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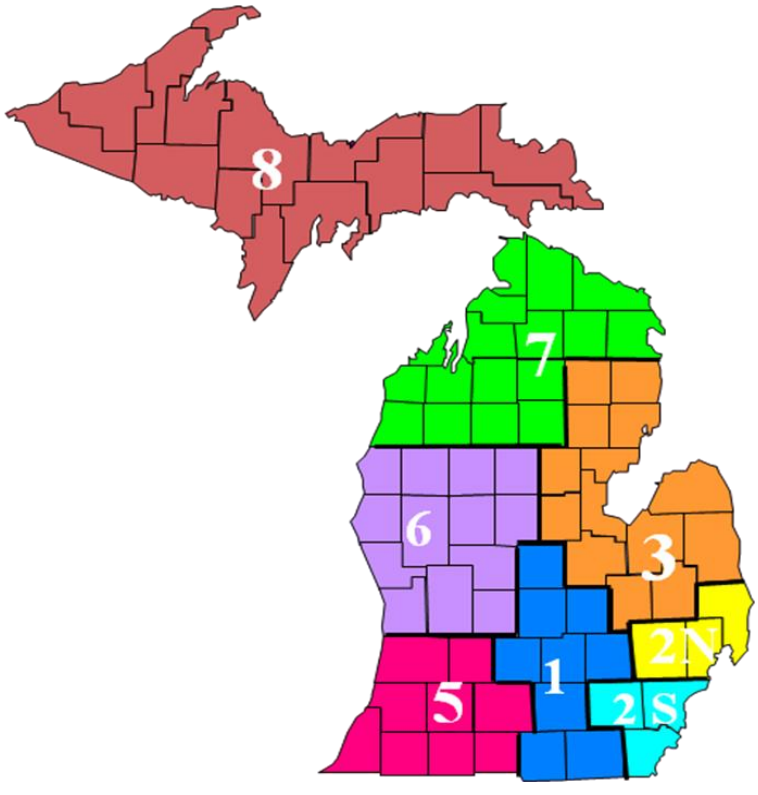
Michigan Statewide Trauma System:

A Guide to Development and Operation of Regional Trauma Networks



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Michigan Trauma System
Overview

General Background

Trauma is the leading cause of death for people between the ages of 1 and 44 in the United States. Trauma related deaths are preventable, with up to 35% of those who die from trauma related injuries doing so because of a lack of access to trauma care. In Michigan, it is estimated that there are over 5,000 trauma related deaths each year, with over 1,100 of those deaths occurring on Michigan roadways. **Creating a trauma system in Michigan could save over 1,800 lives each year. Michigan is one of four states in the United States that does not have statewide trauma system.**

Michigan has been attempting to create a statewide trauma system for over twenty years. In 2001, the Statewide Trauma Care Commission was created in the Department of Consumer & Industry Services under Public Act 440 of 2000. The Commission was charged with the following responsibilities:

- Assess the status of trauma care in Michigan;
- Hold public hearings throughout the state to gather public opinion about the status of trauma care in Michigan'
- Obtain information on trauma care systems in other states;
- File a report, including recommendations, by July 1, 2002, with the Governor, the Legislature, the Director of the Department of Consumer & Industry Services, and the Emergency Medical Services Commission.

The Commission filed its report in 2002 and concluded that the current system unquestionably lacks the essential components of an effective trauma system. The Trauma Commission made a number of recommendations within this report.

Based upon the recommendations of the Trauma Commission Report, in 2004, the Michigan Trauma Coalition, through funds provided by the Department of Community Health, Emergency Medical Services Section, developed a Michigan Trauma System Plan.

Trauma Statute

In 2004, the Michigan legislature passed Public Acts 580, 581, and 582 requiring the Michigan Department of Community Health (MDCH) to create an all inclusive trauma system. This legislation required the Department to create a statewide trauma advisory subcommittee established under the EMS Coordination Committee; and to develop, implement and promulgate rules for the implementation and operation of a statewide trauma care system within the EMS system consistent with the 2004 Michigan Trauma System Plan. In addition, the statute required the department to review and identify potential funding mechanisms to support the statewide trauma care system.

Administrative Rules

During the past three years, MDCH has, in conjunction with the State Trauma Advisory Subcommittee and the Emergency Medical Services Coordination Committee, developed administrative rules to outline Michigan's trauma system. These rules were filed at the Secretary of State on October 30, 2007. It is important to note that these rules received unanimous support from the Emergency Medical Services Coordination Committee, the State Trauma Advisory Subcommittee, and the EMS and Trauma community. No opposition was raised, during public hearing, to the implementation of the administrative rules.

A Trauma System

Although the trauma center is the key component of acute care for the severely injured, a trauma system encompasses all phases of care, from prehospital care through acute care and rehabilitation. The term "Inclusive trauma system" is used for this all-encompassing approach, as opposed to the term "exclusive system," which focuses only on the major trauma patient in the major trauma center cared for by the trauma team. An inclusive system guarantees that all injured patients will receive optimal care, given available resources, even if they do not require the resources of a specialized trauma center. The involvement of **ALL** acute care facilities in trauma patient care education programs and basic data acquisition will aid in attaining this goal of optimal care for all injured patients.

The American College of Surgeons Committee on Trauma notes that an ideal trauma system should include all the following key components to provide an effective state trauma system: leadership; system development; pre-hospital care; definitive hospital care; data collection and trauma system evaluation; public information, education and prevention; human resources; legislation and finances.

The Michigan Trauma systems plan not only includes these key components, but reflects the concept of an inclusive Trauma System in which every health care provider or facility with resources to care for the injured patient is incorporated. Effective trauma systems require clear integration of all components in each phase of care and draw upon the capacity of health care providers to reduce mortality and disability regardless of the severity of the injury involved.

Our inclusive Trauma System will not only incorporate provisions for designated trauma centers to care for the most severely injured patients, but also recognizes the importance of other acute care facilities within a trauma system in caring for the majority of less severely injured. The goal of an inclusive trauma system is to match each trauma care facility's (or provider's) resources to the needs of injured patients so that every patient receives optimal care from the initial recognition of the injury through return to the community. Once an injury occurs, optimal care necessitates that adequate numbers of specially trained trauma care personnel are available to provide care from access of the system to the delivery of rehabilitative services.

It is critical that once a seriously injured has been identified in the pre-hospital setting, the patient is assessed, triaged and transported to a facility with the appropriate resources to definitively care for their injuries. Patients with serious injuries require stabilization in a timely manner, after the injury has occurred, to improve the chances of survival and to minimize disability. If the patient arrives at a facility that does not have the necessary equipment and medical personnel, transfer of the patient to an appropriate facility for care by the appropriate medical personnel is needed in a timely manner. The responsibility of the State Trauma System will be to assess the trauma resources of acute care facilities in the state (resource verification) and evaluate inter-facility transfers. Ideally, **ALL** acute care facilities in the state will play an identified role in our inclusive trauma system. Each facility has a role in providing a tiered response to meet the needs of injured patients, and regional configuration shall reflect the individual needs of the community it serves.

The success of the Michigan Trauma Plan system depends on the ability to ensure that each injured patient will receive timely access to resources and optimal care which will enable the patient to expeditiously return to the community as a productive member of society. The development and coordination of an effective statewide trauma system in Michigan will take commitment and participation from all components of the system. Regionalization of trauma care is critical to the success of this process.

Establishing Regional Trauma System Structure

The development and coordination of an effective Trauma System in Michigan require involvement of the 65 medical control authorities currently responsible for providing Emergency Medical Services (EMS) medical direction for the pre-hospital level of care. Under the Public Health Code, the Department of Community Health is required to designate a Medical Control Authority as the medical control for emergency medical services for a particular geographic region. A Medical Control Authority is designated to provide medical oversight, within an emergency medical services system, including the supervision and coordination of emergency medical services as prescribed, adopted, and enforced through department-approved protocols.

With implementation of the statewide trauma system, the role of the Medical Control Authority will expand to include responsibility for coordinating activities of the components of an "inclusive trauma system": EMS personnel, emergency departments and in-patient trauma care providers.

Regional Trauma Networks

The Regional Trauma Networks (RTN) will be established based on the current eight Emergency Preparedness Regions ***(Appendix A-Michigan Trauma Regions Map)***, to provide clinical oversight of trauma care provided in each region of the state as an all-inclusive system.

Regional Trauma Networks should be comprised of the local MCA's within the region. All MCAs within a region must participate in the Regional Trauma Network in which a Board of the MCAs shall be formed to administer each RTN. The Department, with the advice and recommendations of the State Trauma Advisory Committee (STAC) and Emergency Medical Service Coordination Committee (EMSCC), and contingent upon sufficient funding being appropriated, shall support the establishment and operational activities of the trauma regions through the commitment of staff resources consistent with recommendations of the 2004 Michigan Trauma Systems Plan.

Collaborating MCAs in a region shall apply to the department for approval and designation as a Regional Trauma Network by completing the ***Application for Approval and Designation As a Regional Trauma Network*** **(Appendix B)**. The Department, with the advice and recommendations of State Trauma Advisory Committee (STAC) and Emergency Medical Service Coordination Committee (EMSCC), shall review the appropriateness of the regional structure. The review of the regional structure should occur every 3 years.

The Regional Trauma Network is also responsible for:

- Appointing a Regional Trauma Advisory Council
- Establishing a Regional Professional Standards Review Organization
- Coordinating the regional trauma plan.
- Submit evidence of ongoing activity, such as meeting notices and minutes to the department quarterly.

The establishment of the regional trauma networks shall not limit the transport or transfer of trauma patients between regional trauma networks.

Regional Trauma Advisory Council

The Regional Trauma Advisory Council (RTAC) is appointed by the Regional Trauma Network.

It should be comprised of MCA personnel, EMS personnel, life support agency representatives, healthcare facility representatives, physicians, nurses and consumers.

The following are the functions of the RTAC:

- Provide leadership and direction in matters related to trauma systems development in their region
- Develop RTN plan consistent with Michigan's Trauma System Plan, addressing each of the following trauma system components:
    - Leadership
        - All counties within the RTAC have been included unless a specific county, or portion thereof, has been aligned within an adjacent network, and all health care entities and MCAs, life support agencies have been given an opportunity to participate in the planning process.
    - Public information
        - Education & Injury prevention
    - Human resources
    - Communications
        - Access to the system
    - Medical Direction/Oversight
    - Triage
        - Pre-hospital triage criteria
    - Transport
        - Trauma diversion policies
        - Trauma bypass protocols
    - Trauma care facilities
        - Regional trauma treatment guidelines
    - Inter-hospital transfers
    - Rehabilitation
    - Evaluation of patient care and the system
        - Regional quality improvement plans

- Develop destination protocols based on the American College of Surgeons (ACS) field triage guidelines as referenced in the administrative rules and ensure they are followed.
- Monitor the delivery of patient care through the review of trauma deaths and by monitoring preventable complications.
- Conduct quality improvement activities to monitor the performance of hospitals and patient care providers in meeting patient care standards based on the approved triage criteria and destination protocols.

Annually, a report should be filed with the department:

- Describing progress toward system development
- Demonstrating on-going activity
- Evidence that members of the Regional Trauma Advisory Counsel are currently involved in trauma care

Regional Professional Standards Review Organization

The Regional Professional Standards Review Organization (RPSRO) is established by the Regional Trauma Network.

The purpose of the committee is to evaluate system issues for the purpose of improving the quality of trauma care including, but not limited to: access to the trauma system, triage, Inter-hospital transfer, facility performance and/or trends, guideline compliance and review of all deaths and major morbidity.

*****Refer to Appendix D- Michigan Trauma System State and Regional Trauma Network Diagram for organization structure.***

Developing the Regional Trauma Network Plan

The development of the Regional Trauma Network plan should be consistent with Michigan's Trauma System Plan, addressing each of the following trauma system components:

- Leadership
- Public information, education & prevention
- Human resources
- Communications
- Medical Direction
- Triage, Transport and Destination
- Trauma care facilities
- Inter-hospital transfers
- Rehabilitation
- Data Collection and Trauma System Evaluation

Leadership

The Lead Agency for the Michigan Trauma System is the Division of Emergency Medical Services in the Michigan Department of Community Health. The overall responsibility includes monitoring the statewide trauma system and ensuring the coordination and performance of the Regional Trauma Networks and to assist the RTNs in achieving the goal of an inclusive trauma system.

In addition to State leadership, a broad constituency of trauma leaders that include trauma center medical directors and nurse coordinators, pre-hospital personnel, injury prevention advocates, and others will operate at the regional level. This broad group of trauma leaders will work with the Department to inform and educate others about the state-wide trauma system, aid in the implementation of trauma prevention programs, and assist in trauma system evaluation and research to ensure that the right patient, right hospital, and right time goals are met.[1]

Perhaps the biggest challenge facing the Regional Trauma Network 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 of 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.

The Leadership section of the regional trauma plan should include the following:

- Develop a comprehensive organizational chart identifying the Regional Trauma Network, Regional Trauma Advisory Council, Regional Professional Standards Review Organization and its relationship to the Division of Emergency Medical Services in the Michigan Department of Community Health. ***(Appendix D)***
- Develop a set of clear, concise objectives for each organizational level to demonstrate how the goal of an inclusive trauma system will be met.

Public Information, Education and Prevention

The principle underpinning of a regional system of trauma care is the recognition, on the part of public officials and of the general population, that major injury is a manageable public health problem amenable to primary (preventing the event), secondary (reducing the degree of injury resulting from the event), and tertiary (optimizing outcome from the injury once it occurs) management. Enhancing this recognition requires overcoming several commonly held views on traumatic injury involving the incidence of major injury ("It won't happen to me."), the availability of optimal trauma care ("If I am injured, I'll be well taken care of by my local hospital."), and preventability. [2]

Trauma centers have an important role in reducing the impact of injury by participating in prevention efforts. These efforts are based on identification of specific injuries and risk factors in patients, families, and the community. For many injuries, prevention is often the only, if not the best, means of dealing with this health care problem.[2]

The region should utilize the trauma registry to identify patterns, frequency, and risks for injury within the communities. Trauma centers, working together with pre-hospital providers, rehabilitation experts, local community groups, governmental agencies, national organizations, private foundations, and schools of public health, can have a significant impact on lessening the morbidity and mortality of trauma. Injury prevention often is under-recognized as a powerful tool to reduce injury. The region caring for injured patients can and should establish and aggressively pursue a leadership role in injury prevention.[2]

The regional injury prevention plans should be developed based on the regional data, resources from the Michigan Department of Community Health-Injury and Violence Prevention Section (www.michigan.gov/injuryprevention)- ***(Appendix E-State of Michigan Injury Plan)*** and collaboration with the many local, regional or national prevention programs (American Trauma Society, National Center for Injury Prevention and Control and support groups for the prevention of: domestic violence, suicide, homicide, poisonings, elder and child abuse and gang related violence, etc.)

