any other trauma system consultations or assessments.

Appendix C – ACS Review Team Biographies

ROBERT J. WINCHELL, MD, FACS

Role: Surgeon, Team Leader

Dr. Winchell 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, which 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 the role of Head of the Division of Trauma and Burn Surgery in 2004. He remained in that position for 10 years, also serving as an Associate Professor of Surgery at the Tufts University School of Medicine. Under his direction, Maine Medical Center became a verified Level I trauma center for the first time in 2007. After leaving Maine, Dr. Winchell served as Chief of Trauma and Visiting Professor of Surgery at the University of Texas Health Science Center at Houston and Chief of Trauma at Memorial Hermann -Texas Medical Center until assuming his current post. In July 2015, Dr. Winchell joined the faculty in the Department of Surgery at Weill Cornell Medical College as Chief of the Division of Trauma, Burns, Acute and Critical Care and Director of the Trauma Center at New York-Presbyterian Weill Cornell Medical Center.

Dr. Winchell has been deeply interested and involved in the development and evolution of trauma systems for his entire career. He has been involved in trauma center and trauma systems design and operation in a wide variety of settings covering the spectrum of system development. He was instrumentally involved in leadership roles 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 leadership, operation and ongoing development of the Washington state trauma system, serving on the state advisory board, and as chair of the Southwest EMS region. During Dr. Winchell's tenure in Maine, he helped to develop the Maine state system, serving as a member of the state advisory board and as a chairman of the Maine State Committee on Trauma. In Texas, he served on the Trauma Systems subcommittee of the Governor's EMS and Trauma Advisory Council. Dr. Winchell is a leader in international trauma systems development, and the founding representative from the American College of Surgeons to the World Health Organization's Global Alliance for the Care of the Injured.

In parallel to his clinical and research work, Dr. Winchell has had the honor to serve the American College of Surgeons Committee on Trauma for almost 20 years, first as a State Chair for San Diego County and for Maine, and currently as a member and part of the Executive Committee. His leadership and forethought have been instrumental to the Trauma Systems consultation program of the COT since 2006, and he currently serves as Chair of the Trauma Systems Evaluation and Planning Committee. In that role, he has conducted expert consultation in 18 states and regions, serving as team leader for 14 of these, and has also participated in trauma systems work internationally. Dr. Winchell is also a senior reviewer for the trauma center verification program of the College. He has participated in 18 state and regional trauma system consultations.

Dr. Winchell has dedicated almost two decades to the advancement care of the injured as a part of national public health policy, and the implementation of state and regional trauma systems based upon and supported by that policy.

Dr. Winchell is Board certified in General Surgery, with added qualifications in Surgical Critical Care. He 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, the Society of Critical Care Medicine and the New England Surgical Society. Dr. Winchell is author of more than 50 scientific papers and book chapters, and has given over 100 regional, national and international presentations. He is an ad hoc reviewer for the Journal of Trauma and Acute Care Surgery, the Archives of Surgery and the World Journal of Surgery.

MICHAEL H. THOMASON, MD, FACS

Role: Surgeon

Dr. Thomason is Vice Chair of the Department of Surgery, Specialty Medical Director-Surgery Care Division, and Medical Director-Carolinas Trauma Network for Carolinas HealthCare System. He served as Trauma Medical Director of the F.H. "Sammy" Ross Trauma Center, an ACS verified Level I and Pediatric Level II center in Charlotte, NC., from 1985-2015. He is also Clinical Professor of Surgery at UNC School of Medicine. Dr. Thomason received his undergraduate degree from Davidson College and graduated from the University of North Carolina – School of Medicine in 1978. After completing general surgery training at Charlotte Memorial Hospital (now Carolinas Medical Center), he became the second full time faculty member in general surgery in an institution that has since evolved from a community hospital training program into the only non-university academic medical center in North Carolina, the Carolinas Medical Center.

In 1985, he helped to develop and direct the trauma program from its inception as a Level II state designated trauma center to an ACS Level I trauma center serving the 20 county Metrolina region of North and South Carolina. He has served several terms as Chairman of the Metrolina Trauma Advisory Committee, and has been both Vice Chairman and Chairman of the North Carolina Committee on Trauma. During this time, he also participated in creation and direction of the State Trauma Advisory Committee (STAC). Subsequently, he was appointed Chief of Region IV (Southeastern US) for the ACS Committee on Trauma. He is currently a member of the national COT, and is a site visitor for the COT Verification Review Committee. Following recommendations made by the COT Trauma Systems Review of North Carolina in 2004 he became, in 2008, the first and current Trauma Medical Advisor to the Office of Emergency Medical Services, the regulatory agency for the statewide trauma system.

