

**REGIONAL TRAUMA SYSTEM PLAN**

**TRAUMA TASK FORCE**

**Revised  
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# **TRAUMA PLAN**

## **BACKGROUND**

In the fall of 1993, a study was done by the Birmingham Regional Emergency Medical Services System which showed that in patients meeting physiologically unstable trauma triage criteria of the American College of Surgeons, 60% were being transported to hospitals that did not have any organized trauma response. The BREMSS Executive Committee reviewed this data and as a result, in late 1993 the Executive Committee of BREMSS authorized a program to evaluate trauma in our region and develop an organized trauma care plan if appropriate. Representatives on that Task Force were included from throughout the region and represented a variety of trauma interests. Doctors' Robert Carraway and Richard Treat were appointed Chairman and Co-chairman of that committee. At the first committee meeting the current trauma care status in the Region was discussed and it was the unanimous opinion of all committee members that trauma care could be improved in our region through the implementation of an organized trauma care program. The committee worked until December of 1994 in developing such a plan.

There is currently no legislated authority for the implementation of trauma programs or trauma center designation and there is no reason to think this status will change in the reasonably foreseeable future. Therefore, the committee, after considerable discussion thought the development of a voluntary program was the only option currently available. The committee clearly recognized that such a program may well not be the ultimate best possible trauma program, however, the committee also strongly felt that the implementation of a well designed and supported program would improve trauma care. It was the opinion of the committee members that this type of program may well be an interim step to a more advanced trauma program, and it is clearly expected that any program developed by this committee will have improvement modifications implemented based on ongoing evaluations of the program function. Other areas in the country have used this concept to develop successful trauma systems.

Mechanisms for the development and implementation of improvements and changes are specifically built into the program design. A consensus building process was used in the trauma plan development. Committee members were to discuss each and every aspect of the program as development proceeded with the groups they represented. The committee members, however, understand that it is not possible to develop a plan that all committee members, let alone, all interested parties in the Region agree upon in every single aspect. In developing a voluntary program the Task Force recognized that a vital requirement for such an effort is cooperation, plus give and take to achieve the goal of improving the trauma care in our community. All interested parties in our region must be committed to this concept if the plan is to be accepted and the system implemented resulting in a successful outcome with reduction in trauma mortality and morbidity in our region.

## TRAUMA SYSTEM GOALS

The primary goal of this Regional Trauma System plan is:

**Develop a plan that when implemented will result in decreased trauma mortality and morbidity in our region.**

In order to accomplish this the committee identified a number of specific processes deemed essential. These are:

1. The ability to rapidly and accurately identify victims of incidents who have sustained or have a high probability of sustaining serious or life-threatening injuries.
2. Patients who have sustained serious or life-threatening injuries or have a high probability of such injuries must receive care in a hospital that has a trauma response program in place which is capable of providing immediate and comprehensive assessment, resuscitation, and definitive care, plus establishing rehabilitation access when needed.
3. There must be continuous and effective region-wide coordination of Prehospital and hospital care resources so that trauma victims will most expeditiously get to the closest hospital with adequate trauma resources so that their care can be provided in a manner that is both appropriate and timely while establishing and maintaining continuity. To accomplish this process there must be the ability to track trauma patients.
4. The program must allow all hospitals in the region the ability to participate in the system (an inclusive system) and receive trauma patients if they are willing to meet the system Trauma Center and operational criteria as established by BREMSS.
5. The system must have an ongoing and effective CQI Program in order to assure continuing appropriate function in providing the highly specialized care necessary in cases of serious and critical injury. This program will include evaluation of Prehospital management, hospital management, and overall system function. A standard Prehospital dataset and hospital dataset will be required of all system participants, which will allow uniform system evaluation to document the effectiveness of the function of the trauma program.

This program will involve the care of only a small percentage of the total trauma population as only those patients who have actually sustained or have a high probability of having sustained serious or critical injuries will be entered in the Trauma System. It is estimated that only 6-8 percent or so of the total trauma population would meet these requirements. The remaining 90 plus percent of the trauma cases would not be entered into the system. Specific trauma center function obligation of hospitals as part of this system would only relate to those trauma victims entered into the system.

The committee realizes that a certain overall level of resource availability is essential to provide care to major trauma victims. In any system, be it voluntary or regulated, inadequate participation and resource availability would certainly overload actively participating hospitals at that time and ultimately threaten the function and continuation of a trauma program. The Task Force, therefore, urges all hospitals to carefully evaluate the trauma program and their potential participation in this program recognizing that trauma is a major part of healthcare today. Applying for and accepting designation must be considered as a major responsibility and should be done only if there is physician and hospital administration interest in an appropriate and meaningful level of participation. Excessive disproportionate resource demand secondary to inadequate participation would create a threat to the continuation of the system and therefore, to the health of the population of our EMS Region.