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 communication component of trauma system development and maintenance includes both Public Education and Professional Education and Training.

Public awareness of the trauma system and how to access it may be lifesaving and limb-saving. The importance of early access for care of injured patients cannot be overemphasized. Early access may be accomplished best when the public is aware of the local means of access to the trauma system. Emergency 911 systems are used commonly in the United States, but when 911 is not available, the public should be taught other means of access, such as other phone numbers, radio, and so on. First aid courses and CPR classes teach basic management principles to laypersons. Good educational programs to teach simple lifesaving and limb-saving skills and to avoid

harm to injured patients are needed to enhance any trauma system. Many organizations have these types of programs available and welcome the participation of trauma centers and systems personnel.

Professional education and training should be on-going throughout the trauma system. These programs are important to maintain and enhance the knowledge and skills to care for injured patients consistently at the highest optimal level to improve outcomes. Support of regional education in the areas of pre-hospital, nursing and physician trauma care will be essential to the success of an inclusive Trauma System.[3] Some of the types of educational and training programs include: Sponsoring various trauma related Continuing Education (CE) and CME (Continuing Medical Education) classes or symposiums including: Advanced Trauma Life Support (ATLS), Pre-hospital Trauma Life Support (PHTLS), International Trauma Life Support (ITLS), Trauma Nurse Core Curriculum (TNCC) and Trauma Nurses Advanced Trauma Course (TNATC) and promoting educational initiatives to support regional Emergency Medicine and Surgical Residency programs. The challenge that must be met will be to bring these educational opportunities to the regional and local level.

The following are the professional education and training recommendations for participating in the Michigan Statewide Trauma System:

UNIT	**EDUCATION PER YEAR**
ED	TNCC or ATCN
ICU, Trauma related whether surgical, burn, etc.	TNCC, ATCN or 8 hours of trauma related in-service
PICU	TNCC, ATCN or 8 hours of trauma related in-service
PACU	TNCC, ATCN or 8 hours of trauma related in-service
Med-Surg Pediatrics	TNCC, ATCN or 8 hours of trauma related in-service
Rehab	8 hours of trauma related in-service
Physicians	ATLS per ACS guidelines and Statewide Trauma System Administrative Rules.[2,4]
• Trauma director and the liaison representatives from neurosurgery, orthopaedic surgery.	16 hours annually or 48 hours in 3 years of external trauma-related CME*

▪ Emergency physicians	Board certification in emergency medicine by a national organization approved by the department or successful completion of ATLS 16 hours annually or 48 hours in 3 years of external trauma-related CME.*
• Other members of the general surgery, neurosurgery, ortho-paedic surgery and who take trauma call.	16 hours of CME per year on average or by demonstrating participation in an internal educational process conducted by the trauma program and the specialty liaison based on the principles of practice-based learning and the performance improvement and patient safety program. 16 hours annually or 48 hours in 3 years of external trauma-related CME.*
Pre-hospital	MDCH Continuing Education Requirements in the Trauma Credit Category:

Level of Licensure	Lecture	Practical
Paramedic		2
EMT Specialist		2
EMT		1
MFR		1

Trauma Registrar	4 hours of trauma related coding/education
Injury Prevention Coordinators	8 hours of trauma/injury prevention related In-service/education
Respiratory therapy Physical therapy Occupational therapy Speech therapy Radiology	8 hours of trauma related in-service
Support services • Chaplin	4 hours of trauma related in-service

- Social work

**Programs given by visiting professors, invited speakers, and teaching an ATLS course are considered external CME.*

The Regional Trauma Network along with the Regional Trauma Advisory Council should determine how program attendance will be tracked and what level the compliance rate should be set at for the region.

Outreach or the act of providing trauma center expertise, information, and leadership to institutions, agencies, and individuals within a region is essential for the purpose of improving the care of injured patients. The communication between the regional trauma centers not only helps provide consistency within the system, but also improves and facilitates care on a case-by-case basis, including referrals, transfers and follow-up care as appropriate.

The department will assist in determining the needs of trauma care personnel for the regions by developing and distributing a statewide needs assessment. Some of the areas the tool will address include, but are not limited to:

- Number of personnel, by caregiver type, needing basic trauma education and number needing supplemental trauma education to augment their current level of knowledge/skills.
- Mechanisms in place for continuing education in trauma care- ITLS/PHTLS/TNCC
- Current hospital personnel resources (physician, nurse and other health care professionals) and education levels of personnel required to care for all injured persons.
- Number of sub-specialist physician support personnel
- Needs required to support the infrastructure of the trauma system
- Strategies for securing needed personnel

This data will be compiled and shared with each of the regions.

The Public Information, Education and Prevention section of the regional trauma plan should include the following:

- Describe how the region will identify patterns, frequency, and risks for injury within the communities.
- Describe how the region will inform public officials and the general population regarding injury prevention and trauma system development.
- Describe how the regional trauma system is active within it jurisdiction in the evaluation of community-based activities and injury prevention and response programs,
- Describe 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.

- List the organizations dedicated to injury prevention within the region and the issues they address.
- Provide an educational plan specific to trauma for the region to include the following:
    - Who will be educated
    - What types of programs will be offered
    - How often the programs will be offered
    - How will personnel education be tracked

Human Resources

The statewide trauma system requires administrative and clinical leadership, authority, planning and development, legislation and finances. The section of Emergency Medical Services within the Department of Community Health shall provide the administrative direction of the statewide trauma system with a full time **State Trauma Coordinator**.

The following additional positions will be staffed contingent upon funding:

State EMS/Trauma Medical Director

- Staffed part-time
- Provide medical oversight for trauma care and prehospital care.
- Board certified in either Surgery or Emergency Medicine
- Clinical and administrative experience in EMS and trauma care

State Trauma Registrar

- Staffed full-time
- Coordinate the collection of regional trauma data to allow evaluation of quality and outcomes on a state basis.
    - Validates individual hospital reports
    - Provides feedback to hospitals and regions
- Oversees the data process and documentation
- Collaborates with the Database Manager to provide accurate aggregate data to administration, hospitals, National Trauma Databank and the general public
- Interact with national organizations to allow comparisons of Michigan's trauma care performance with national benchmarks of trauma care.

State Verification and Designation Analyst

- Staffed full-time
- Coordinate the trauma center designation process and verification activities
- Development of an appeals mechanism for the designation process

State Database Manager

- Staffed full-time
- Develops and maintains trauma data through the upload process and web-enhanced process
- Responsible for the data linkage to other related databases
- Generates hospital data validation reports that shall include completeness of data, patient records with errors
- Works collaboratively with the State Trauma Registrar

Administrative Support

- Staffed full-time
- Performs administrative and office support activities for EMS and trauma section.

A Statewide Trauma Care Advisory Subcommittee (STAC) has been established to act as the department's subject matter experts with regard to the clinical and operational components of trauma care[4]. The membership includes the following:

- Two trauma surgeons who are trauma center directors
- One trauma nurse coordinator
- One trauma registrar
- One emergency physician
- Two administrative hospital representatives
    - 1 of whom represents a hospital **designated** as a Level I or Level II Trauma Center by the American college of surgeons committee on trauma
    - 1 of whom represents a hospital that is **not designated** as a Level I or Level II Trauma Center by the American College of Surgeons Committee on Trauma (ACS-COT)
- One life support agency manager who is a member of the emergency medical services coordination committee.
- Two medical control authority medical directors, 1 of whom represents a rural county and 1 of whom represents a non-rural county.

Refer to www.michigan.gov/ems for current member listing

The effectiveness of a Trauma System depends on its integration within the emergency medical services (EMS) system and other relevant subcomponents. Planning for trauma system implementation requires consideration of the additional responsibilities the trauma system will place on existing EMS components such as local medical control authorities, pre-hospital agencies and personnel, communication networks, referral hospitals and receiving hospitals.

As discussed in, "Establishing Trauma System Committee Structure", the medical control authorities will be asked to expand their responsibilities with the implementation of a statewide trauma system. The MCA's within the region will be responsible for working together with the implementation and maintenance of the trauma system, including development of destination protocols, establishment of inter-facility transfer agreements, data collection for the statewide trauma registry, and regionalization of medical control functions where applicable.[3]

The following regional positions will be staffed, contingent upon funding:

Regional Trauma Coordinator ***(Appendix F)***

- Staffed full-time
- Assist in coordination of Medical Control Authorities
- Coordinating the regional modifications to state trauma triage protocols
- Establish inter-facility agreements
- Development of trauma center standards
- Coordinate the regional data collection and QI activities
- Integrate trauma system activities with related initiatives in Bioterrorism response and EMS

The Human Resources section of the regional trauma plan should include the following:

(The regional positions are contingent upon funding)

- Describe the number, position titles and status of all personnel within the region who have roles or responsibilities to the trauma system that include, but are not limited to:
  - Dispatch Centers
  - EMS agencies
  - Hospitals
  - Rehab centers

Communications

Effective communications among all aspects of the trauma system, from identification of the event through definitive care, is an essential component of the trauma system. [3]

The communication system starts with the event identification and public access to care and extends through EMS dispatch of first response and transporting resources, coordination of communication among all the out-of-hospital agencies, communication with the receiving facility and overall integration and quality management of the process.[3]

The trauma system must be supported by a communication system that provides immediate citizen access, for example, Enhanced 9-1-1 (E 9-1-1) and the dispatch of appropriate medical resources (ambulances and helicopters) with pre-arrival instructions to the calling party. The system must also be supported by on-line or off-line bidirectional voice communications that allow field-to-medical receiving facility medical instructions even during inter-facility transfers and mass casualty or all-hazards incidents.[5]

Michigan has a statewide Medical Communications (MEDCOM) plan to address the communication needs from field providers to hospital, coordinated at the local level. It is expected that everyday radio communications within the EMS system will be maintained according to the local protocols as well as the State MedCom plan.

Michigan does have a 800 MHz communication system in place, currently being used primarily by the Michigan State Police. This system is referred to the Michigan Public Safety Communications System (MPSCS) and allows for interoperable communication among multiple agencies. With the disaster preparedness initiatives, efforts have been made to make interoperable communications a priority by providing most agencies with the MPSCS system.

During multi-casualty incidents that exceed local resources, the Regional and State radio communication plans should be followed. Alternative communication should be considered for those types of situations in which radio communication failure is encountered.

Web-based communication applications that may be used to provide continuity of care of the trauma patient from one agency to the next by facilitating rapid patient care data sharing This allows for coordination and streamlining of patient information distribution to fulfill the overall goal of timely and optimal care of the injured patient.

The Communications section of the regional trauma plan should include the following:

- Describe the EMS communication system within the trauma region
  - How citizens access EMS System?
  - How dispatching of appropriate medical resources are accomplished?
  - Are Pre-arrival instructions provided?

- Describe the current communication capabilities of the hospitals in your region
- Describe the regions current interoperability communication status
- Describe the Regional communication plan that would be utilized in the event of a mass casualty and/or disaster situation
- Describe other communication tools utilized within the Region to assist in optimizing the care of the trauma patient.

Medical Direction

Medical direction provides the operational framework for field providers and assures appropriateness of all medical aspects of the pre-hospital program with the same professional accountability as medical care in the more traditional settings.

Medical direction of EMS activities in Michigan is provided under Michigan Public Health Code (Part 209 of the Public Acts of 1978 as amended), through a system of Medical Control Authorities (MCA) established by the area participating hospitals.

The MCA is responsible for identifying the EMS medical director for the system. The medical director is responsible for medical oversight for the emergency medical services system served by the medical control authority as indicated in Part 209 of the Public Acts of 1978 as amended. The EMS medical director shall meet the following qualifications:

- Be a Michigan licensed physician
- Board certified in emergency medicine by a national organization approved by the department or
- Practices emergency medicine and has successfully completed both advanced cardiac life support and advanced trauma life support courses approved by the department
- Familiarity with the design, goals and operation of out-of-hospital EMS systems
- Experience or training in the out-of-hospital emergency care of the acutely ill or injured patient
- Experience or training in medical direction of out-of-hospital care providers
- Active participation in Emergency Department management of the acutely ill or injured patient
- Experience or training in the instruction of out-of-hospital personnel
- Experience or training in the EMS performance improvement process
- Knowledge of EMS laws and regulations
- Knowledge of EMS dispatch and communications procedures
- Knowledge of skills, equipment, environment and functions of out-of-hospital emergency units
- Successful completion of a State approved Medical Director's Course
- Other standards set forth in department rules.

The initial on-scene assessment and management are provided by the pre-hospital medical team. Medical direction of pre-hospital trauma care is provided by pre-existing protocol (off-line medical direction) or by voice-directed communication (online medical direction).

On-line medical oversight is provided at the local level, generally by the hospital to which the patient is being transported. Frequently, the communication from the field is simply to inform the ED of the patient's impending arrival. The state trauma system, working through the Lead Agency, will define qualifications, roles and responsibilities for those providing on-line medical direction.

All radio communication regarding an injured patient being transported to the hospital shall be standardized throughout the region with specific information provided by the EMS crew to the hospital personnel. Relay of information about an incoming injured patient to a hospital being cared for by EMS is necessary to facilitate timely and optimal patient care. Consistency of this communication not only sets appropriate expectations but also minimizes the risk of omitting important information needed by the receiving hospital and its personnel regarding the incoming injured patient.

Because off-line trauma protocols have enormous impact, it is imperative that medical directors actively involved in EMS systems are participating in protocol development and evaluation. The development of the protocols should also include trauma health providers, including surgeons, emergency physicians, medical directors for emergency medical services (EMS) agencies, and appropriately trained basic and advanced medical personnel. Collaboration amongst this team throughout the region will not only provide consistent and organized medical direction but it will also help establish continuity of care and hospital protocols

The Medical Direction section of the regional trauma plan should include the following:

- Describe how EMS and trauma medical direction and oversight are coordinated and integrated regionally.
- Describe how the region will maintain an ongoing relationship between the trauma specialty physician leaders (for example, trauma medical director within each trauma center) and the EMS system medical directors.
- Describe how the region will develop, adopt and implement protocols as well as monitor them for performance and improvement.
- Provide a regional radio communication protocol for in-bound injured patients.