As Medical Director of the Ross Trauma Center, he recruited a diverse group of 14 trauma/ critical care/ acute care surgeons who provide continuous in house coverage for the highest volume trauma center in the state.

JAMES D. UPCHURCH, MD, MA, REMT-P

Role: ED Physician

Dr. Upchurch began his medical career in 1971 as a Special Forces Medic courtesy of the US Army. He graduated from the University of Texas Medical Branch at Galveston in 1982 and completed a Family Practice residency from the University of Oklahoma in 1985. From 1985

until 2015, he has served as an Indian Health Service (IHS) Physician on the Crow Indian Reservation in Montana. During that time the majority of his clinical practice involved emergency medicine (EM), Emergency Medical Services (EMS), surgery and obstetrics. In 2003, he completed a Master's Degree in educational technology from George Washington University. His current practice includes emergency services for a local rural hospital.

Dr. Upchurch is a long-standing member of the National Association of EMS Physicians, and the American College of Emergency Physicians. Since 1986, he has functioned as EMS medical director for Big Horn County in Montana and guided their basic care program to the advanced life support level, including critical care inter-facility transport. He also provides EMS medical direction for the Incident Medical Specialist Program and Missoula Smoke Jumpers, US Forest Service, Region I.

Dr. Upchurch is director of a small non-profit organization, EMS Education & Training. They offer distance and face-to-face educational opportunities to rural and frontier EMS personnel in Montana who desire to advance their level of care. He is an active ACLS, ACLS EP, ATLS, PALS, PHTLS and CALS instructor.

Dr. Upchurch served many years as the volunteer state EMS medical director for Montana and represented Montana on the National Council of State EMS Medical Directors of the National Association of State EMS Officials. Until recently he functioned at the IHS national level as a consultant on EM and EMS issues. He is a member of the Montana Board of Medical Examiners who license physicians and EMTs.

FERGUS LAUGHRIDGE, Captain, CPM

Role: State EMS Director

Mr. Laughridge has a diverse professional background as a police officer, firefighter, paramedic, and manager of EMS systems and operations. Mr. Laughridge has served as the Director of Nevada State Health Division, Emergency Medical Systems and Trauma program where he was responsible for assuring the quality of pre-hospital emergency medical and trauma services throughout Nevada. As State EMS Director, he was involved with numerous federal, state, and community activities relating to emergency preparedness and response.

Mr. Laughridge is currently employed by Humboldt General Hospital EMS and Rescue in Winnemucca, Nevada. Mr. Laughridge has the responsibilities of coordinating public health preparedness for Humboldt General Hospital and surrounding county. Mr. Laughridge is also responsible for assuring regulatory compliance for a high performance and dynamic rural emergency medical system.

Mr. Laughridge is continually requested to serve on various committees centered on quality patient care, trauma systems, and credentialing of EMS systems.

HEIDI A. HOTZ, RN

Role: Trauma Program Manager

Ms. Hotz is the Trauma Program Manager at Cedars-Sinai Medical Center, a Department of Health designated and ACS verified Level I Trauma Center. She is also the President of the Los Angeles Association of Trauma Program Managers as well as the Immediate Past President of

the American Trauma Society (ATS), Past President of the Society of Trauma Nurses (STN), and Past President of the Trauma Managers Association of California (TMAC).

Ms. Hotz has extensive experience in all aspects of trauma including clinical care, program management, trauma data, trauma performance improvement and patient safety, trauma systems, injury prevention, consultation for trauma centers and systems, educational curriculum development, conference and event planning and all trauma related issues across the continuum of care.