## **REGIONAL TRAUMA SYSTEM BRIEF OVERVIEW**

The Task Force has developed a plan for a Regional Trauma System that meets the goals as set forth in the previous section. A system is a group of individual components brought together to function in a unified manner to achieve a specific end result. In this case, the end result is improvement in trauma survival and outcome in our region. The components to some degree have separate and individual identities and functions, however, in the trauma setting it is important that there is an understanding, a desire, and a willingness to work together in a unified effort to maximize outcome following injury occurrence. Since there is no legally sanctioned mandate for development and implementation of Trauma Systems, the only option the Task Force had was to develop a voluntary system. A voluntary system requires a uniquely strong commitment to trauma care as there is no legislatively based enforcement process. The goal of the system is to provide specific management through the progressive trauma care phases utilizing the various components and continually improve the stabilization and outcome of the patient during this period. This Regional Trauma Plan refers to a Regional Trauma System and Trauma System patients. The system is the hospitals functioning specifically as designated Trauma Centers and the protocols which will be implemented for use in patients that have a serious or critical injury or a high probability for serious or critical injury. These patients will be selected by protocol based on primary triage criteria (system entry criteria) in the Regional Trauma Plan. If patients meet the primary triage criteria for system entry, the system function protocols and specialized trauma care resources at the Trauma Centers will be implemented for their care. Trauma patients who do not meet the primary triage protocols for entry into the system will not be Trauma System patients and any reference to **Trauma System Patients** in this document does not pertain to this group of patients.

Systems require an oversight authority for project concept, overall responsibility, developmental aspects, implementation, and evaluation of continuing activities. Such an entity is commonly referred to as a lead agency and in this program the proposed lead agency by the Task force is the Birmingham Regional Emergency Medical Services System, as this body has the responsibility for coordinating Prehospital EMS services and has knowledge of Trauma Systems, Prehospital care, and hospital Emergency Department activities in our region. The authority of this agency is derived from specific activity goals and plans approved by the State EMS office

and thus, the State Board of Health, plus a willingness on the part of Prehospital and hospital healthcare providers in our region allowing BREMSS to serve as the lead agency so that trauma care in our region will improve resulting in increased survival and management outcome status. The Executive Committee of BREMSS serves as the leadership body for this organization and therefore, will serve as the supervising authority for this program.

The system involves organization of already existing resources into a program providing comprehensive care for trauma patients through all phases of their management from the moment of injury through rehabilitation. As trauma patients may well have injuries that cause vital function instability with an immediate threat to life that may be, but often is not obvious, the program must provide for rapid movement of patients through all initial phases of management with the provision of optimal care at any time a critical situation is present or any significant changes in the patient status develop. The two basic patient management components to this system are the Prehospital providers and individual hospital organizations. The system function involves the establishment and implementation of protocols, which are in this plan. Based on need, modifications or some additions may be developed by the TIC (see Page 14) and the TOC (see Page 16) for system operations. The entry criteria are intended to select out patients with actual or a high potential for serious or critical injury. It is estimated that only approximately six to eight percent of injured patients would fit these criteria. The other 92 plus percent (the vast majority of trauma patients) do not have actual or significant potential for serious injury and would not need protocol directed specific transport to a Trauma Center. In that large group of trauma patients the system protocols for triage and transport with specific hospital destination would not apply. Hospitals participating in the system would not incur any special obligations to non-system patients as a result of participation in the Regional Trauma Program. All victims of trauma that have EMS transport are to be entered into the Regional Trauma Database (not necessarily the Regional Trauma System) by communication with a central coordinating agency as soon as practical following determination that transport for further hospital care will be required. Upon determination that a patient is in the small percent of actual or possible major or critical injury victims and would benefit from specialized Trauma Center management, specific entry into the Trauma System will be automatically accomplished and resource availability will be surveyed. Entry into the system means that a patient meets specific primary triage criteria indicating an actual or high probability of major or critical injury and the specialized Trauma System resources will be used in their care. Protocol directed Trauma Center destination will be determined and the care of these patients will be evaluated through the CQI Program. A Trauma System, which reports all injured patients into a centralized facility, enables the most appropriate resource utilization and the most appropriate care to be provided to those patients with serious and critical injuries. With this system status knowledge and the application of specific secondary triage protocols based on physiologic status, anatomic injuries, and trauma mechanism severity a determination can be made for patients meeting system criteria as to the relative potential intensity of care needed which then allows a determination of the appropriate care intensity need for that patient. The closest system hospital with available trauma resources meeting the level of need can then be selected as the appropriate destination for that patient using previously established protocols as part of the Regional Trauma Plan. Hospitals participating in this system and receiving trauma patients will have organized response systems, including equipment and facilities plus trained and committed personnel using organized management plans such as protocols of the American College of Surgeons Advanced

Trauma Life Support course in providing management for major trauma victims entered into the system. A regional trauma database will be established which will allow generation of overall knowledge of the magnitude and scope of trauma in our region, determination of teaching and training needs in trauma, and will be used in conjunction with other ambulance services and hospital evaluations in a continuous quality improvement program to evaluate the trauma care and be able to document appropriateness and quality, with implementation of improvements utilizing this evaluation process. The Task Force recommends a specific Trauma Implementation Committee to actually establish the program and then a Trauma Operations Committee to oversee the program during its continuing function. These committees will be directly responsible to the lead agency. They will make recommendations regarding the Trauma System to the lead agency for action. The Trauma Operations Committee will specifically review the continuing function of the Trauma System and prepare routine reports regarding system function and QI review summaries for the lead agency.