Triage, Transport and Destination

Triage and Transport

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 pre-hospital providers.[1]

The goals of the pre-hospital component of the system are to prevent further injury, initiate resuscitation, and provide safe and rapid transport of injured patients. The successful management of trauma patients requires the identification of specific injuries or mechanisms likely to cause injury to allow correct triage to an appropriate facility. 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.[1]

Major trauma patients requiring the resources of a Level I Regional Trauma Research Center or Level II Regional Trauma Center shall be identified by the ACS Field Triage Scheme as referenced in the administrative rules (***Appendix G-Field Decision Triage Scheme***). There is not one single set of criteria that can define the appropriate trauma center for each area of the state. However, each Regional Trauma Network will need to determine a system that is appropriate for its specific location based on these recommended minimum criteria.

Primary triage of a patient from the field to a center capable of providing definitive care is the goal of the trauma system even if it means bypassing a Level III or Level IV Trauma Center. However, there are circumstances (for example, airway management, rural environments, inclement weather) when triaging a patient to a closer facility for stabilization and inter-facility transfer is the best option for accessing definitive care.[1]

Because the pre-hospital trauma system is driven by the goal of getting the right patient to the right place at the right time, imprecision results in overtriage (minimally injured patients are transported to higher level trauma centers) and undertriage (severely injured patients are transported to lower level trauma centers). Therefore, a trauma system should establish and monitor acceptable rates of over and undertriage.[2]

Undertriage is defined as a triage decision that classifies patients as not needing trauma center care when in fact, they do. This classification is false-negative triage. Undertriage may result in an adverse patient outcome. The receiving medical facility may not be adequate to diagnose and treat the trauma victim.[2]

Defining acceptable levels of undertriage is dependent on how one defines patients requiring trauma center care (major trauma patients). A couple of the methods that may be utilized to define acceptable levels of undertriage are to:[2]

- Identify all of the potentially preventable deaths that occur within a regionalized trauma system. Undertriaged patients would be those who were taken to a non-trauma center hospital and then died of potentially preventable causes. By using this method, a target undertriage rate should be 1% or less.[2]

  OR

- Determine how many major trauma patients were transported incorrectly to a non-trauma center. If an Injury Severity Score of 16 or more is used to define major trauma patients, undertriaged patients would be patients with an Injury Severity Score of more than 15 who were taken to a non-trauma center hospital. By using this method, an acceptable undertriage rate could be as high as 5%.[2]

Overtriage is a decision that incorrectly classifies a patient as needing trauma center care, although retrospective analysis suggests that such care was not needed. Overtriage has been said to result in overutilization of finite resources (financial and human) and, as such is also important to monitor[2]

Calculation of overtriage rates starts by classifying major trauma patients using standard triage criteria. One example introduced with the Major Trauma Outcome Study evaluated patients who died or were admitted to the hospital for more than 48 hours, an intensive care unit, or the operating room. The patients triaged to the trauma center not meeting these criteria become the numerator. The total number of patients triaged to the trauma center would be the denominator. Most agree that an acceptable percentage of overtriage is in the range of 25% TO 50%.[2]

Air medical transportation is also an important method of rapidly transporting injured patients from the scene to a trauma center. A structured air medical safety program should be in place to guide pre-hospital personnel in establishing a safe landing site, proper loading procedures, communications with pilots and medical personnel, and safe procedures in proximity to an operating helicopter. This assures that no matter where the aircraft may be there is consistency in operation. Criteria and procedures for requesting air medical transport for injured patients from the scene to a trauma center should also be developed within the region.[2]

Trauma centers vary in their resources and their capacity to care for certain injuries. Trauma triage criteria, transport and destination protocols should consider the specific injuries for which the local trauma centers are capable of caring, thus avoiding the unnecessary transfer of patients who can be treated locally while preserving limited resources for patients most in need. Developing and maintaining open communication

within the trauma system while considering the patients best interest is imperative for developing optimal trauma triage, transport and destination protocols.

Destination

The development of destination protocols is often fraught with many political and competitive issues. The following factors seek to minimize these difficulties by attempting to focus on the best way to get the seriously injured patient to the hospital that can provide definitive care as soon as possible. They shall serve as the minimal guidelines to incorporate into the regional patient destination protocol and will be used by the department to evaluate the regional destination procotol:[4]

- All patients meeting the ACS Field Triage Scheme should be transported to the closest appropriate state designated trauma center. Although regional variation may occur based on local needs, the following guidelines should be used to assist in this process:
    - If a Level I or Level II state designated trauma center is within 30 minutes transport time of the scene, the adult should be transported to the closest of these facilities
    - Pediatric trauma patients should be transported to a regionally designated facility for appropriate evaluation and stabilization and then transported to the appropriate children's trauma center, if needed. Parents should be transported to the same facility as their children, if resources are available.
- Bypassing a Level III or Level IV Trauma Center or a nonparticipating hospital is appropriate as long as the Level I or Level II Trauma Center is within a reasonable distance from the scene, as defined by protocol.
- No patients meeting the ACS Field Triage Scheme should be transported to a facility not participating in the state trauma system unless there is no other reasonable alternative available. For example, the next closest facility is more than a reasonable distance from the scene.
- Some areas of the state have prolonged transport times to any facility. Trauma patients in these areas shall be transported to the closest facility that can facilitate rapid transport to the definitive care facilities
- In areas of the state where Level I and Level II Trauma Centers are not within a reasonable distance from the scene, the trauma patient shall be transported to the closest appropriate highest level trauma center
    - Each region will need to carefully evaluate this situation since it could be detrimental to the patient to transport him/her to a level 4 center 30 minutes to the east, when the closest level 2 center is 40 minutes to the west. That patient would then have to be transported 70 minutes back to the west after stabilization.
- Protocols shall take into account the fact that some centers may have different resources available even though they are the same level
- Each region shall make appropriate determinations for destination based on what is best for the patient rather than based on politics or economic factors

- In areas of the state close to state borders, the most appropriate facility may be out of the state. Whenever possible, trauma patients should be transported within state borders, but local protocols should address this issue

This team approach of the development of the trauma triage, transport and destination criteria/protocols will help to establish not only continuity of care across the region, but also the state.

The Triage, Transport and Destination section of the regional trauma plan should include the following:

- Provide a regional pre-hospital tiered trauma triage scheme using the minimum criteria referenced by the ACS Field Triage Scheme in the Administrative Rules and/or the Resources for Optimal Care of The Injured Patient 2006: Committee on Trauma American College of Surgeons Manual.
- Describe how the EMS system ensures availability of EMS resources during times of minimum staff availability, high emergency call volume and high transfer volumes.
- Describe how the region will establish and monitor acceptable rates of undertriage and overtriage.
- Provide a regional air medical services protocol that addresses the following:
    - Establishing a safe landing site
    - Proper loading procedures
    - Communications with pilots and medical personnel
    - Safe procedures in proximity to an operating helicopter
    - Criteria that helps determines when air medical should be utilized
    - How this protocol is shared regionally with personnel
    - How often this protocol is shared regionally with personnel
    - List of Latitude and Longitude of regional trauma center helipads
- The regional criteria used to guide the decision to transfer patients to an appropriate resource facility and criteria variation between regional Trauma Centers.
- Provide a regional trauma destination protocol utilizing the state guidelines as a minimum as referenced above or in the Administrative Rules. These guidelines will be used by the department in evaluating the regional destination protocol.

Trauma Care Facilities

The statewide trauma system shall integrate all hospitals into an inclusive system or network of definitive care facilities in order to provide a spectrum of care for **ALL** injured patients. This allows for hospitals to participate in the system to the extent (level) that they are willing to commit the resources necessary for the appropriate management of the injured patient. It also ensures that all injured patients are part of the system of coordinated care, based on level of injuries and care required.[3]

The American College of Surgeons Committee on Trauma (ACS-COT) has identified the following service levels of trauma centers that are based on a number of factors, including resources and location.

- Level I:
  - Lead hospital
  - Designated as a regional resource leader within a service area
  - Generally serves large cities or population-dense areas
  - Must be able to manage large numbers of injured patients with a certain severity level of injury
  - Expected to conduct trauma research
  - Be a leader in education, prevention and outreach activities

- Level II
  - Provides comprehensive trauma care in two environments
    - Population-dense area where this facility supplements the clinical activity and expertise of a Level I center
    - A less population-dense area where the facility serves as the lead trauma facility for a geographic area when a Level I institution is not geographically close
      - Must have an outreach program that involves smaller institutions in its service area

- Level III
  - Must have continuous general surgical coverage
  - Must be capable of managing the initial care of the majority of injured
  - Must have transfer agreements with other trauma hospitals for patients that exceed its patient care resources
  - Must be involved in prevention and have an active outreach program for its referring communities
  - Must conduct education programs for nurses, physicians and allied health care workers involved with trauma

- Level IV
  - Located in a rural area
  - Usually supplements care within a larger trauma system
  - Provide initial evaluation and assessment of injured patients, but most require transfer to higher level trauma centers

- Must have 24-hour emergency coverage by a physician
- Well defined transfer plans

Please refer to the current edition of the ACS-COT publication, "Resources for Optimal Care of the Injured Patient", for additional criteria for each service level.

In order for the trauma care facilities in Michigan to be integrated into a network that functions on a continuum so that all injured patients are matched to a facility that meets their needs in a timely manner, the department will designate ALL Michigan's definitive care facilities into one of the four categories. All trauma care facilities will, at a minimum, have a basic emergency medicine capability and may be hospital based or free standing facilities.

- Regional Trauma Research Center
  - This level of facility would correspond directly with "Level I" trauma facility as defined in the most current edition of the ACS-COT publication, "Resources for Optimal Care of the Injured Patient".

- Regional Trauma Center
  - This level of facility would correspond directly with "Level II" trauma facility as defined in the most current edition of the ACS-COT publication, "Resources for Optimal Care of the Injured Patient".

- Community Trauma Facility
  - This level of facility would be similar to the "Level III" trauma facility as defined in the most current edition of the ACS-COT publication, "Resources for Optimal Care of the Injured Patient".

- Trauma Support Facility
  - Provides initial emergency stabilization of a patient, in preparation for expeditious transfer to a Regional Trauma Research Center, Regional Trauma Center, or a Community Trauma Facility, depending on the highest level of care available for that region.
  - It is not expected that patients would receive definitive care at TSF's, nor would patients be transported to a TSF if there were a higher-level facility within the area.
  - Standards for TSF verification have been developed by the department. ***(Appendix I- Michigan Level IV Verification Criteria)***.
  - Facilities verified as TSF's will be designated trauma receiving facilities within their respective regional system and the overall State Trauma System

Currently, ACS-COT verification is for a period of three years and designation through the department will follow this time frame. Community need will be reassessed at the

time of re-application for designation to determine any change in the need for trauma center designation.

Definitive 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 definitive care facilities will participate in the essential activities of a trauma system, including performance improvement, data submission to the trauma registry, representation on the regional trauma advisory committee 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. Facilities providing the highest level of trauma care will be expected to provide leadership in education, outreach, patient care and research.[1]

The Trauma Care Facilities section of the regional trauma plan should include the following:

- Provide a list of hospitals within the region.
- Provide a list of the current ACS verified centers along with the service level within the region.
- Provide a list of the clearly defined roles and responsibilities of all acute care facilities within the region treating trauma and of facilities that provide care to specialty populations (for example, burn pediatric, SCI, and others).
- Describe how the region will continually evaluate and assure the resources and care being provided to trauma patients meet the standards based on the current level of state designation for each acute care facilities within the region.

Inter-hospital Transfers

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.[1]

Once a patient has entered the system, a receiving facility would transfer the patient to the highest level of care if they are not the appropriate facility for that patient. Therefore, the development of agreements for transfer of patient's between institutions is an essential part of a statewide trauma system. These transfer agreements will be developed in advance to define which patients should be transferred and the process for doing so. Once the need for transfer is recognized, the process should not be delayed for laboratory or diagnostic procedures that have no impact on resuscitation or the transfer process. Minimizing the time from injury to appropriate definitive care can have a positive influence on patient outcome. Regional trauma systems facilitate the transfer process and improve the efficiency of patient movement through the system by designing and implementing transfer plans that deal with issues before the acute patient need.[2]

Written agreements between hospitals help ensure that consistent, timely, proper and efficient movement of patients between institutions, allow for review of the structure of the transfer process with the goal of performance improvement, and result in mutual educational benefit for both institutions. The value of these agreements is to design a process before its necessity that allows injured patients to receive the specialty care needed. This process avoids delays that prolong the time from injury to definitive care. The transferring and receiving hospitals benefit by having predetermined the needs and expectations of both institutions and resolving problematic areas before the actual transfer process. The best plans are carefully considered, mutually approved, written, and frequently reviewed.[2]

Communication linkages may take the form of telephone, cellular phone, or web based technology, but in all instances, should be physician-to- physician for accurate communication of the patient's clinical needs. A centralized, statewide transfer access phone number shall be developed in all trauma-receiving facilities for expedited patient access to the higher level of care.[3]

It will be the responsibility of all designated trauma centers to maintain inter-facility transfer protocols for all patients. The following shall serve as the minimal guidelines to incorporate into the regional inter-facility transfer protocol.[4]

- Trauma patients should be transported to Michigan hospitals that participate in and are designated as a Michigan trauma facility.
- Michigan hospitals that frequently transfer patients to out of state hospitals will do so only if a designated Michigan trauma center is unavailable.