Additionally, Ms. Hotz is the recipient of the STN's Trauma Leadership Award. She has been a survey team member for the ACS Trauma Systems and Evaluation Program. She has been an invited expert panel member for many national trauma initiatives and projects such as the ATS Leadership Forums, the screening & brief intervention for alcohol in trauma initiatives, the Model Trauma System Plan work group, to name a few. She has lectured on a wide variety of trauma related topics throughout the United States and internationally. She has extensive participation at the member and Chair levels for local, regional, state and national committees. She was the Chair of the Advanced Trauma Care for Nurses® (ATCN) Committee in Arizona for 6 years. She was then appointed the first Chair of the STN's ATCN National-International Committee and spearheaded the special projects team to attain the ACS COT approval of the program as a collaborative effort with the ATLS Subcommittee. She was a member of the STN Board of Directors for over 8 years in the positions of Director at Large, Treasurer, President Elect and President. She is an author and Faculty Member for the STN's Trauma Outcomes Performance Improvement Course (TOPIC).

NELS D. SANDDAL, PHD, REMT-B

Role: Technical Advisor

Dr. Sanddal is the former Manager of the American College of Surgeons (ACS) Trauma Systems and Verification Programs. Upon his retirement in January 2016 he will continue working closely with the Trauma Systems Program as a consultant to the ACS COT Trauma Systems Evaluation and Planning Committee.

Prior to his position at the ACS, Dr. Sanddal 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 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 from Montana State University and his doctorate in Health Science from Walden University. He has been a co-investigator for numerous state or regional rural preventable trauma mortality studies and has conducted additional 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 EMS Officer and Assistant Fire Chief.

JANE W. BALL, RN, DRPH

Role: Technical Advisor

Dr. Ball has served as a consultant to the Trauma Systems Evaluation and Planning Committee of the American College of Surgeons Committee on Trauma since 2006. As such, she has participated on more than 20 state and regional trauma system consultations. She was 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 participated in the development of the HRSA Model Trauma Systems Evaluation and Planning document. She also provided technical assistance to states regarding 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 (8 editions), Child Health Nursing (3 editions), Pediatric Nursing: Caring for Children (6 editions), Maternal and Child Nursing Care (4 editions), and Pediatric Emergencies: A Manual for Prehospital Care Providers (2 editions). One of these texts, Pediatric Nursing: Caring for Children, received the 1999 and 2001 Robert Wood Johnson Foundation Last Acts Coalition Outstanding Specialty Book Award. 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.

JOHN P HUNT, MD, FACS

Role: Observer – Surgeon

Dr. Hunt received his undergraduate degree from Rensselaer Polytechnic Institute, his M.D. from Albany Medical College, and did his internship and General Surgery residency at Louisiana State University Health Sciences Center at New Orleans. He completed a Trauma & Critical Care fellowship at University of North Carolina at Chapel Hill and while there did basic science research in burns and hemorrhagic shock on a National Institutes of Health T-32 trauma training grant. He also completed a Master's degree in Public Health in Epidemiology during this time. He has been on the faculty of the Louisiana State University Health Sciences Center at New Orleans, Department of Surgery, since 1997. He is currently a Professor of Surgery and the Chief of the Trauma and Critical Care Division. He started the Trauma/Critical Care fellowship there in 2004 and has been the Program Director for that program since its inception. He has

also served as the Program Director for the General Surgery Residency since 2006. He was the Associate Trauma Director for the Level I Trauma Center at Charity Hospital New Orleans, from 2002 to 2015 and is now the acting Trauma Director at the Level I Trauma Center at University Medical Center New Orleans. During this time he also served as the Director of the Surgical Intensive Care Unit.

Dr. Hunt has been interested and involved in the development of trauma centers and trauma systems for approximately ten years. He has been a member of the Louisiana Committee on Trauma since 2002, serving as the Chairman from 2006 to 2012. He has been an Associate Member or Member of the American College of Surgeons Committee on Trauma since 2006. He has served on the Committee on Trauma - Trauma Systems subcommittee for ten years. Through his tenure at Louisiana State University he has helped guide and shape the trauma system in New Orleans. This includes the time surrounding Hurricane Katrina. In 2011, Dr. Hunt was appointed by the Governor to the Louisiana Emergency Response Network (LERN), a committee tasked with improving the care in the state for all time-sensitive illness including trauma, myocardial infarction, and stroke. During his time with LERN, the state saw the opening of two new verified trauma centers with the addition of another three trauma programs poised for verification. In 2015, the LERN call center routed nearly 15,000 patients, from the field to appropriate hospitals, in the state. Dr Hunt was elected as the Vice-Chair of the LERN board in 2012 and was elected as the Chair of the board in 2014.