There are special requirements for trauma care in children under the age of 16 years. As a result of these requirements patients in this age range should be directly transported to the closest available green status Trauma System facility with a Level I Pediatric Intensive Care Unit as defined by the American Academy of Pediatrics, or if the patient is unstable (any patient which cannot be effectively ventilated by the EMT or a patient who is in need of volume replacement, but IV volume resuscitation cannot be provided/maintained) is to be transported to the closest hospital which has full-time Emergency Department coverage by a physician for immediate resuscitation with secondary transport to a pediatric specialty center as soon as initial resuscitation (not necessarily full and complete resuscitation or evaluation/initial care) has been completed (hopefully less than 1/2 hour).

Finally, it is important to emphasize that Trauma is a surgical disease. The Emergency Department plays a critical role in trauma management, but Surgery and Critical Care are pivotal services in determining the survival and recovery of trauma patients. Surgical leadership of hospital trauma programs is therefore, essential in order for hospitals to participate in the Trauma System. This leadership role must be clearly defined within the Hospital Trauma Plan along with specific appropriate authority to carry out that leadership role. Evidence of continuing leadership should be demonstrated through surgeon participation in the Regional Trauma System Activities and through the individual hospital CQI programs.

## **COMPONENTS AND ORGANIZATION**

The Trauma System is comprised of a number of separate components, which are organized and work together as a system. The individual components and elements, which make up the system, will be described in this section.

### **I. PREHOSPITAL COMPONENT**

EMS Units will obviously be an integral part of the Trauma System. Their organization

will not change under the Trauma System Plan and if there are changes in the make up of EMS Units, that will not affect the functional status of the Regional Trauma System.

There are, however, two specific issues regarding the Prehospital component of the Regional Trauma System.

- A. All EMT intermediates and paramedics need to have a basic knowledge and awareness of the Trauma System elements and system function. This specifically refers to the entry criteria and communications. If they are unclear about entry criteria or system function this information can be easily obtained on a 24 hour a day basis from the Trauma Communications Center so that they can then apply the system trauma protocols in field care situations.
- B. BTLS/PHTLS is recommended for all EMT-I/EMT-P in the region. It is expected that the system find the means to accomplish BTLS/PHTLS for all EMT-I/EMT-P in the region within one year of the start of the system. The regional EMS agency is to assist all providers in the Region in fulfilling this goal.

## II. HOSPITAL COMPONENT

Hospitals will be able to participate in this system on a voluntary basis. Standards have been developed by the Trauma Task Force based on the American College of Surgeons' Resources for Optimal Care of the Injured Patient Document. These are present in Appendix A. Each hospital will be able to determine whether they are on-line (have adequate resources currently available and receive patients based on system operations protocols) or are off-line (do not have adequate resources currently available and do not receive patients per the Trauma System). The hospitals will be able to go on-line and off-line at will. Each hospital must have a General Surgeon primarily responsible for oversight of the Trauma Program. This responsibility includes:

1. Working with administration to maintain resources for that level of Trauma Center.
2. Assuring that call schedules are prepared on a monthly basis that provide physician availability as per their chosen Trauma Center level.
3. Establish/maintain basic trauma care protocols for the hospital.
4. Overseeing the Hospital Trauma CQI Program including database collection and reporting to BREMSS, oversight responsibility for the Hospital Trauma CQI Program per BREMSS requirements, and participation in Regional Trauma System administrative and CQI activities as per the Regional Trauma Plan.

Participation in the Regional Trauma system is accomplished as follows:

1. The decision to participate must be a joint effort between Hospital Administration and medical staff.

2. Hospital Administration and the medical staff carefully evaluate the Regional Trauma Program.
3. A joint decision is made (Hospital Administration and medical staff) that the hospital wishes to participate at a specific level commensurate with their resource capabilities.
4. Application is obtained from BREMSS and returned documenting the hospital's desire to participate and resource capability level with specific resource requirement availability inventory list documenting resource availability at their hospital for their chosen Trauma Center level.
5. An on site orientation meeting at each applying facility is to be held to review the system design and function, plus the requirements to assure there is a full and complete understanding on the part of the hospital and the medical staff. This meeting must be attended by a minimum of the General Surgeon leader of the trauma program in that hospital, the Medical Director of Emergency Department and the Hospital Administrator.
6. The Trauma Operations Committee will review the application and on site visit report to document compliance with requirements and knowledge of system design and function and provide a report to BREMSS Executive Committee.
7. The BREMSS Executive Committee will make the final decision regarding hospital participation as a Trauma Center in the system. If approved, the hospital will become part of the system by executing a contract with BREMSS documenting their willingness to actively participate in the system and maintain Trauma Center resources as per their chosen level.

Hospitals, therefore, must elect whether to participate in this system or not based upon ability to meet resource standards for a chosen individual Trauma Center level, medical staff desire to participate and support this program, and Hospital Administration desire to participate in and support the Regional Trauma Program.