- A trauma patient, who meets the ACS Field Triage Scheme as referenced in the Resources for Optimal Care of the Injured Patient 2006; Committee on Trauma ; American College of Surgeons, will undergo rapid evaluation and treatment in preparation for transfer.
- The method by which the patient is transferred (ground or air) shall be determined by the sending or receiving physician based on patient need
    - Patients needing staff or equipment beyond the scope of local ground providers will be transferred via air-medical personnel at the discretion of the sending or receiving physician
- Patients or their families may request transfer to a specific hospital if it is designated as Level 1 or Level 2 trauma center, and the transfer can be accomplished without harm to the patient.
- Designated trauma centers shall use all of the following criteria for trauma patient transfer protocols:
    - Central Nervous System
        - Depressed skull fracture
        - Penetrating injury/open fracture, with or without cerebrospinal fluid leak.
        - GCS <14 or deterioration
        - Spinal cord injury or cerebral vascular injury
    - Chest
        - Major chest wall injury or pulmonary contusion
        - Wide mediastinum or other signs suggesting great vessel injury
        - Cardiac injury
        - Patients who may require prolonged ventilation
        - Flail chest/multiple rib fractures
    - Pelvis/Abdomen
        - Unstable pelvic ring disruption
        - Pelvic fracture with shock or other evidences of continuing hemorrhage
        - Open pelvic injury
        - Intra-abdominal visceral injury
        - Acetabular injury
    - Major Extremity Injuries
        - Fracture/dislocation with loss of distal pulses
        - Open long-bone fractures
        - Extremity ischemia
        - Compartment syndrome
    - Multiple-System Injury
        - Head injury combined with face, chest, abdominal or pelvic injury
        - Burns with any combination of multi-system, injury including inhalation injury
        - Multiple long-bone fractures
        - Injury to more than two body regions
    - Co-morbid Factors
        - Age >55 years

        - Children <5 years
        - Cardiac or respiratory disease
        - Insulin-dependent diabetes
        - Morbid obesity
        - Pregnancy
        - Immunosuppression
        - Liver or renal insufficiency
    - Secondary Deterioration (late sequelae)
        - Prolonged mechanical ventilation >48 hours
        - Sepsis
        - Single or multiple organ system failure (deterioration in central nervous, cardiac, pulmonary, hepatic, renal or coagulation systems)
        - Major tissue necrosis/soft tissue injury
- Specific consideration should be taken in determining inter-facility destination with those populations that require specialized resources such as pediatrics and patients with burns.

The Inter-hospital Transfers section of the regional trauma plan should include the following:

- All Level 3, Level 4 and non-designated hospitals will develop and provide a copy of the regional formal policy that describes the process for transfer of trauma patients who meet the criteria to be cared for at a Level 1 or Level 2 trauma center. The policy should be submitted with the regional trauma plan and include, but is not limited to the following:
    - Centralized number to trauma centers to arrange interfacility transfer
    - Method of which patient is transferred (ground vs. air)
    - Records that should accompany the patient to the receiving facility
    - Regional Trauma Transfer Order Sheet ***(Appendix K- Regional Trauma Transfer Order Sheet)***
    - Destination for those populations requiring specialized resources
- All Level 3, Level 4 and non-designated hospitals will provide a copy of the regional formal transfer agreements ***(Appendix J-Sample Inter-facility Transfer Agreement)*** established with Level 1 or Level 2 hospitals for the transfer and receipt of trauma patients and be submitted with the regional trauma plan.
- All Level 3 and Level 4 hospitals will develop and provide a copy of the regional protocol for activation of the transfer process, in anticipation of need for a Level 1 or Level 2 center, by pre-hospital personnel prior to arrival at the Level 3 or Level 4 hospital based on the field triage criteria and be submitted with the regional trauma plan.

Rehabilitation

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.[1] Not only is this effort best for the patient, it is also less costly. When rehabilitation results in independent patient function, there is a 90% cost saving compared with costs for custodial care and repeated hospitalizations.[2]

The rehabilitation of an injured patient requires input from an organized multidisciplinary team to address all aspects of the patient that include such as physical, psychological, occupational, spiritual, social, vocational, nutritional and medical needs. Each patient is assessed by the rehab team within the first hospital day or 24 hours to set realistic goals and to determine, as far as possible, the potential for rehabilitation benefit. Depending on the needs of the patient, the rehabilitation will either be inpatient or outpatient. Rehabilitation specialists should be integrated into the multidisciplinary advisory committee to ensure that rehabilitation issues are integrated into the trauma system plan.[1]

Rehabilitation requires a major commitment by the patient and program to be successful. Therefore, it is appropriate to make plans early to determine the needs for the specific components of therapy because rehabilitation of all functional deficits is not always simultaneous.[2]

When faced with an injured patient, it will be important to be able to address the rehabilitation needs in a timely manner. Therefore, an inventory of available rehabilitation facilities including specialized programs (TBI-Traumatic Brain Injury, SCI-Spinal Cord Injury, Children) will be conducted to identify credentialed institutions, geographic location (in or out of state), and capabilities. This will allow for the development of inter-facility transfer agreements before its necessity and allow injured patients to receive the specialty rehab care needed.

The rehabilitation section of the plan should be summed up with having a mechanism in place to allow for transition of patients who have been transferred to rehabilitation facilities across regions/state lines, back to their communities and providing the participants of the trauma system outcomes of the injured patient who has gone through the rehabilitation process.

The Rehabilitation section of the regional trauma plan should include the following:

- Provide a list of available rehabilitation facilities within the Region and surrounding the Region. Categorize them according to Credentialed Institution/Specialty Program, Geographic Location and Capabilities.
- Provide a list of rehabilitation specialists and how they are integrated into the trauma system planning.
- Develop and provide a sample inter-facility agreement specific to rehabilitation facilities/specialty programs.
- Describe the mechanism in place that allows for patients who have been transferred to rehabilitation facilities outside of the region/state to be transferred back to their communities.
- Describe the process in which outcome data of the injured patient who has gone through the rehabilitation process is retrieved and incorporated into the quality improvement program.

Data Collection

A trauma registry is a disease-specific data collection composed of a file of uniform data elements that describe the injury event, demographics, pre-hospital information, diagnosis, care, outcomes, and costs of treatment for injured patients. It is an essential management tool that contains detailed, reliable, and readily accessible information needed to operate a trauma center.[2]

The purpose of the trauma registry is to:[4]

- Collect and analyze trauma system data to evaluate the delivery of adult and pediatric trauma care
- Develop injury prevention strategies for all ages
- Provide resources for research and education

The department, with advice and recommendations from the State Trauma Advisory Sub-committee (STAC) and Emergency Medical Service Coordination Committee will develop and maintain a statewide trauma data collection system for all hospitals throughout the state as well as a state trauma data oversight committee, a subcommittee of the STAC to do the following:[4]

- Adopt the national trauma data elements and definitions as a minimum set of elements for collection based on the most current version of the National Trauma Registry Data Dictionary that provides the exact standard for submission of trauma registry data to the National Trauma Data Bank (NTDB)
    - Additional required data elements that shall be submitted include:
        - Destination medical record number
        - Patient care report number

- Develop and publish a data submission manual that specifies all of the following:
    - Data elements and definitions
        - Based on most current version of the National Trauma Registry Data Dictionary with additional data elements listed above
        - Method of submitting data to the department
        - Timetables for data submission
        - Electronic record format
        - Protections for individual record confidentiality
    - Notification of trauma care facilities, ambulance service providers and first responder services of the required registry data sets
    - Update the facilities and providers, as necessary, when the registry data set changes
    - Specification of both the process and timelines for healthcare facility and ambulance service provider submission of data to the department

- Provide and Prescribe:
    - Standard reporting mechanisms to be used by all healthcare facilities and life support agencies
    - The form and content of records to be kept

- The information to be reported to the department

- Develop procedures to meet the following 5-year data implementation plan:
  - Year 1
    - Establish state committee structure
    - Establish regions and regional structure
    - Define data dictionary
    - Define the data download and data verification process
      - The department will make available the trauma registry software to all agencies to assist in the data gathering process. An agency may opt to utilize their own trauma data collection software as long as their software is capable of interfacing with the state repository and allows all required data elements to be exported to the state repository.
    - Download all ACS verified trauma facility data to a regional trauma registry
      - Each region shall oversee the transfer of data from all facilities within a defined region
      - Data transfer from a hospital registry to a regional registry shall be timely, but not burdensome
      - Data related to a trauma response shall be submitted to the department on a quarterly basis
      - Initially, data may be submitted in either paper form, or as an electronic file
      - Generate reports and evaluate uniformity of data
        - Initial evaluation of the data will take place at the regional level which will include the following:
          - Removing unique patient identifiers from the patient data to protect patient confidentiality
          - Review and provide feedback to each hospital registrar or designee regarding:
            - Errors
            - Incomplete records
            - Conflicting data
        - Pre-hospital providers will work with hospitals to supply missing or incomplete data prior to the hospital data transfer process
          - In cases when more than one agency is used to transport a patient, the receiving EMS agency will provide the data to the hospital of definitive care
  - Year 2
    - Each regional registrar or designee shall generate reports.
      - Data shall be used for performance improvement and system evaluation measures
    - Initial evaluation of regional data by regional committees should begin

- Identify all healthcare facilities for data submission
- Establish a data collection process for Community Trauma Facilities and Trauma Support Facilities
- Work towards uploading regional data to state registry

o Year 3
- At this level the aggregate data shall be used to:
  - Generate statewide demographic and system evaluation reports
  - Develop annual reports using regional and state data as defined by the state trauma advisory subcommittee (STAC)
  - Prepare other reports and analyses as requested by regional trauma advisory committees (RTAC), state trauma advisory subcommittee (STAC), or the emergency medical services coordinating committee (EMSCC).
  - Identify and evaluate regional trauma care
  - Assess the state trauma system and regional trauma network

o Year 4
- Expand the trauma data collection system to include all participating healthcare facilities

o Year 5
- In addition to EMS and hospital data, other existing databases may be of value to a comprehensive data collection effort by linking to the state trauma data system where appropriate
  - Hospital discharge data
  - Death certificates
  - County coroner autopsy reports
  - Police reports
  - Insurance information
  - Financial data

Trauma System Evaluation

Trauma care should be efficacious, safe and cost-effective. In order to ensure this is achieved, performance improvement and patient safety in trauma care should include a continuous cycle of monitoring, assessment, and management of all aspects of the trauma system. Performance improvement must be supported by a reliable method of data collection which can be used to assess opportunities for system improvement. At a minimum, the program must be able to demonstrate that the trauma registry supports the PI process. The process of analysis must include multidisciplinary review and must occur at regular intervals to meet the needs of the program. The results of analysis must define corrective strategies and must be documented. The effect of change then is evaluated as the cycle repeats itself.[2]

The Department, along with the Regional Trauma Networks, have the 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 pre-hospital and acute care management phases through rehabilitation and community reintegration, and financial impact or cost.[1]

The Performance improvement process should include both the trauma center and the trauma system (regional). This will help ensure patient care is being provided at the most optimal level throughout the health care continuum as well as meeting the goal of the right patient, at the right time and the right place. This performance improvement process should include the following:[4]

- Trauma Centers
  - Focus on structure, process and outcome evaluations which focus on improvement efforts that
    - Identify root cause problems
    - Intervene to reduce or eliminate these causes
    - Take steps to correct the process as set forth in the trauma center level specific requirements
  - This system shall provide for input and feedback from these patients and guardians to hospital staff regarding the care provided
  - Shall further include, but not limited to:
    - Detailed audit of all Trauma-related:
      - Deaths
      - Major complications
      - Transfers
  - A multidisciplinary trauma peer review committee that includes all members of the trauma team
  - Participation in the trauma system data management system
  - Ability to follow up on corrective actions to ensure performance improvement activities
- Trauma Care Regions

- Required to develop and implement a region wide trauma performance improvement program
- Include standards in program as referenced below.
- Develop annual processes for reporting to the department a review of all region-wide policies, procedures and protocols

The Regional Trauma Networks will be expected to appoint a Professional Standards Review Organization (PSRO) that promotes 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 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.[1]

Any deviations from recommendations and protocols, which are established and adopted by local medical control and approved by the department for trauma patients, shall be addressed through a documented trauma performance improvement process established by the Regional Trauma Network PSRO.[4] The performance improvement process shall include the following standards for both adults and pediatrics:

- Data collection and analysis
  - A procedure should be developed for receiving all data and/or information from EMS providers, trauma centers and the local medical community on the implementation of various components of that region's trauma system to include, but not limited to:
    - Components of the regional trauma plan
    - Minimum set of required data elements
    - Triage criteria and effectiveness (over-triage vs. under-triage)
      - Critical to the success of the trauma system to improve morbidity and mortality of injured patients is the ability to identify those severely injured patients who require the resources of sophisticated Regional Trauma Research Center or Regional Trauma Centers, as well those patients who are appropriately cared for in Community Trauma Facility or Trauma Support Facility. This avoids over taxing the Regional Trauma Research Center or Regional Trauma Centers and ensures inclusion of Community Trauma Facility or Trauma Support Facilities in the system. It is understood that, for the benefit of the trauma

patient, there will be some over-triage of patients to higher level centers while minimizing under-triage of patients as much as possible. Review of the appropriateness of protocol compliance and over and under triage is the responsibility the trauma QI program.[3]

- Activation of trauma team
- Notification of specialists
- Trauma center diversion

- Adult and pediatric-specific quality indicators for evaluation
- A system for case referral
- A process for indicator review and audit
- A mechanism for an action plan and process improvement
- A mechanism for feedback to the medical control authorities, the emergency medial services coordinating committee, and the state trauma advisory subcommittee
- An evaluation of system performance to include all of the following:
  - Designation
    - Compliance with criteria
  - Triage and Transport
    - Access
  - Outcomes
    - Stratified by ISS/TRISS (Injury Severity Score)
  - Both of the following transfers
    - LOS (Level of Service)
    - Deaths
  - Both of the following patient care issues
    - Mortality
      - All deaths
    - Morbidity
      - Defined by regions
  - Review of hospital performance improvement plans as well as how the hospital PI process interfaces with the regional PI plan.
  - The following audit filters and data elements should be included, but are not limited to:
    - Trauma related deaths
      - List hospital
      - Elapsed time
      - ED admission time
      - MOI
      - Age
      - Cause Code
      - Transport Mode
      - GCS (Glasgow Coma Scale)
      - RTS (Revised Trauma Score)

- AIS (Abbreviated Injury Score)-***(Appendix H)***
- ICD-9
- CPT (Current Procedural Terminology)
- ISS (Injury Severity Score)- ***(Appendix H)***