MARIA ALVI, MHA

Role: ACS Staff (Trauma Systems and Quality Programs Manager)

Ms. Alvi joined the American College of Surgeons (ACS) Trauma Department as the Trauma Systems and Quality Programs Manager in May 2015. In this role, Ms. Alvi provides administrative support to the COT subcommittees of Trauma Systems Evaluation and Planning, Advocacy and Injury Prevention and Control. She also serves as the program manager for the Trauma Systems Consultation Program, the BIS Facilitation Program, and other Trauma Systems and Quality initiatives.

Prior to joining the ACS, Ms. Alvi worked as a healthcare consultant at Truven Health Analytics for 2 years, providing data reporting support to US clients, through the company's trademarked financial, marketing and clinical programs. Her focus at Truven also allowed her to assist with critical analysis and assessment of client data towards improving health outcomes in their patients, and better management of their healthcare programs.

In December 2013, Ms. Alvi earned her Masters of Healthcare Administration (MHA) from UIC School of Public Health in Chicago. As part of her curriculum, she also completed a Preceptorship at Cook County Health and Hospitals System (CCHHS). Through this opportunity, Ms. Alvi employed her strategic planning and program management skills to clinical programs and non-clinical initiatives at John H Stroger Hospital of Cook County and CCHHS.

Although interested in clinical sciences (pre-med curriculum), and licensed as an EMT-B for the State of Illinois until June 2012, Ms. Alvi found her passions truly lay within healthcare management. Ms. Alvi serves as a volunteer member on the ACHE CHEF Communications Committee, is a Young Professional member for the Chicago Council on Global Affairs, and partakes in various early careerist, networking and charitable events throughout the greater Chicago area.

JEAN CLEMENCY

Role: Observer – ACS Staff (Administrative Director, ACS Trauma Programs)

Ms. Clemency serves as Administrative Director for the Committee on Trauma (COT) of the American College of Surgeons (ACS), leading the staff support team for the various subcommittees and programs of the COT, and also as a member of the ACS Executive Leadership Team.

Ms. Clemency came to the COT in 2013 with a 20+ year affiliation as an executive manager within the healthcare industry. Those years were split between service as the associate executive director for the American Academy of Cosmetic Surgery (AACS) at the association management firm of Smith, Bucklin and Associates, and in a progression of roles in various divisions of HealthSTAR Communications, a network of related communications agencies working within the healthcare arena. She contributed to the operational and administrative success of both organizations, serving in a variety of areas including medical education and healthcare compliance, general business and financial operations oversight, and strategic resource planning and management.

MELANIE NEAL

Role: Observer – ACS Staff (Manager, TQIP/NTDB)

Ms. Neal has been with the American College of Surgeons for thirteen years, and is the Manager of the National Trauma Data Bank (NTDB) and the Trauma Quality Improvement Program (TQIP). In this position, she provides strategic direction and high level management for scientific, business, and product operations areas.

In addition, Ms. Neal works with a variety of data and quality initiatives of the Committee on Trauma that support the mission of the COT to improve care for the injured patient. She represents the COT programs of the ACS on this consultation.

Ms. Neal has a Master's degree in Social Science Research Methods.

Appendix D – Sample Job Description: Trauma System Program Manager

The Trauma System Program Manager should optimally be a master's prepared RN with at least five years' experience in emergency nursing or ICU nursing at a trauma center. Familiarity with EMS activities is highly desirable. Prior service as a trauma center TPM and familiarity with trauma registry operations are additional desirable attributes.

Responsibilities might include, but are not limited to:

- Membership and active participation on the Trauma Medical Review Committee (TMRC)
- Liaison to state trauma programs within Massachusetts, Maine, and trauma system stakeholders
- Assists the New Hampshire EMS-Trauma Medical Director with his/her duties as directed
- Attends all verification/designation visits
- Conducts site visits at all New Hampshire trauma centers on a regular basis to support and monitor trauma program operations
- Establish and leads system wide trauma program manager's (TPM) work group
- Oversees trauma system-wide data acquisition and analysis
- Attends all TMRC meetings
- Participates in setting research agenda
- Is active in the Society of Trauma Nurses, Emergency Nurses Association and other trauma nursing professional organizations
- Contributes to financial and development decisions regarding trauma care at the state level
- Participates along with the EMS-Trauma Medical Director in development of clinical pathways, guidelines and protocols
- Is an active liaison to the EMS community
- Develops and promulgates an internal and external Public Information and Education (PI & E) program for the medical community, the EMS community, and the public at large
- Coordinates the implementation of system-wide Prevention Program(s) and Injury Prevention Plan