### III. COMMUNICATIONS COMPONENT

Communications are critical to the function of the Trauma System. Communications provide (1) essential knowledge of the overall status of Prehospital trauma activities and hospital resource availability on a continuous basis, (2) access to system organization and function protocols whenever such information is requested by Prehospital personnel or hospital based personnel, (3) a link between the field and Trauma Centers for the rapid exchange of information resulting in efficient Prehospital care provision and hospitals being able to best prepare for trauma victim arrival, (4) collection of uniform system wide data for both CQI activities and development of a Regional Trauma database. Providing all of these functions to the entire system on a continuous basis requires a

central communications facility with constant communications capabilities to all Prehospital units and participating hospitals, plus the ability to immediately and directly link the Prehospital providers to the Trauma Centers. This central communications coordination center could be designed in numerous configurations and the Task Force did not determine which configuration should be utilized. However, the Task Force refers to such an entity as the Trauma Communications Center (TCC).

The TCC will be staffed 24 hours a day by personnel with specific in-depth knowledge of the Trauma System design, function, and protocols. It will be the primary responsibility of the TCC to coordinate the Trauma System activities by maintaining and providing information whenever needed on the field status and hospital status so this data can be used by the Prehospital and hospital personnel in providing care to patients meeting system entry criteria. The Trauma Operations Committee will manage the TCC as part of the Trauma System, which is directly responsible to the lead agency. Oversight of the day-to-day operations of the TCC will be responsibility of the BREMSS Executive Director. The TCC will operate through the system operations protocols. The TCC will make no primary decisions themselves, but provide information about patient management and destination as per pre-established protocols for system function. The TCC will serve as a resource for such protocol information to EMTs that may not be familiar with the protocols or the TCC may simply provide the coordination of Prehospital and hospital resource utilization for trauma management. Therefore, the general functions of the Trauma Communications Center are:

1. Assigns unique system I.D. number for each patient meeting system entry criteria for tracking throughout the system.
2. Collects brief Prehospital database.
3. Provides information on system entry criteria based on preset protocols as requested by EMTs when it is not clear if a patient meets entry criteria.
4. Maintains knowledge of the functional status of all system hospitals at all times.
5. Maintains knowledge of the activity status in the Prehospital setting at all times.
6. Provides information regarding secondary triage status of the patient based on preset protocols.
7. Coordinates patient destination, when patient meets system entry criteria, based on preset protocols as to the closest currently operational Trauma Center utilizing the secondary triage status of the patient.
8. Coordination for optimal resource utilization using pre-established protocols for system function when there are either multiple victims in one event, or there are multiple simultaneous events in the region (which, of course, neither EMTs or individual hospitals could know about).

9. Establishes automatic communication link between EMS provider and receiving facility.

10. Records and enters Prehospital data for Regional Trauma database.

In addition to the above functions, in the event of a mass casualty situation the TCC would serve as an established vital coordination link between on-site control and all Trauma System hospital resources in the region for the most rapid and efficient patient distribution in such circumstances.

An Emergency Resources Display is also part of the communications component. The Emergency Resources Display provides each participating hospital and the Trauma Communications Center with the continuous real-time functional status display of all Trauma Centers. The Emergency Resources Display is a simple computer system with terminals at each participating facility and the TCC. This system will provide a display grid listing each individual hospital, their Trauma Center level, and the 10 primary resource components indicating the availability or non-availability of these individual components in each hospital and therefore, their current trauma activity status. Each system hospital will maintain the status notation of the primary trauma resources in that hospital and therefore, their overall trauma activity level. The Trauma Centers will be able to change their resource availability status and activity level at any time. A record of trauma hospital activity status for the entire system will be maintained through the Emergency Resources Display at the TCC. Any change in hospital status as made by hospital personnel at its own display terminal will be automatically communicated to the central system monitoring station at the TCC. The TCC maintains a consolidated system wide display status indicating the individual resource availability at the Trauma Centers and their overall functional status at any given time. This consolidated information table will be transmitted back to hospitals. The system is maintained automatically by computers with automatic polling and display refresh. The consolidated status display would be similar to the following example:

EMERGENCY RESOURCES DISPLAY

<u>HOSP.</u>	<u>T.C.</u> <u>LEVEL</u>	<u>E.D.</u>	<u>ANES.</u>	<u>O.R.</u>	<u>X-RAY</u>	<u>ICU</u>	<u>TS</u>	<u>SS</u>	<u>OS</u>	<u>NS</u>	<u>CT</u>
A	1	1	2	3	4	5	6	7	8	9	10
B	3	1	2	3	4	5	6	7	8	9	10
C	1	1	2	3	4	5	6	7	8	9	10
D	2	1	2	3	4	5	6	7	8	9	10
E	3	1	2	3	4	5	6	7	8	9	10
F	4	1	2	3	4	5	6	7	8	9	10

Numbers are color-coded - green for available, red for not available  
Hospital abbreviations are automatically color coded for on-line status (green-active, red-inactive) based on individual resource availability in the hospital at that time.  
(See page 28)

The equipment for the Emergency Resources Display will consist of a color video monitor, a computer and a modem connected to a dedicated line, which does not enter the facility through the switchboard. The software will allow simple keystroke change of resource status by the Trauma Center personnel and this change will be transmitted to the central system monitoring station at the TCC with this information then being immediately updated on all resource display monitors in the system. The central monitor station automatically polls the individual monitor stations in the system. If a station's computer fails to acknowledge the poll, that hospital's information will be blanked out on all resource display monitors in the system. If there is an isolated failure at a resource display at a hospital that will not cause a total system fault but that hospital will be blanked out and the TCC will call requesting the information directly. The system integrity is not dependent upon the operation of any single station. The communications component's options are detailed in Appendix B.