- Trauma patients with more than one inter-hospital transfer prior to definitive care
  - List hospitals sending and accepting the transfer for each patient meeting criterion
- Ground transport trauma patients with an Emergency Department Revised Trauma Score less than or equal to 5.5 **AND** scene transport times (scene departure to Emergency Department arrival) greater than 20 minutes
  - List and sort by hospital
  - Transport mode
  - EMS agency
  - Scene to hospital transport time
  - Injury county
  - Cause code
  - ISS (Injury Severity Score)
  - Outcome for each patient meeting these criteria
- Trauma patients with EMS scene times (EMS scene arrival to EMS scene departure) greater than 20 minutes
  - List EMS agency
  - Transport mode
  - Scene time'
  - Scene procedures (air, CPR, fluids)
  - Trauma type
  - Injury zip code (Injury county)
  - ISS (Injury Severity Score)
  - Outcome for patients meeting criterion
- Transferred trauma patients with an ISS (Injury Severity Score) greater than 15 **AND** transfer time (Emergency Department admit to definitive hospital admit) greater than 6 hours for rural place of injury **OR** 4 hours for urban place of injury
  - List Emergency Department hospital
  - Definitive hospital
  - Urban or rural place of injury
  - Transfer time
  - Cause code
  - ISS (Injury Severity Score)
  - Outcome for patients meeting criteria
- Trauma patients with an ISS (Injury Severity Score) greater than 15 **AND** Emergency Department time (Emergency Department admit to Emergency Department discharge) greater than 2 hours
  - List hospital

- Patient transfer (yes or no)
- Cause code
- Emergency Department time for patients meeting criteria

- Trauma patients who die with a probability of survival (Trauma Injury Severity Score) >50%. Trauma Injury Severity Score for trauma patients using physiologic measures collected at the first presenting hospital)
  - List hospital
  - Age
  - Cause code
  - Transport mode
  - ISS (Injury Severity Score)
  - Outcome
  - LOS (Level of Service)
  - Trauma Injury Severity Score for patients meeting criteria
- Trauma patients with an Injury Severity Score greater than 15 who are discharged from non-trauma centers
  - List hospital
  - Age
  - Cause code
  - Transport mode
  - ISS (Injury Severity Score)
  - Outcome
  - LOS (Level of Service)
  - Trauma Injury Severity Score for patients meeting criteria
- Trauma patients transported by EMS without an associated ambulance report in the medical record
  - List percentage of missing run reports by transport mode **AND** EMS agency
- Trauma patients 14 years of age or younger (children) who either had an Emergency Department Glasgow Coma Score less than or equal to 8, intubation, or Injury Severity Score greater than 15 **AND** not transferred to a regional pediatric trauma center
  - List hospital
  - Age
  - Emergency Department Glasglow Coma Scale
  - ISS (Injury Severity Score)
  - Cause code
  - LOS (Level of Service)
  - Transport mode for each patient meeting criteria

Based upon the data and/or information received by the region in the evaluation process, the region will be responsible for preparing a report annually that contains the results of the evaluation as well as the performance improvement plan. These results of the evaluation and performance improvement plan shall

be made available to all EMS providers, trauma centers and local medical community. The region will be responsible for ensuring that all trauma centers participate in this annual evaluation process along with encouraging all other hospitals that treat trauma patients to do so likewise. Specific information related to an individual patient and/or practitioner will not be released to maintain data confidentiality. However, aggregate system performance information and evaluation will be available for review as a region.[4]

Each Regional Trauma Advisory Committee shall observe the confidentiality provisions of the health insurance portability and accountability act under 45 CFR Part 164, data confidentiality provisions under the code, or as established by the regional professional standards review organization.[4]

Performance improvement entails demonstrating that a corrective action has the desired effect as determined by continuous evaluation. As the definition of quality is neither exact nor constant, improvement cannot always be demonstrated with compelling data; however systematic use of a defined performance improvement plan can. Although some process loops may never be completely closed, a trauma system should demonstrate the continuous pursuit of performance improvement.[2]

The Data Collection and Trauma System Evaluation section of the regional trauma plan should include the following:

- Provide a list of the membership of those represented on the Regional Trauma Network Professional Standards Review Organization.
- Describe the process in which the RTN Professional Standards Review Organization reports it's findings and to whom.
- Describe the process in which the RTN Professional Standards Review Organization will integrate the appeals process within the region.
- Describe the process in which the region will address the following in the performance improvement plan:
    - Data collection and analysis of data and/or information from EMS providers, trauma centers and local community including, but not limited to the implementation of the various components of the region's trauma system
        - Minimum set of required data elements
        - Components of the regional trauma plan
        - Triage criteria and effectiveness (over-triage vs. undertriage)
        - Activation of Trauma Teams
        - Notification of Specialists
        - Trauma Center Diversion
    - Adult and pediatric- specific quality indicators for evaluation
    - A system for case referral
    - A process for indicator review and audit

  - Mechanism for an action plan and process improvement
  - Mechanism for feedback to the medical control authorities, the emergency medical services coordinating committee, and the state trauma advisory subcommittee
- Describe the process in which the region will address evaluation of system performance based on audit filters and data elements as listed above.
- Describe how the region will address problems related to significant over-triage and under-triage, both primary and secondary.
- Describe the process in which the region will use to prepare a report annually containing the results of the evaluation as well as the performance improvement plan and how this report will be made available to all EMS providers, trauma centers and local medical community.
- Describe the process in which the region will ensure that all trauma centers and hospitals that treat trauma patients will participate in the annual evaluation process.
- Describe how the region will ensure and enforce patient confidentiality provisions of the health insurance portability and accountability act under 45 CFR Part 164 based on the RTN, RTAC and PSRO.

References

[1] American College of Surgeons Committee on Trauma: *Regional Trauma System: Optimal Elements, Integration, and Assessment. Systems Consultation Guide*. Copyright 2008.

[2] American College of Surgeons Committee on Trauma: *Resources for Optimal Care of the Injured Patient 2006.*

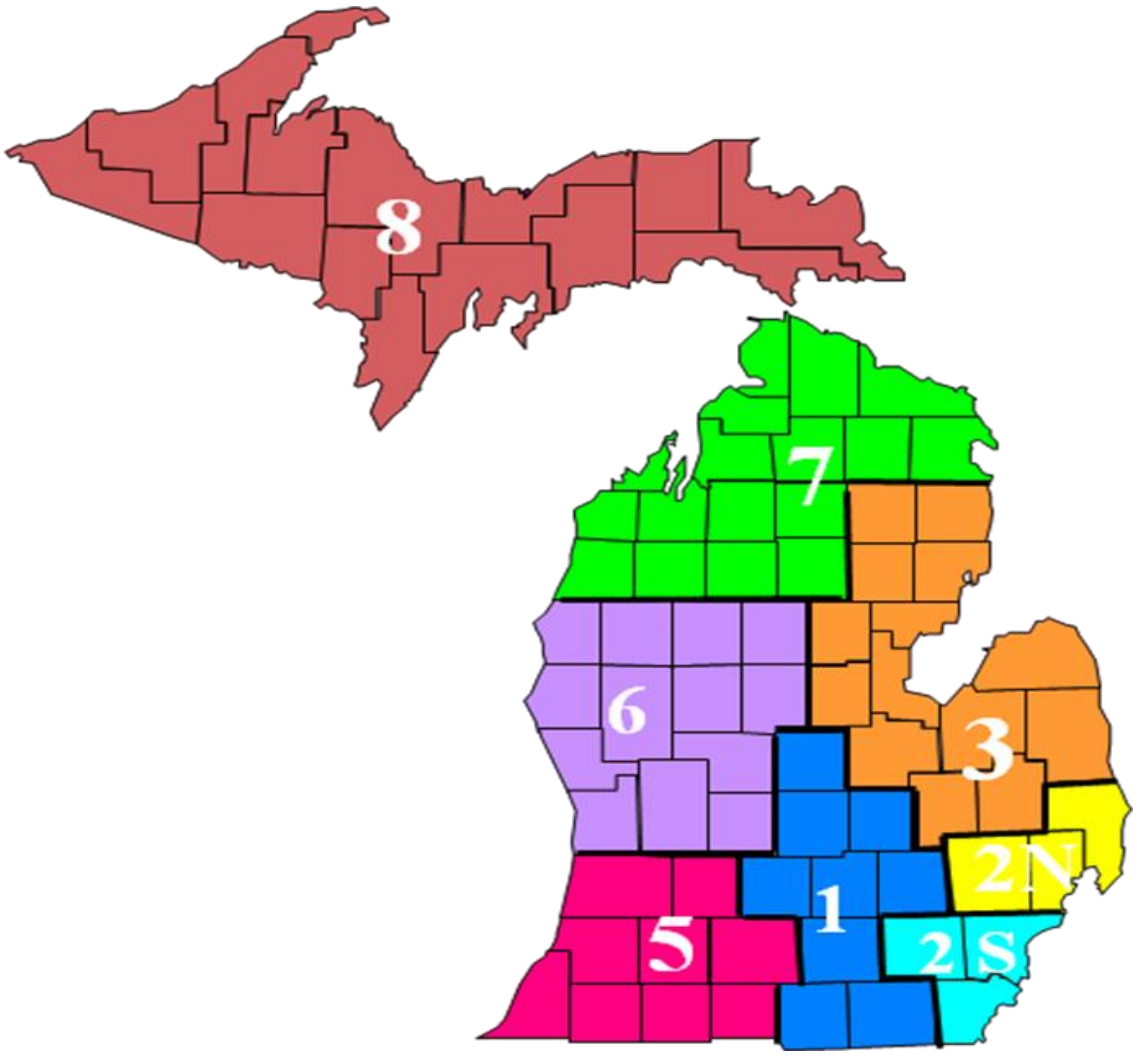
[3] Michigan Trauma Systems Plan. March 2004. Prepared by the Michigan Trauma Coalition, Inc.

[4] Statewide Trauma System Administrative Rules. October 30, 2007. Michigan Department of Community Health: Bureau of Health Policy, Planning and Access. EMS and Trauma Services Section.

[5]The Health Resources and Services Administration document *Model Trauma System Planning and Evaluation*. Released February 2006. U.S. Department of Health and Human Services Program Support Center, Visual Communications Branch.

Appendix A

Michigan Trauma Regions



Appendix B
Application for Approval and Designation
As a Regional Trauma Network

1. Region (Choose One): 1 2N 2S 3 5 6 7 8
2. Regional Contact:_____
3. Address: _____
4. City: _____ State: _____ Zip: _____
5. Regional Trauma Network Members:

Medical Control Authority	Name	Title

6. Vision

_____
_____
_____
_____

7. Purpose _____

_____
_____
_____

8. Organizational Chart-Identify each organization that make up the RTN, RTAC & RPSRO. (Appendix D):

9. Briefly describe the Regional Trauma Network standard operating guidelines including, but not limited to: Meeting schedule, conduct of meeting, election of officers, voting process and quorum.

10. Briefly describe the Regional Trauma Advisory Committee standard operating guidelines including, but not limited to: How committee will be formed, membership list, meeting schedule, conduct of meeting, election of officers, voting process and quorum.

11. Briefly describe the Regional Professional Standards Review Organization operating guidelines including, but not limited to: Membership list, meeting schedule, conduct of meeting, confidentiality and protection of patient data, analyzing regional trauma data to evaluate the delivery of adult and pediatric trauma care and performance improvement plans.

12. The trauma system shall integrate all MCA's and hospitals into an inclusive system in order to provide a spectrum of care for all injured patients. Provide Memo of Understanding/Letter of Support from each participating Medical Control Authority and Hospital within the Regional Trauma System. (Appendix C)

13. The goal of implementation of an "Inclusive Trauma System" is to match each trauma care facility's (or provider's) resources to the needs of injured patients so that every patient receives optimal care from the initial recognition of the injury through return to the community. Please state brief, concise objectives of how this goal will be met:

_____
_____
_____
_____
_____
_____
_____

Appendix C
Sample Memo of Understanding/Letter of Support

WHEREAS, traumatic injury is the leading cause of death for Michigan between the ages of 1 and 44 years; and

WHEREAS, (HOSPITAL) strives to provide optimal trauma care based on resource capability to the needs of injured patients; and

WHEREAS, treatment at a trauma hospital that participates in a standardized trauma system can greatly reduce the number of deaths and the seriousness of long-term disability from trauma injuries.

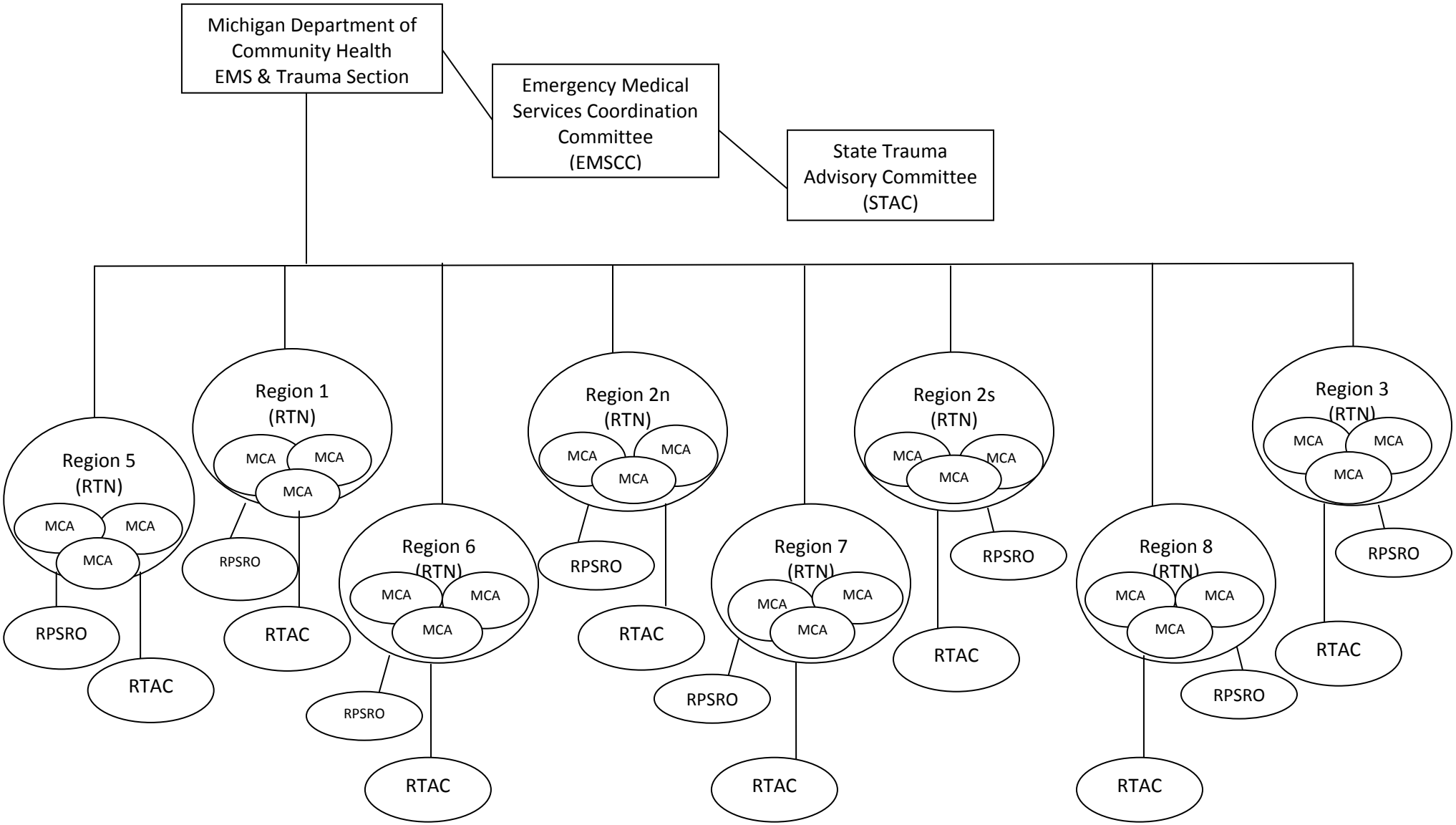
WHEREAS, participation in the Michigan Statewide Trauma System will result in organized and timely response to patients' needs, a more immediate determination of patient's definitive care requirements, improved patient care through the development of regional performance improvement plans and an assurance that those caring for trauma patients are educationally prepared:

THEREFORE; (HOSPITAL) hereby commit full participation and support for the development of the Michigan Statewide Trauma System.