Appendix E – Sample Job Description: State Trauma Registrar

The Trauma Registrar should optimally hold a bachelor's degree in a behavioral, social, or health science or health-related field with emphasis in statistics or biostatistics and research methods. This position requires a minimum of two years' experience in research methods/statistical analysis and application, and conducting health or health care delivery research. A master's degree will substitute two years practical experience.

Responsibilities might include, but are not limited to:

- Validate data that is submitted to the Division of Health
 - Develop and implement a system or methodology to statistically validate data that are submitted for every ambulance run and every major trauma patient admission to New Hampshire hospitals.
 - Provide feedback to ambulance and hospital personnel on appropriate submission of data.
 - Maintain the trauma registry database
 - Respond to requests by management for special studies and data analysis.
- Provide educational support for end users of the trauma registry database.
 - Provide quarterly, regional training in data submission and quality assurance to ambulance services and hospitals.
 - Develop and continually refine a best practices guide for data submission and use for ambulance services and hospitals.
 - Make presentations at state and regional conferences to explain best practices for data submission and use.
 - Assist EMS agencies with benchmarking EMS performance measures. These benchmarks can drive local allocation of EMS resources to better serve the public.
- Production of statistical reports
 - Research, analyze, and draft monthly and annual reports.
 - Design report formats and content.
 - Final report editing and preparation before printing and distributing reports.
 - Make presentations to departmental, state, and regional groups describing data driven conclusions about trauma care in New Hampshire.
 - Provide ad hoc statistical reports to FST&EMS staff and TMRC upon request.
 - Work with external customer's requests for data.
- Act as a liaison between the FST&EMS, contracted software vendors, and national data repositories.
 - Work with software vendors to resolve any technical issues identified with the trauma registry database.

Appendix F – Funding Source Examples

State Funding		
The state provides formal funding mechanisms for the trauma system through:	Fees on moving/ motor vehicle violations	Colo., Fla., Ill., Kan., Miss., Ohio, Okla., Texas, Wash.
	Fees on criminal penalties	Fla., Ill., Mich., Va.
	Vehicle registration/ driver's license fees	Miss., Okla., Texas, Va., Wash.
	Cigarette/ tobacco fee	Ark., Hawaii, Okla., Tenn., Texas
	General fund appropriation	Alaska, Ga., Ky., La., Md., Mont., N.M., N.D., Pa., S.C., S.D., Tenn., Texas, W.Va., Wyo.
	Ambulance or EMT operations fee	Texas
	Other	Ariz., Colo., Minn., Ore., Texas

Adapted from the Hendrikson, H.: *The Right Patient, The Right Place, The Right Time: A Look at Trauma and Emergency Medical Services Policy in the States*, National Conference of State Legislators, 2012.