#### IV. DATA/CONTINUING QUALITY IMPROVEMENT COMPONENT

This component is absolutely essential for function of the Trauma System. In virtually any serious trauma/injury situation, the patient has a very limited ability to meaningfully select Prehospital, hospital and physician care. The efficacy of the initial care in these patients may have a pivotal role in determining their outcome. Therefore, there is a system responsibility to evaluate the system function to determine continuing effectiveness in the management of these major trauma victims. The Trauma Plan is designed with this component to be able to generate an overall system-wide trauma database which would provide an overall look at Trauma incidents, significance, care and outcomes, provide information for use in determining and developing trauma teaching programs, provide information able to be used in potential trauma studies, and utilization in evaluation of system function in the CQI Program. There are two basic elements of this component. The first is a standard trauma dataset that will be used to establish a regional trauma database. The second element is the continuous quality improvement program of the trauma system.

The Trauma CQI Dataset is designed as a relatively minimal dataset, only 10 fields, that will help to fulfill the goals of this component as stated in the previous paragraph. A unique trauma identification number will allow uniting Prehospital and hospital data, which will increase the data usefulness. The data fields are noted in the following list:

1. Incident location

2. Prehospital unit(s)
3. Activity times
4. Receiving hospital
5. Patient and system demographics
6. Prehospital outcome
7. Hospital status/response
8. Emergency Department disposition
9. Initial (within the first 24 hours) procedures
10. Final disposition

A more thorough listing of the Trauma CQI Dataset is present in Appendix C.

The second entity in this component is the continuous quality improvement (CQI) program for the Trauma System. This program is necessary to the Trauma System to document continuing function and allows the implementation of improvements in a system where the patients may not have the ability to make their own personal medical care choices and depend on the system for adequacy and completeness of care. This program will be system-wide with the individual agencies basically doing their own CQI evaluations and reporting to a regional oversight committee. The appropriateness, quality and quantity of all activities in the system must be continuously monitored in the areas of Prehospital care, medical care of the patients in the hospitals and overall system function.

The basic CQI process involves numerous specific steps to be performed by each individual entity their CQI effort. These steps are:

1. Assignment of a CQI manager to oversee the process in the organization.
2. Develop a written CQI program to evaluate patient care with regard to appropriateness, quality and quantity and as part of that program, patient care standards are established for use in the evaluation process. For Prehospital programs, this simply may be the regional Prehospital protocol. For hospitals this may be a combination of ATLS protocols, plus additional standards as deemed necessary or an individual set of patient care standards (protocols) developed by that hospital. These programs are reviewed and approved by the Regional CQI Committee and lead agency as part of becoming a Trauma System participating hospital.

3. A method for CQI data collection is established. For Trauma Centers this must include a morbidity and mortality list.
4. CQI evaluations are undertaken by the individual system participants - EMS providers or Trauma Center hospitals. This first involves the determination of specific audit filters. Mandatory Trauma Center audit filters include major complications and deaths. Other appropriate audit filters are also evaluated. For Trauma Centers, external outcome comparisons are part of the evaluation process.
5. Determine the presence of CQI issues through the data evaluation process.
6. Discussion of CQI issues at the formal CQI Conference of each individual system participant - EMS provider or Trauma Center.
7. Develop a correction action plan. In general, action activities can be placed under the categories of professional resolution or administrative resolution.
8. Re-evaluation must occur to document the results and effectiveness of the corrective action plan. This is commonly called "closing the loop".

Adequate documentation of these activities is essential. In Trauma Centers a multi-disciplinary peer review process must occur. In Trauma Center CQI programs both medical care and Trauma Center function must be evaluated.

The Regional CQI Committee has the goal of review of the entire Regional Trauma Program activities for appropriateness, quality, and quantity of activities. That review is to include system administration/organization activities, plus Prehospital care and hospital care review. The Regional Committee will document effectiveness of hospital and EMS Service CQI evaluations through routine reports of these CQI activities provided by each participating entity to the Regional Committee. The Regional Committee will perform focused review of specific items as determined appropriate, but these reviews will include evaluation of both Prehospital and hospital activities. Death audit review is mandatory. It is expected that most issues will be resolved by developing an action plan in conjunction with the various Trauma System entities. A re-evaluation for results is to be undertaken. If it is determined that a change in system configuration or standard function should occur, a recommendation will be sent to the Trauma Operations Committee for evaluation and report to the lead agency. A more detailed outline of the Regional Continuous Quality Improvement Program is available in Appendix D.

## V. TRAUMA IMPLEMENTATION COMMITTEE

The Trauma Implementation Committee (TIC) will be established by the lead agency for the purpose of implementation of the Trauma Plan. This is done under the authority of the lead agency with action plans developed and presented as recommendations to the lead agency. As part of the implementation plan, operational protocols for the Trauma

System will be developed and forwarded to the lead agency. This committee will function only during the implementation period.