Signature _____ Date _____
Print Name _____ Title _____

DRAFT

Appendix D
Michigan Trauma System
State and Regional Trauma Network Diagram



Appendix F
POSITION DESCRIPTION

TITLE: ***Regional Trauma Coordinator***

DEPARTMENT: Community Health

SECTION: EMS & Trauma Systems

SUPERVISOR:

I. GENERAL DESCRIPTION

The Regional Trauma Coordinator is responsible for the oversight of trauma activities regionally which includes working in conjunction with the Regional Trauma Network, Regional Trauma Advisory Committee and Regional Professional Standards Review Committee to develop, implement and maintain a standard system of care for trauma patients and their families throughout the continuum of care. The Regional Trauma Coordinator will interface regularly between hospital and agencies regionally. They will promote, educate, evaluate and communicate State and Regional trauma registry process to ensure quality of the data. They will work as the liaison between regional EMS agencies and hospitals to ensure hospitals receive timely data. The Regional Trauma Coordinator will assist in trauma registrar orientation, provide software training, report feedback to hospitals regarding data submitted including work with small hospitals in data collection/AIS coding. They will interface with the State Trauma Coordinator to collate, prepare and submit regional trauma data to the department. The Regional Trauma Coordinator will monitor and identify system trauma care problems so that they are addressed in a timely manner to ensure performance improvement management.

II. ESSENTIAL FUNCTIONS AND RESPONSIBILITIES

- Administration
  - Coordinate with regional trauma committee structure in developing regional policies, procedures and protocols relating to the care of a trauma patient within a functioning trauma system
  - Coordinate with regional participants to develop and implement a regional trauma plan
  - Facilitate Regional Trauma System Network
  - Monitor and maintain compliance with statewide trauma system regulatory requirements
  - Support and adhere to regional policies, procedures and protocols
  - Interpret and implement policies, procedures and protocols; make recommendations for revisions; assist with updating policies, procedures and protocols
  - Attends and participates in the regional trauma committee structure based on the minimum criteria as defined in the Statewide Trauma System Administrative

Rules in development and planning of goals and objectives related to trauma care within the region
- Represent the region on various committees to enhance and foster optimal trauma care management
- Monitor adherence to regional policies, procedures and protocols through observation, medical record review, regional participant feedback and other appropriate sources
- Assist the department with coordinating the statewide trauma system designation process for the region
- Develop and foster collaborative relationships with participants of the regional trauma system. (MCA's, hospitals, EMS agencies, etc.)
- Participate in regional and state trauma care activities
- Monitor national and statewide trends in trauma care
- Serve as a resource for the region participants regarding trauma care issues
- Plan and implement strategies for ongoing regional trauma plan development and improvement
- Conduct analysis of regional agency equipment needs
- Collaborate and explore financial resources for region with state trauma coordinator

- Performance Improvement
  - Collaborate with the region to ensure patient data accuracy/validation of the trauma registry data.
  - Collaborate with region to manage regional registrar data: collect, analyze and trend
  - Collaborate with region to ensure all collected patient data into the computerized trauma registry data system is entered in a manner in which meets the requirements (for accuracy, completeness and timeliness) of the American College of Surgeon's Committee on Trauma and the Michigan Department of Community Health
  - Collaborate with region to run monthly reports to assure trauma patient abstracting information is clean & complete within 30 days of submission
  - Collaborate with region in providing aggregate reports from the Trauma Registry Software on a monthly or as needed basis for the Regional Trauma Network and/or Regional Trauma Advisory Committee
  - Assist in reporting aggregate trauma statistics/data to the Regional Professional Standards Review Organization on a monthly or as needed basis
  - Coordinate Regional Professional Standards Review Organization with performance improvement identification and tracking of variance issues
  - Coordinate with region to assist in developing a tracking system that assures monthly monitoring of an issue will not fall through the loop closure process
  - Assist region in monitoring and assuring the loop is closed when issues are entered into the regional trauma registry
  - Analyze regional registry data on the trauma patient population; identify trends for strategic planning and performance improvement
  - Assist region with running aggregate performance reports (missing EMS runs, inpatient/outpatient, etc.) on monthly or as needed basis for the Regional Trauma Network and/or Regional Trauma Advisory Committee
  - Ensures maintenance of the trauma registry in collaboration with the region.

- Ensure the periodic reporting of trauma data to the state trauma coordinator
- Facilitate the measurement of selected outcomes for the regional trauma patient population

- Education
  - Assess and evaluate regional educational needs and opportunities
  - Plan, coordinate and evaluate regional trauma-related educational programs
  - Monitor licensed healthcare professionals compliance with the educational requirements of the statewide trauma system
  - Develop, coordinate and implement regional education and in-service programs related to care and management of trauma patients
  - Seek and pursue opportunities for regional educational programs
- Community Outreach
  - Coordinate and oversee the development and implementation of a regional injury prevention program
  - Direct community trauma education and prevention programs by developing, implementing and evaluating programs for targeted populations in the communities related to injury prevention and other topics identified through a needs assessment of the region and Michigan's State Injury Prevention Plan
  - Develop and implement strategies for communication, education and feedback for EMS systems throughout the region
  - Identify opportunities for injury prevention programming in local communities throughout the region
  - Plan, coordinate and collaborate with community representatives throughout the region to accomplish injury prevention activities
  - Evaluate the impact of injury prevention activities throughout the region

III. QUALIFICATIONS

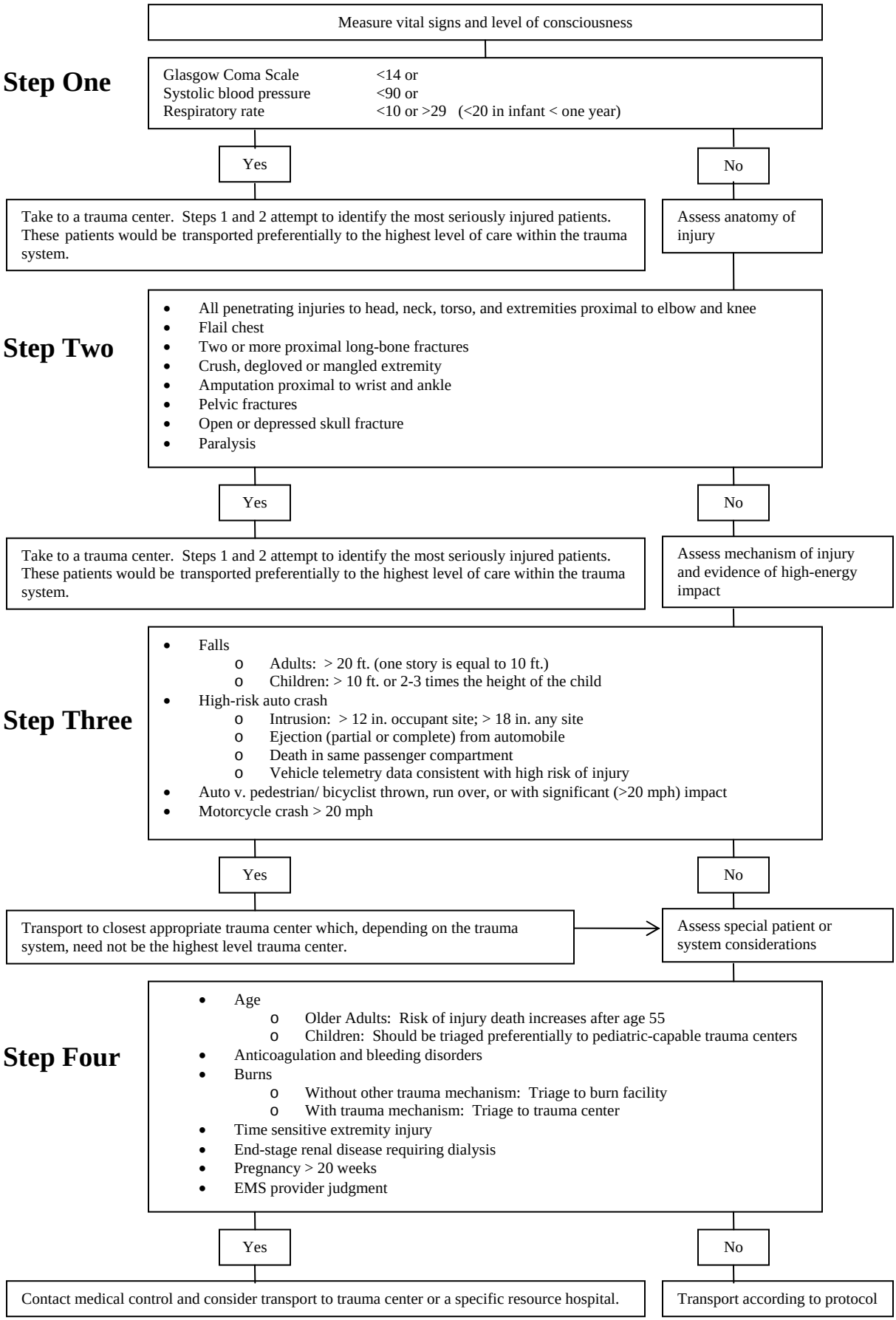
- **Education:**
  - High school diploma required.
  - Bachelor's Degree in nursing or health related field
  - Currently licensed as a registered nurse in Michigan
  - Proof of training or ability to renew certification within six (6) months for one of the following:
    - Trauma Nurse Core Curriculum (TNCC)
    - Pre-hospital Trauma Life Support (PHTLS)
    - Basic Trauma Life Support (BTLS)
    - Advance Trauma Life Support (ATLS)

- **Knowledge of:**
  - Three years experience in trauma/emergency care.
    - 1 year administrative experience
    - 2 years clinical experience
  - Statewide Trauma System Administrative Rules

- Demonstrate competency in word processing, spreadsheet programs and database software.

- **Ability to:**
  - Demonstrate effective interpersonal, written and verbal communication skills.
  - Be reliable, dependable, and able to initiate and complete projects of moderate complexity with limited supervision
  - Multi-tasking, detail oriented, and the ability to prioritize activities
  - Demonstrate time management and organizational skills
  - Accept and implement change
  - Make decisions and recommendations to promote problem solving
  - Compile and analyze data
  - Prepare comprehensive reports
  - Promote standardization and compliance with regional and statewide trauma system protocols and procedures
  - Coordinate training
  - Effectively interact with a wide variety of individuals, physicians and regional participants with diverse backgrounds

Appendix G
FIELD TRIAGE DECISION SCHEME



WHEN IN DOUBT, TRANSPORT TO A TRAUMA CENTER.

This field triage decision scheme, originally developed by the American College of Surgeons Committee on Trauma, was revised by an expert panel representing emergency medical services, emergency medicine, trauma surgery, and public health. The panel was convened by the Centers for Disease Control and Prevention (CDC) with support from National Highway Traffic Safety Administration (NHTSA). Its contents are those of the expert panel and do not necessarily represent the official views of CDC and NHTSA.

Appendix H

Injury Severity Score

The Injury Severity Score (ISS) is an anatomical scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an Abbreviated Injury Scale (AIS) score and is allocated to one of six body regions (Head, Face, Chest, Abdomen, Extremities (including Pelvis), and External). Only the highest AIS score in each body region is used. The 3 most severely injured body regions have their score squared and added together to produce the ISS score.

An example of the ISS calculation is shown below:

Region	Injury Description	AIS	Square Top Three
Head & Neck	Cerebral Contusion	3	9
Face	No Injury	0	
Chest	Flail Chest	4	16
Abdomen	Minor Contusion of Liver Complex Rupture Spleen	2 5	 25
Extremity	Fractured femur	3	
External	No Injury	0	
		Injury Severity Score:	**50**

The ISS score takes values from 0 to 75. If an injury is assigned an AIS of 6 (unsurvivable injury), the ISS score is automatically assigned to 75. The ISS score is virtually the only anatomical scoring system in use and correlates slinearly with mortality, morbidity, hospital stay and other measures of severity.

Its weaknesses are that any error in AIS scoring increases the ISS error, many different injury patterns can yield the same ISS score and injuries to different body regions are not weighted. Also, as a full description of patient injuries is not known prior to full investigation & operation, the ISS (along with other anatomical scoring systems) is not useful as a triage tool.

Appendix H

Abbreviated Injury Scale

The Abbreviated Injury Scale (AIS) is an anatomical scoring system first introduced in 1969. Since this time it has been revised and updated against survival so that it now provides a reasonably accurate was of ranking the severity of injury. The latest incarnation of the AIS score is the 1990 revision. The AIS is monitored by a scaling committee of the Association for the Advancement of Automotive Medicine.