Appendix G – State Participants List

#	Participant Name (Last, First)	Title	Organization
1	Andrew, Thomas	Chief Medical Examiner	Division of Public Protection
2	Barnard, Sue	ARNP	St. Joseph Hospital
3	Beres, Christine		
4	Bizarro-Thunberg, Kathy	FACHE, Member TMRC	NHHA, TMRC
5	Blanchard, Vicki	Clinical Systems Coordinator	NH Bureau of EMS (NH BEMS)
6	Bouffard, Jon	Deputy , Bureau Chief	NH BEMS
7	Brock, Gary	Assistant Director of EMS	Frisbie Memorial Hospital
8	Carbone, Victor		Catholic Medical Ctr.
9	Chabot, Lynn	BS, RN, Stroke and Trauma Program Mgr.	Wentworth-Douglass Hospital
10	Coelho, Joel		Dartmouth Hitchcock
11	Cooper, Chip	Captain, Research Coord & Quality Manager	NH BEMS
12	Curcio, Gary	MD, Vice Chair	Elliot Hospital, TMRC
13	Drewniak, Pamela	B.A. EMT-I, I/C, CHEP EMS & Emergency Prep Coordinator	New London Hospital
14	Frederickson, Bett		
15	Gilligan, Doreen	RN, BSN, Trauma Service Line Director	Portsmouth Regional Hospital
16	Gionet, Jessica	RN, BSN, BA, MA, Clinical Nurse Leader, Emergency Dept	Frisbie Memorial Hospital
17	Goldthwaite, Bruce	Captain	Franklin Fire Dept.
18	Green, David	MD, Chief Medical Officer	Concord Hospital/Capital Region Health Care
19	Grey, Joseph		Weeks Medical Center
20	Gupta, Sanjay	FACS, Trauma Medical Director	Southern NH Medical Center
21	Harnois, Michael		
22	Hastings, Mark	RN	
23	Hedberg, Peter	MD, Member	Wentworth Douglass Hospital, TMRC
24	Hemeon, Chuck	Director of EMS	Derry Fire Dept.
25	Hickey, Ryan	Member, Representative of PFFNH	Professional Firefighters of NH (PFFNH), TMRC, Derry Fire Dept
26	Houston, Janet	MHA	Dartmouth Geisel School of Medicine
27	Johnson, Don	Public Member	NH Emergency Medical & Trauma Service Coordinating Board (CB)
28	Leahy, Joe	DO, FACEP, Associate VP Emergency Medicine, Med. Director of Emergency Services	Southern NH Medical Center
29	Levitow, John	BSN, MA, RN, NREMT-P, Associate Chief Nursing Officer	Frisbie Memorial Hospital

30	Maggio, Tony	Representative on the TMRC, EMT	NH Assoc. of EMT's, Barrington EMS
31	Martin, Eric	MD, Member	Dartmouth Hitchcock Medical Center, TMRC
32	McIntire, Aaron		Concord Fire Dept.
33	Mercuri, Nick	Bureau Chief	NH BEMS
34	Mulla, Lu	RN, BSN, MN, Vice President Operations, Clinical and Emergency Services	Catholic Medical Center
35	Murphy, Rick	MD, Chair	Concord Hospital, TMRC
36	O'Brien, Richard		NH Assoc. of Fire Chiefs (NHAFC), President; Emergency Medical and Trauma Services Coordinating Board (CB), Member; Goffstown Fire Dept., Chief
37	O'Hearn, Brian	MBA, BSN, CEN, CNO, VP of Patient Care Services	Androscoggin Valley Hospital
38	Prentiss, Sue	BA, MPA, NREMT-P, Manager of EMS	Concord Hospital
39	Prickett, John		LRG Healthcare
40	Redding, Tim	NR-P, I/C	Emergency Education Consultants LLC
41	Reidy, Mary	RN, BSN, MS, CEN, Trauma Program Mgr.	Concord Hospital
42	Rembisz, Adam	MSN, RN, CNL, CEN, Trauma Program Mgr., Trauma and Acute Care Surgery	Elliot Hospital
43	Rivers, David	Chief of Operations	Bureau of Emergency Communications
44	Schelberg, Eric	Representative of NHPA	NH Paramedic Association, Emergency Medical and Trauma Services Coordinating Board (CB), Milford Ambulance Service
45	Schuler, Scott		American Ambulance New England
46	Schultz, Maxim	Assistant Director	NH State Fire Marshal's Office
47	Snow, Jon	MS, NR-P, CCEMTP, CICP, I/C, Clinical Coordinator	New England EMS Institute, Elliot Health System
48	Steigmeyer, Robert	CEO/President	Concord Hospital
49	Sutton, John	MD, FACS, Professor of Surgery, Emeritus	Geisel School of Medicine at Dartmouth
50	Thomas, Gail	RN, AEMT	Cheshire Medical Center
51	Turpin, Grant	Chair, EMS Preparedness Coordinator	Emergency Medical and Trauma Services Coordinating Board; Portsmouth Regional Hospital
52	Warnock, Laurie	MPH, NH Education Coordinator	Northern New England Poison Center
53	Williamson, Janet	BS, NRP, CICP, EMS and Emergency Management Coordinator	Huggins Hospital
54	Willis, Albert	MS, Injury Prevention Program Mgr., Maternal Child Health	DHHS