Committee development will occur in the following manner.

- A. A chairman and vice-chairman will be chosen by the chairman of the Executive Committee from a list of candidates offered by Level I hospitals committed to the Trauma Program. The chairman and vice-chairman of the TIC will be physicians and they will continue as the initial chairman and vice-chairman of the Trauma Operations Committee in order to maintain continuity through initial system implementation and activity. Each hospital making a nomination will demonstrate a trauma commitment through a letter of firm intent to apply for Trauma Center status at Level I in the system and if the hospital withdraws from the Trauma Center process, that physician will no longer maintain committee membership. The hospital and the candidate must jointly understand that the chairman and vice-chairman positions will require an estimated four to six hours a week work effort, and a commitment to availability for that time must be made by the hospital and the candidate. Requirements for chairman.
  1. Surgeon with significant past experience in direct medical management of trauma cases.
  2. Demonstrated knowledge of Trauma Systems organizations.
  3. Knowledge of BREMSS structure and function.
  4. Ability to commit an average of four hours a week to this project.

The vice-chairman is to be an Emergency Medicine physician with significant past experience in trauma management meeting the above 2, 3, & 4 requirements.

- B. Hospitals that have committed to participation in the Trauma System and other agencies/groups will provide committee membership nominations as per the following groups:
  1. Hospitals committed to Trauma System participation
    - a. Hospital Administration
    - b. Emergency Nursing
    - c. Trauma Nursing
    - d. Surgeon (primary trauma call)
    - e. Surgeon, Orthopedic

- f. Surgeon, Neurological
  - g. Emergency Medicine Physician
  - h. Anesthesiology
2. Hospital not directly involved in the Trauma System
    - a. Physician
    - b. Administrator
  3. Non-Hospital Agencies/Group
    - a. EMT - Transporting/Non-transporting
    - b. Fire Service Administration
    - c. Ambulance Service Administration
  4. MCAC Chairman (or designee)

TIC membership nomination form is Appendix E.

- C. The TIC chairman and vice-chairman will select a proposed committee from the nominations received encompassing members from the groups. There will be 12 to 16 members on the committee. Members must be present in order to vote (no proxy votes). At least 70% of the membership is to come from Level I & II hospitals committed to the trauma program.
- D. The Chairman of the BREMSS Executive Committee will appoint the TIC membership.
- E. BREMSS will staff the TIC (inclusive of the Regional Medical Director).

At the initial meeting the TIC will draw up an implementation schedule and provide that schedule along with monthly progress reports to the BREMSS Executive Committee.

## VI. TRAUMA OPERATIONS COMMITTEE (TOC)

Monitoring and primary management of system function during the continuing operation of the Trauma System will be the responsibility of the Trauma Operations Committee. This committee will be directly responsible and report to the lead agency. The committee will have a specific accountability for direct ongoing system governance, which will occur by evaluation of issues/situations/ideas and standard system data regarding

operations and configuration. Recommendations for action will be developed by the committee based on analysis of data/information evaluated during committee function.

A. Membership

1. The chairman and vice-chairman shall serve for two-year terms. The first chairman and vice-chairman shall be the chairman and vice-chairman of the Trauma Implementation Committee. Future chairman and vice-chairman of the Trauma Operations Committee shall be appointed by the Chairman, BREMSS Executive Committee from nominations provided by Level I hospitals actively participating in the Trauma System. Requirements for the chairman of this committee include:
  - a. Surgeon with significant past experience in direct medical management of trauma cases.
  - b. Demonstrated knowledge of Trauma Systems organizations.
  - c. Adequate knowledge of BREMSS structure and function.
  - d. Ability to commit an average of four hours a week to this project.

The vice-chairman is to be an Emergency Medicine Physician with significant past experience in trauma management meeting the above b, c, & d requirements.

Nominees for the chairman and vice-chairman positions of the Trauma Operations Committee and their sponsoring institutions must understand the expected 4-6 hours per week time availability for carrying out the duties this position.

Responsibility of the chairman include:

- a. Serve as leader for committee meetings.
- b. Responsibility for carrying out the assigned duties of the Trauma Operations Committee.
- c. Report to the BREMSS Executive Committee regarding overall system function plus system monitoring activities, suggestions, problems, CQI activities, and other issues as deemed appropriate.

The vice-chairman is to actively assist the chairman as appropriate in carrying out the committee responsibilities.

2. General membership will be constituted from the following groups making nominations for specific membership positions (although not all nominees will necessarily become committee members).
  - a. Hospitals actively participating in the Trauma System
    - 1) Hospital Administration
    - 2) Emergency Nursing
    - 3) Trauma Nursing
    - 4) Surgeon (primary Trauma call)
    - 5) Surgeon, Orthopedic
    - 6) Surgeon, Neurological
    - 7) Emergency Medicine Physician
    - 8) Anesthesiologist
    - 9) Trauma Prevention personnel
    - 10) Trauma Registry personnel
  - b. Hospital not directly involved in the Trauma System.  
Physician - Surgeon or Emergency Medicine physician.
  - c. Prehospital members
    - 1) EMT-Transporting or non-transporting
    - 2) Fire service administration
    - 3) Ambulance service administration
  - d. A consumer will be requested by the BREMSS Executive Committee to be a member.
  - e. A local government official will be requested by the BREMSS Executive Committee to be a member.
  - f. BREMSS will staff the TOC to include participation of the Regional Medical Director.