Injuries are ranked on a scale of 1 to 6, with 1 being minor, 5 severe and 6 an unsurvivable injury. This represents the 'threat to life' associated with an injury and is not meant to represent a comprehensive measure of severity. The AIS is not an injury scale, in that the difference between AIS1 and AIS2 is not the same as that between AIS4 and AIS5. There are many similarities between the AIS scale and the Organ Injury Scales of the American Association for the Surgery of Trauma.

AIS Score	Injury
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

Appendix I

Michigan Level IV Essential Components

INSTRUCTIONAL ORGANIZATION

1. Trauma program
2. Trauma team
3. Trauma coordinator/TPM

CLINICAL CAPABILITIES

1. Specialty immediately available 24 hours/day, as documented in a published on-call schedule

CLINICAL QUALIFICATIONS, WHICH SHOULD INCLUDE BOTH OF THE FOLLOWING:

1. General/trauma surgeon
   a. ATLS completion
2. Emergency medicine
   a. ATLS completion

FACILITIES/RESOURCES/CAPABILITIES

1. Presence of surgeon at operative procedures

EMERGENCY DEPARTMENT (ED) equipped with all of the following resuscitation equipment

1. Airway control and ventilation equipment
2. Pulse oximetry
3. Suction devices
4. Electrocardiograph-oscilloscope-defibrillator
5. Standard IV fluids and administration sets
6. Large-bore intravenous catheters
7. Sterile surgical sets for
   a. Airway control/cricothyrotomy
   b. Thoracostomy
   c. Venous cutdown
8. Drugs necessary for emergency care
9. Broselow tape
10. Thermal control equipment for patient
11. Qualitative end-tidal Co2 determination
12. Communication with EMS vehicles

OPERATING ROOM (OR) personnel available 24 hours/day, which shall include both of the following:

1. Thermal control equipment for both of the following:
   a. Patient
   b. Fluids and blood
2. X-ray capability

POSTANESTHETIC RECOVERY ROOM, which shall include both of the following:

1. Equipment for monitoring and resuscitation
2. Intracranial pressure monitoring equipment
   a. Pulse oximetry
   b. Thermal control

RESPIRATORY THERAPY SERVICES

RADIOLOGICALSERVICES (Available 24 hours/day)

CLINICAL LABORATORY SERVICES
available 24 hours/day, which shall include all of the following:

1. Standard analyses of blood, urine, and other body fluids, including microsampling when appropriate
2. Blood typing and cross-matching
3. Coagulation studies
4. Comprehensive blood band or access to a community central blood bank and adequate storage facilities
5. Blood gases and pH determinations
6. Microbiology

ACUTE HEMODIALYSIS OR TRANSFER AGREEMENT

BURN CARE,
organized in-house or transfer agreement with burn center

ACUTE SPINAL CORD MANAGEMENT in-house or transfer agreement with regional acute spinal cord injury rehabilitation center

REHABILITATION SERVICES in-house or transfer agreement to an approved rehabilitation facility

PERFORMANCE IMPROVEMENT, which shall include all of the following:

1. Performance improvement programs
2. Participation in state, local, or regional registry
3. Audit of all trauma deaths
4. Morbidity and mortality review
5. Medical nursing audit including the following

CONTINUING EDUCATION/OUTREACH

PREVENTION

Appendix J
Sample
Inter-facility Transfer Agreement

This AGREEMENT is made between ***(TRAUMA CENTER)*** located at _____ and ***(HOSPITAL)*** located at _____ ,hence forth referred to as ***(HOSPITAL)*** or referring hospital.

This Agreement serves as documentation of the arrangements, policies, and procedures governing the transfer of critically injured patients between the above named institutions in order to facilitate timely transfer, continuity of care, and appropriate transport for these patients.

THE TRAUMA CENTER AND HOSPITAL DO MUTUALLY AGREE AS FOLLOWS:

1. ***HOSPITAL*** recognizes that on certain occasions injured patients require specialized care and resources beyond the scope of resources available at ***HOSPITAL*** and that optimal care of these injured patients requires transfer from the emergency department or inpatient services to a verified and/or designated trauma center.

2. The medical staff and hospital administration of ***HOSPITAL*** have identified the ***TRAUMA CENTER*** as a patient referral center with specialized resources (staff, equipment, facilities, etc.) for tertiary-level care of critically injured patients.

3. The ***TRAUMA CENTER*** agrees to maintain their verified and/or designated trauma center status that is equipped and staffed to provide a full range of medical and surgical services for critically injured patients in accordance with applicable State and Regional Standards.

4. The ***TRAUMA CENTER*** agrees to accept transfers of critically injured patients from ***HOSPITAL*** if beds, personnel, and appropriate resources are available, if the transfer has been approved by the receiving physician, and if the transfer is consistent with current patient transfer laws.

5. ***HOSPITAL*** and **TRAUMA CENTER** recognize the privilege of an attending physician and the right of the patient, or the patient through a relative or guardian, to request transfer to an alternative facility.

Indications for Critically Injured Patient

6. The referring physician has examined the patient, documented the patient's condition, and has determined that the patient requires a higher

level of care provided at ***HOSPITAL*** or requires specialized resources provided at the ***TRAUMA CENTER***.

7. The referring physician has evaluated the patient and has determined that the transport is compatible with the patient's condition and is in the best interests of the patient's medical care.

Transfer Arrangements

8. Requests for consultation or transport team support and patient transfer can be generated by telephone to:

(List appropriate Centralized number to trauma centers and other services, as appropriate to arrange inter-facility transfer)

9. When it appears that a critically injured patient requires specialized resources or medical care beyond the scope of resources provided at ***HOSPITAL***, the referring physician shall contact the appropriate physician at the ***TRAUMA CENTER*** to obtain consultation. The referring physician in conjunction with the ***TRAUMA CENTER*** consultant shall be responsible for determining the need for admission to the ***TRAUMA CENTER***.

The consent of appropriately authorized staff at the ***TRAUMA CENTER*** to receive the patient shall be obtained prior to the patient's release from ***HOSPITAL*** and shall be documented in the patient's medical record.

10. Transfer arrangements will be made by mutual consent of the referring and consulting physician. It shall be the responsibility of the physician to whom the patient is transferred to arrange the admission of the patient to the ***TRAUMA CENTER***. If the ***TRAUMA CENTER*** is unable to accept the patient because of lack of physical or professional resources, the ***TRAUMA CENTER*** personnel will assist the referring hospital in locating an alternative center for patient placement.

11. The referring physician, in consultation with the receiving physician, shall determine the method of transport to be used. The ***TRAUMA CENTER*** may, at its option, provide a specially-trained transport team particularly in the case of pediatrics.

12. To the extent possible, patients will be stabilized prior to transfer and treatment initiated to ensure that the transfer will not, within reasonable medical probability, result in harm to the patient or jeopardize survival. Responsibility for the stabilization and care of patients prior to and during transport should be specified.

13. The referring hospital shall be responsible for informing the patient, patient's parent(s), legal guardian, or other relatives of the transfer process and for obtaining any release to effect the transfer. In the case of pediatrics, the referring hospital shall use its best efforts to arrange for the parent(s) or guardian to be present at the time of transport.

Records and Transmission of Information

14. Subject to federal and state laws regarding medical care and confidentiality of medical information, the referring hospital shall send with the patient, or arrange to be immediately transmitted (via FAX), at the time of transfer the necessary documents and completed forms containing the medical, social, and/or other information necessary to ensure continuity of care to the patient. Such documentation shall include, but is not limited to the following:
    a. Identification of patient
    b. Diagnosis
    c. Copies of the relevant portions of the patient's medical record (including medical, nursing, dietary, laboratory, X-rays, and medication records)
    d. Relevant transport forms
    e. Copy of signed consent for transport if patient is a minor

16. Subject to limitations regarding confidentiality, the ***TRAUMA CENTER*** shall provide information on the patient's diagnosis, condition, treatment, prognosis, and any complications to the referring physician during the time that the patient is hospitalized at the ***TRAUMA CENTER*** and upon discharge or transfer from the ***TRAUMA CENTER***.

Return of Patient to Referring Hospital

17. If the patient's physician at the ***TRAUMA CENTER*** determines that the patient will be returning to the referring hospital or rehab center for continued care and is medically fit, that physician should contact an appropriate physician at the referring hospital or rehab center to arrange for the return of the patient. The ***TRAUMA CENTER*** shall send with the patient at the time of transfer the necessary documents and forms containing the medical, social, and/or other information necessary to ensure continuity of care to the patient. The ***TRAUMA CENTER*** shall be responsible for informing the patient, patient's parent(s) or legal guardian of the transfer process and for obtaining any releases required for the transfer or the appropriate disposition of any personal effects of the patient. The ***TRAUMA CENTER*** will be responsible for arranging patient transport to referring hospital.

18. The return transfer of pediatric patient for continued care upon completion of the treatment at the ***TRAUMA CENTER*** will be made by mutual agreement.

Charges for Services

19. Charges for services performed by either institution shall be made and collected by the institution in accordance with its regular policies and procedures. Unless special arrangements have been made to the contrary, the transfer of a patient from one institution to the other shall not be construed as imposing any financial liability by one institution on the other. The parties shall cooperate with each other in the exchange of information about financial responsibility for the services rendered by them to patients who are transferred to the ***TRAUMA CENTER***.

Authority of Governing Bodies

20. The Governing Body of each institution shall have exclusive control of its policies, management, assets and affairs, and neither shall incur any responsibility by virtue of this Agreement for any debts or other financial obligations incurred by the other. Further, nothing in this Agreement shall be construed as limiting the rights of either institution to contract with any other facility on a limited or general basis.

Term of Agreement

21. The term of this Agreement shall commence on _____ and shall continue in full force and effect until _____ Either institution may terminate this Agreement at any time upon giving the other written notice not less than thirty (30) days in advance of the termination date. However, should either institution fail to maintain its license or certification, this Agreement shall automatically terminate as of the date of termination of the license or certification.

Indemnification

21. The parties agree to indemnify, defend and hold one another, their officers, agents and employees harmless from and against any and all liability, loss, expense, attorney's fees, or claims for injury or damages arising out of their performance of this Agreement, but only in proportion to and to the extent such liability, loss, expense, attorney's fees, or claims for injury or damages are caused by or result from the negligent or intentional act or omission of the indemnifying party.

Compliance with Laws and Regulations

22. This Agreement is entered into and shall be performed by both parties in compliance with local, state and federal laws, rules, regulations, and guidelines.

Insurance Provisions

23. The parties hereto warrant they shall obtain and maintain during the term hereof, at their own sole cost and expense, insurance or a program of self insurance covering their activities in performance hereof.

General Provisions

24. This Agreement constitutes the entire understanding of the parties hereto with respect to the matters discussed herein and supersedes any and all written or oral agreements, representations or understandings, whether made by the parties or others purportedly on behalf of one of the parties. No changes, amendments, or alterations of this Agreement shall be effective, unless made in writing and signed by all parties.

25. It is not the intention of either party that any person or entity be a third party beneficiary of this Agreement.

26. Neither party may assign, sell, or otherwise transfer this Agreement, or any interest in it, without the express prior written approval of the other.

27. Any notice required or permitted by this Agreement shall be effective and shall be deemed delivered five (5) business days after placing it in the mail, by certified mail, return receipt requested, postage prepaid, or upon personal delivery as follows:

To: Administrator
TRAUMA CENTER
Address

To: Administrator
HOSPITAL
Address

Signature _____
Date _____

Signature _____
Date _____

Reference: Emergency Medical Services for Children
Model Pediatric Inter-facility Transfer Agreement

Appendix K

Regional Trauma Transfer Order Sheet

Date/Time	Physician's Orders:
	Transfer to:
	Mode of Transfer: ( ) Ground Ambulance ( ) Helicopter
	EMS Transport Agency:
	Accepting Physician:
	Diagnosis:
	Patient is being transferred due to:
	Attach copy of original scene patient care record or list field triage identified
	pre-hospital to indicate trauma alert level
	( ) Copies of all pertinent patient records attached
	Include copies of following x-rays:
	Vital Signs every ( ) 5 ( ) 10 ( ) 15 Minutes
	Cardiac Monitor
	Notify receiving facility if: HR> HR<
	SBP> SBP<
	DBP> DBP<
	Airway:
	( ) Continous monitoring O2 sat; Notify receiving facility if SAO2 <
	( ) CO2 monitor
	Oxygen:
	( ) Nasal cannula at L/min ( ) Non-rebreather at 15L/min
	( ) Ventilator settings: TV FI02 Rate Mode
	( ) PEEP
	IV instructions:
	( ) Foley to gravity
	NG tube: ( ) Clamp ( ) Open to air
	( ) Chest tube to water seal
	( ) Full C-spine precautions
	Medications during transport:
	Nursing report called to:
	Phone number:
	Sending Nurse:
	Sending Physician's signature

Glossary of Terms

1. **Accountable-** Ensuring compliance on the part of each healthcare facility, trauma facility, life support agency, and emergency medical services personnel in carrying out emergency medical services based on protocols established by the medical control authority and approved by the department.
2. **ACS-** American College of Surgeons
3. **Adult trauma patient-** An individual that is, or reasonably appears to be, 15 years of age or older.
4. **Assessment-** The regular systematic collection, assembly, analysis, and dissemination of information on the health of the community. These data, from a variety of sources, will assist in determining the status and cause of a problem and will identify potential opportunities for interventions.
5. **ATLS (Advanced Trauma Life Support) course-** An advanced trauma life support course is targeted for physicians with an emphasis on the first hour of initial assessment and primary management of an injured patient, starting at the point in time of injury continuing through initial assessment, life-saving intervention, reevaluation, stabilization and transfer when appropriate.
6. **Available Resources-** The components required to respond to injured patients and provide injury care (for example, workforce, equipment, medications, supplies and facilities).
7. **Benchmarks-** Global overarching goals, expectations, or outcomes. In the context of the trauma systems, a benchmark identifies a broad system attribute.
8. **Board certified in emergency medicine-** Current certification by the American board of emergency medicine, the American board of osteopathic emergency medicine, or other agency approved by department that meets the standards of these organizations.
9. **Casualty-** Any person who is declared dead, missing, injured, or ill as a result of an incident.
10. **Communication System-** An infrastructure that facilitates field-to-facility bidirectional connectivity, interfacility dialogue, and disaster service communications among all parties.
11. **Compliance-** The process of performing acts according to what is expected or required; in the context of trauma systems, for example, meeting expectations required by the state to achieve trauma center status.
12. **Comprehensive Trauma System-** A coordinated inclusive system of care of the injured people that encompasses all phases of care, from the prehospital setting to rehabilitation services and follow-up care. Such systems include data systems for injury surveillance and prevention and for performance measurement and improvement.
13. **Data Collection Standards-** Clearly defined expectations and rules regulating the collection of data. In the context of trauma systems, such

standards would include patient exclusion and inclusion criteria, common elements to be collected, and clear definitions for each element collected to ensure consistency in data collection and analysis.