Hospital TOC membership form is present in Appendix F.

The general membership term is for two years and the committee will be constructed so there is a one-half turnover each year. There will be 17 to 24 committee members, 70% of the committee members must come from Level I & II Trauma Centers and at least two members from the Level III and IV hospitals. The chairman with vice-chairman assistance will select committee members from nominations from Groups a, b, and c above and then all committee members will be appointed by the chairman of the BREMSS Executive Committee. Members must be present to vote (no proxy votes).

## B. Duties

The duties of the Trauma Operations Committee include the review of the overall function of the trauma program including hospital and Prehospital activities. This includes review of criteria, data, or reports. This information will be evaluated regarding adequacy of these various activities and for development of system function reports and recommendations regarding the hospital or Prehospital components or functions, including responsibilities, standards, and activities. If recommendations directly involve Prehospital aspects of the trauma program they will be referred to the MCAC for review and comment and then re-evaluated by the TOC regarding the MCAC input and then, the recommendation in final form will be sent to the Executive Committee for action. Areas of responsibilities include:

1. Trauma Center resource requirements criteria.
2. Trauma Center membership in the system.
3. Trauma Center removal from the system.
4. Communications within the system.
5. Prehospital and hospital datasets.
6. Prehospital and hospital continuous quality improvement programs.
7. Patient entry criteria into the Trauma System (primary triage standards).
8. Secondary triage protocols for Trauma Center destination determination.
9. Trauma Communications Center operations in the system.
10. Prehospital activities in the system.
11. Monitoring of ongoing system requirements/standards/activities and use of

system function protocols.

## **TRAUMA SYSTEM FUNCTION**

General function of the system will follow the scenario of:

1. Injury occurs
2. Field evaluation done by EMT who determines if the patient meets the system criteria (if EMT is unsure of entry criteria, that information may be immediately obtained from the TCC).
3. Communication is established with the TCC with brief basic information provided to the TCC on all trauma patients transported to a hospital.
4. Secondary triage (categorization of severity status, either physiologic, mechanism, or specific injury) is made by the field EMT (with TCC assistance as necessary) on patients entered into the Trauma System.
5. The secondary triage status and the current Trauma Center activity status (from the Emergency Resources Display) determine hospital destination.
6. A direct patched communications link to the closest active hospital is provided by the TCC to the field EMT.
7. Medical control is established with the receiving Trauma Center by the communications link, orders are provided as needed.
8. Prehospital care is completed and transport to the destination Trauma Center is initiated.

Specific functions relative to the Trauma System are described in the following sections.

### **I. SYSTEM ENTRY CRITERIA**

Patients are to be entered into the Trauma System following a trauma incident based on the following criteria:

- A. Physiologic criteria:
  1. Systolic blood pressure consistently less than 90mm. Hg. in an adult or less than 80mm. Hg. in a child five or younger.

2. Respiratory distress which may be evidence by a respiratory rate consistently less than 10 or greater than 29 in an adult or less than 20 or greater than 40 in a child one year or younger.
3. Altered mental status as evidence by a Glasgow Coma Scale score < 10, or a loss of consciousness for five or more minutes or not known whether patient had a loss of consciousness.

B. Mechanism of Injury Criteria:

1. A patient with the same method of restraint and in the same seating area as a dead victim.
2. Ejection of the patient from an enclosed vehicle.
3. Motorcycle/bicycle crash with the patient being thrown at least ten feet from the motorcycle/bicycle.
4. Auto versus pedestrian with significant impact with the patient thrown, or run over by a vehicle.
5. An unbroken fall of 20 feet or greater.

C. Anatomical Criteria:

1. The patient has flail chest.
2. The patient has two or more obvious proximal long bone fractures (humerus, femur).
3. The patient has a penetrating injury of the head, neck, torso, or groin associated with an energy transfer.
4. The patient has a combination of trauma and burns (partial and/or full thickness) of fifteen percent or greater.
5. The patient has an amputation proximal to the wrist or ankle.
6. The patient has one or more limbs which are paralyzed.
7. The patient has a pelvic fracture, as evidenced by a positive "pelvic rock."

D. EMT Discretion:

1. If the EMT is convinced the patient could have a severe injury, which is not yet obvious, the patient may be entered into the Trauma System.

2. The EMTs suspicion of severity of trauma/injury may be raised by the following factors (but these situations alone do not constitute reason for Trauma System entry):
  - a. Age greater than 55
  - b. Age less than five
  - c. Extremes of environment (hot/cold)
  - d. Patient's previous medical history
    - 1) Insulin dependent diabetes
    - 2) Cardiac condition
    - 3) Bleeding disorder
  - e. Pregnancy
  - f. Extrication time greater than 20 minutes, with heavy tools utilized
  - g. Motorcycle crash
3. The EMT is to immediately inform the TCC when a decision is made to enter a patient into the Trauma System using discretion and inform the TCC of the reason for that decision.
4. It is to be specifically noted in the run report that EMT discretion is being used to enter a patient into the Trauma systems and the reason or basis for that decision is to be written on the Prehospital Patient Care Report (PHPCR).