14. **Data Source-** A collection of information from which one may make conclusions or inferences. In the context of trauma systems, data sources aid in describing the epidemiology of injury, care and outcome data, and cost of system and care and provide a tool for quality measurement in system jurisdiction using population-based data, clinical databases, and accounting data. Such sources may include vital statistics and these types of data: EMS, ED, trauma center and hospital discharge, state police, medical examiner, trauma registry, rehabilitation, and mental health and social services.
15. **Department-** The Michigan Department of Community Health, or its duly appointed successor.
16. **Dedesignation-** The revocation of trauma center designation for noncompliance with preestablished criteria and standards for verification and designation.
17. **Definitive Care-** Actions taken or implemented to ensure the needs of the patient are met.
18. **Designation (facility)-** The identification of capabilities or status based on predetermined criteria; in the context of trauma systems, the identification of trauma centers based on the meeting of specific predetermined criteria.
19. **Determinant (of injury)-** A factor causing or contributing to the occurrence of trauma.
20. **Disciplinary Action-** An action taken by the department against a medical control authority, a life support agency, healthcare facility, or individual, or an action taken by a medical control authority against a life support agency or licensed individual for failure to comply with the code, rules, or protocols approved by the department. Action may include suspension, limitation, or removal of medical control from a life support agency of a medical control authority providing medical control, from an individual providing emergency medical services care, or any other action authorized by code.
21. **Emergency Medical Services Intercept-** A situation where a life support agency is transporting an emergency patient from the scene of an emergency and requests patient care intervention from another life support agency for a higher level of care.
22. **Fixed Wing Aircraft-** A non-rotary aircraft transport vehicle that is primarily used or available to provide patient transportation between health care facilities and is capable of providing patient care according to orders issued by a patient's physician.
23. **Gap Analysis-** The analysis of the difference between trauma system standards and the compliance of the trauma system with those standards that result in the identification of system needs.
24. **Ground Ambulance-** A vehicle that complies with design and structural specifications, as defined in Public Health Code PA 368 of 1978, Part 209

Emergency Medical Services, and is licensed as an ambulance to provide transportation and basic life support, limited advanced life support, or advanced life support.

25. **Healthcare Facility-** A healthcare facility licensed under MCL 333.20801 and 333.21501 that operates a service for treating emergency patients, 24 hours a day, 7 days a week.
26. **Inclusive Trauma System-** A system that include all 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.
27. **Inter-facility Trauma Transfer-** Identifying the group of trauma patients that require additional trauma resources with the goal of providing optimal care to these patients by the timely transfer of that patient to an appropriate level of care to optimize outcome.
28. **Infrastructure-** In the context of trauma systems, the identified lead agency within the state; state trauma manager; state trauma advisory sub-committee; regional trauma network; regional trauma advisory council; regional professional standards review organization; and supporting legislative language, that is, rules and regulations; trauma data system; identified resource care facilities (for example, levels of trauma centers and burn centers); workforce; and other essential componenets to facilitate the implementation, monitoring, and performance improvement of care provided to severely injured people.
29. **Injury-** Physical harm or damage to the body resulting from the transfer of or exposure to mechanical, thermal, electrical, or chemical energy or from the absence of such essentials as heat or oxygen.
30. **Injury Risk Assessment-** The process used to determine the likelihood that injury will result from an incident, taking into account the identification of the hazard type, population affected, severity of injury, and volume or number affected.
31. **International Classification of Disease Coding System (ICD-9 and ICD-10)-** A standardized classification of disease, injuries, and causes of death, by etiology and anatomic localization and codified into a 6-digit number, which allows clinicians, statisticians, politicians, health planners and others to speak a common language, both US and internationally.
32. **Lead Agency-** The agency responsible for trauma-EMS systems planning and program coordination within the state.
33. **Legislative authority-** Statute and regulations. A statutory provision establishing and continuing a government agency, activity, or program for a fixed or indefinite period.
34. **License-** Written authorization issued by the department to a life support agency and its life support vehicles to provide emergency medical services as defined in the code.
35. **Life Support Vehicle-** An ambulance, a non-transport pre-hospital life support vehicle, or medical first response vehicle, as defined in the code.
36. **Medcom Requirements-** Medical communication requirements for an emergency medical services communication system.

37. **Medical Control-** The supervision and coordination of emergency medical services through a medical control authority, as prescribed, adopted, and enforced through department-approved protocols, within an emergency medical services system.
38. **Medical Control Authority-** An organization designated by the department to provide medical control, as defined by the code.
39. **Medical Control Authority Board-** A board appointed by the participating organizations to carry out the responsibilities and functions of the medical control authority.
40. **Medical Control Authority Region-** The geographic area comprised of a county, group of counties, or parts of an individual county, as designated by the department.
41. **Medical Oversight-** The responsibility of supervising something (formal) relating to, involving, or used in medicine or treatment.
42. **Morbidity-** The relative incidence of disease; the condition of being diseased; the ratio of sick to well persons in a community.
43. **"Non-designated" Healthcare Facility-** A healthcare facility that either has chosen not to be a part of Michigan's trauma care system, or a healthcare facility that the department has not designated as a Level I regional trauma research facility, Level II regional trauma facility, Level III community trauma facility, or Level IV trauma support facility.
44. **Pediatric Trauma Facility-** A facility that has obtained an additional level of verification as a trauma facility, as provided by the American College of Surgeons, as well as those requirements to be designated as a trauma facility in Michigan, as set forth in the Administrative Rules.
45. **Pediatric Trauma Patient-** An injured individual that is, or reasonably appears to be, 14 years of age or under.
46. **Performance Improvement (PI)-** Method for evaluating and improving processes that uses a multidisciplinary approach and that focuses on data, benchmarks, and components of the system being evaluated.
47. **Policy Development-** A core function that uses the results of assessments and scientific knowledge, in an organized manner, to establish comprehensive policies intended to improve public health; a process of decision making that includes building constituencies; identifying needs and setting priorities; exercising legislative authority and providing funding to develop plans and policies to address needs; and ensuring the public's health and safety.
48. **Population-based Data-** Analysis of data based on a given population. The US Census Bureau collects and publishes data on populations in the United States according to several definitions. Various systems then use the appropriate population to calculate rates.
49. **Preparedness-** The range of deliberate, critical tasks and activities necessary to build, sustain, and improve the operational capability to prevent, protect against, respond to, and recover from domestic incidents. Preparedness is a continuous process involving efforts at all levels of government and between government and private-sector and

nongovernmental organizations to identify threats, determine vulnerabilities, and identify required resources. The term “preparedness” is used interchangeably with “readiness”.

50. **Protocol-** A patient care standard, standing orders, policy, or procedure for providing emergency medical services that is established by a medical control authority and approved by the department.
51. **Professional Standards Review Organization-** A committee established by a life support agency or a medical control authority for the purpose of improving the quality of medical care, as provided MCL 331.531 to 331.533.
52. **Quality Improvement Program-** Actions taken by a life support agency, medical control authority, trauma facility, or jointly between a life support agency, medical control authority, or trauma facility with a goal of continuous improvement of medical care in accordance with the code. Actions shall take place under a professional standards review organization, as provided in MCL 331.531 to 331.533.
53. **Regional-** In the context of trauma system development, this term refers to intrastate-designated trauma areas (regions).
54. **Regional Professional Standards Review Organization-** A committee established by the regional trauma network for the purpose of improving the quality of trauma care within a recognized trauma region as provided in MCL 331.531 to331.533.
55. **Regional Trauma Advisory Council-** A committee established by a regional trauma network and comprised of MCA personnel, EMS personnel, life support agency representatives, healthcare facility representatives, physicians, nurses, and consumers. The functions of the RTAC are to provide leadership and direction in matters related to trauma systems development in their region, and monitor the performance of the trauma agencies and healthcare facilities within the region, including, but not limited to, the review of trauma deaths and preventable complications.
56. **Regional Trauma Network-** An organized group comprised of the local MCA’s within a region, which integrates into existing regional emergency preparedness, and is responsible for appointing a regional trauma advisory council and creating a regional trauma plan.
57. **Regional Trauma Plan-** A written plan prepared by a regional trauma advisory council, and approved by the regional trauma network, that is based on minimum criteria established by the department, and addresses each of the following trauma system components: leadership; public information & prevention; human resources; communications; medical direction; triage; transport; trauma care facilities; inter-facility transfers; rehabilitation; and evaluation of patient care within the system.
58. **Rehabilitation-** Services that seek to return a trauma patient to the fullest physical, psychological, social, vocational, and cognitive levels of functioning of which he or she is capable, consistent with physiologic or anatomic impairments and environmental limitations.

59. **Risk Assessments-** Risk priorities determined by collecting and evaluating data and comparing the level of risk against predetermined standards, target risk levels, or other criteria (that is, injury risk assessments).
60. **Regulation-** A rule or an order having force of law issued by the executive authority of the government. The term “regulation” is often used interchangeably with “rule”.
61. **Rotary Aircraft-** A helicopter that is licensed under the code as an ambulance.
62. **“Service Area”-** A geographic area in which a life support agency is licensed to provide emergency medical services for responding to an emergency.
63. **Special Population-** Children, elderly, burns, ethnic groups, disabled, and other populations who have chronic physical, developmental, behavioral, or emotional health conditions; populations living in rural or frontier areas.
64. **Specialty Care Facility-** An acute care facility that provides specialized services and specially trained personnel to care for a specific portion of the injured population, such as pediatric, burn injury, or spinal care injury patients.
65. **Statewide Trauma Care Advisory Subcommittee-** Acts as the department’s subject matter experts with regard to the clinical and operational components of trauma care.
66. **Statewide Trauma Care System-** A comprehensive and integrated arrangement of emergency services personnel, facilities, equipment, services, communications, medical control authorities, and organizations necessary to provide trauma care to all patients within a particular geographic region.
67. **Statewide Trauma Registry-** A system for collecting data from trauma facilities and life support agencies for which the department manages and analyzes the data and disseminates results.
68. **Trauma-** Bodily injury caused by the application of external forces.
69. **Trauma Bypass-** To forego delivery of a patient to the nearest healthcare facility for a healthcare facility whose resources are more appropriate to the patient’s injury pursuant to direction given to a pre-hospital emergency medical service by online medical direction or predetermined triage criteria as established by department-approved protocols.
70. **Trauma Facility-** A healthcare facility designated by the department as having met the criteria set forth in the code as being either a Level I regional trauma research facility, Level II regional trauma facility, Level III community trauma facility, or Level IV trauma support facility.
71. **Trauma Response-** A patient who presents as having been bodily injured as a result of the application of external forces and requires the utilization of emergency department resources.
72. **Trauma Team-** A team of multidisciplinary health care providers established and defined by a healthcare facility or emergency care facility that provides trauma care.

73. **Triage-** Classifying patients according to the severity of their medical conditions
74. **Verification-** A process by which trauma care capability and performance of an institution are evaluated by experienced ACS on-site reviewers based on criteria contained in the *Resources for Optimal Care of the Injured Patient.*
75. **Years of Productive Life Lost-** An evaluation of the economic, social, and other consequences of premature death in a population from injury or disease as compared to the potential productivity of the deceased if they had lived normal life spans.

Acronyms and Abbreviations

1. **ABA-** American Burn Association
2. **ACEP-** American College of Emergency Physicians
3. **ACS-** American College of Surgeons
4. **ACS-COT-** American College of Surgeons Committee on Trauma
5. **AIS-** Abbreviated Injury Scale
6. **ALS-** Advanced Life Support
7. **ATCN-** Advanced Trauma Care for Nurses
8. **ATLS-** Advanced Trauma Life Support
9. **ATS-** American Trauma Society
10. **BIS-** Benchmarks, Indicators, and Scoring
11. **BLS-** Basic Life Support
12. **CDC-** Center for Disease Control and Prevention
13. **CE-** Continuing Education
14. **CME-** Continuing Medical Education
15. **CPT-** Current Procedural Terminology
16. **CTF-** Community Trauma Facility
17. **ED-** Emergency Department
18. **EMS-** Emergency Medical Services
19. **EMSC-** Emergency Medical Services for Children
20. **EMSCC-** Emergency Medical Service Coordination Committee
21. **ICD-** International Classification of Disease Coding System
22. **ICU-** Intensive Care Unit
23. **IOM-** Institute of Medicine
24. **ISS-** Injury Severity Score
25. **ITLS-** International Trauma Life Support
26. **MCA-** Medical Control Authority
27. **MCEP-** Michigan College of Emergency Physicians
28. **MCOT-** Michigan Committee on Trauma
29. **MDCH-** Michigan Department of Community Health
30. **MOU-** Memorandum of Understanding
31. **NEMSIS-** National EMS Information System
32. **NHTSA-**National Highway Traffic Safety Administration

33. **NTDB-** National Trauma Data Bank
34. **PHTLS-** Pre-hospital Trauma Life Support
35. **PI-** Performance Improvement
36. **QA-** Quality Assurance
37. **RPSRO-** Regional Professional Standards Review Organization
38. **RTAC-** Regional Trauma Advisory Council
39. **RTC-** Regional Trauma Center
40. **RTN-** Regional Trauma Networks
41. **RTRC-** Regional Trauma Research Center
42. **SCI-** Spinal Cord Injury
43. **STAC-** State Trauma Care Advisory Subcommittee
44. **TBI-** Traumatic Brain Injury
45. **TNCC-** Trauma Nursing Core Course
46. **TSF-** Trauma Support Facility
47. **YPLL-** Years of Productive Life Lost

References

Statewide Trauma System Administrative Rules. October 30, 2007. Michigan Department of Community Health: Bureau of Health Policy, Planning and Access. EMS and Trauma Services Section.

ACS Informational Webpage: Glossary of Terms, Acronyms and Abbreviations