## II. COMMUNICATIONS

Maintenance of adequate and prompt communications are essential to function of the Trauma System. In many instances trauma survival or maximum outcome potential can only be achieved with efficient and rapid movement of the patient through the system of Prehospital assessment and treatment, transport, and hospital resuscitation, evaluation and definitive care. Communication throughout the system is vital to this activity occurring in a most efficient and complete manner. Knowledge of the system-wide Prehospital trauma activities and the current (and possibly changing) status of the functional capabilities of the various hospitals in the system is important at all times as it is possible multiple trauma activities are occurring simultaneously. This function also is essential for maximum mass casualty disaster response. Communications allow differential system

resource utilization when there are multiple trauma activities ongoing simultaneously and also allow maximum response preparation by receiving Trauma Centers. The key to system function is full knowledge of ongoing activities in all parts of the system at all times.

In order to maintain the goal of decreased trauma mortality and morbidity in our region and a program having continuous and effective region-wide system status knowledge and coordination the continuous status of trauma activity must be monitored. This is a function of the TCC. All trauma patients requiring transport are to be called in to the TCC. Patients who do not meet system entry criteria require only very limited information. The TCC notes the date and time. The responding EMT provides the following data.

1. Age and sex
2. Injury mechanism
3. Major obvious injuries
4. Confirmation that the patient does or does not meet system entry criteria
5. Level of care provided, that is actually used for this patient  
- ALS vs. BLS
6. Hospital destination

TCC will note the closest hospital for the EMT and the database.

It is essential to establish radio communications as soon as possible in patients meeting system entry criteria to provide a baseline level of the patient's status. After determination that a patient meets system entry criteria, the highest level EMT should contact the TCC at the earliest practical time to enter the patient into the system. The reporting EMT should identify himself/herself and provide the following information:

1. Basic patient data - number of victims, age, and sex
2. Injury mechanism data
3. Major anatomic injuries
4. Current primary survey status - airway, breathing, circulation, level of consciousness, and vital signs
5. Incident location
6. Estimated scene departure time

7. Proposed mode of transport, if ground state transporting unit number

The TCC will establish a direct patched communications link with the receiving Trauma Center hospital, and provide them with the basic information. The field EMT will then be able to communicate any additional pertinent data and receive medical control while the hospital is simultaneously activating its trauma response system. The transporting EMT will maintain contact as appropriate with the receiving Trauma Center hospital, and provide information updates if changes in the patient's status or transport plan occur. The EMTs are to reconfirm Trauma Center ETA once transport has been initiated.

If radio failure does occur, direct contact between the EMS unit and their dispatch should be established with relay of information to the TCC by telephone.

III. SYSTEM OPERATIONS

System operations refers to the activities that occur once it is determined a patient meets system entry criteria and communications has been established within the system. These activities include performance of secondary triage, trauma center destination determination, continuing communication, provision of field care, patient transport, and Trauma Center management.

1. Secondary Triage (use of system protocols to determine hospital destination).

Secondary triage involves a determination of the severity status once a decision has already been made that a patient is to be entered into the system (primary triage). Secondary triage is used in conjunction with estimated transport time and current hospital activity status to determine Trauma Center destination. The TCC coordinates the application of the approved secondary triage protocols utilizing the patient assessment and transport time estimate by the field EMT combined with the current Trauma Center activity status as noted on the resource display to determine the hospital destination. Secondary triage is based on physiologic status, mechanism of injury, and anatomic criteria, plus the potential use of EMT discretion and evaluation of co-morbid factors. Secondary triage standards are:

A. Physiologic entry criteria

- 1) Physiologic entry criteria take precedence over other criteria even if patients also meet mechanism and/or anatomic criteria.
- 2) Any patient entered into the system meeting physiologic criteria is to be transported to a Level I or II Trauma Center if the transport time is under 40 minutes.
- 3) Any patient who is entered under the altered CNS status physiologic criteria is to be transported to a Level I Trauma Center.

4) A patient that is initially or becomes critically unstable -any patient which cannot be effectively ventilated by the EMT or a patient who is in critical need of volume replacement without being able to provide ongoing volume replacement resuscitation - is to be transported to the closest hospital with active Emergency Department care available at that time.

B. Mechanism of injury criteria - for stable patients (for unstable patients see A. Physiologic Entry Criteria above):

1) Death in same passenger area

a. Closest level I if <40 minutes TXP

b. Closest level IV if >40 minutes TXP to I,II,III

2) Ejection

a. Closest level I or II if <40 minutes TXP

b. Closest level III or IV if >40 min TXP to I or II

3) Motorcycle/bicycle

a. Closest level I, II, III if <40 minutes TXP

b. Closest level IV if >40 minutes TXP to I,II,III

4) Auto versus pedestrian

a. Closest level I,II,III if <40 minutes TXP

b. Closest level IV if >40 min. TXP to I,II, or III

5) Fall

a. Closest level I or II if <40 minutes TXP

b. Closest level III or IV if >40 min TXP to I or II

C. Anatomic Criteria - for stable patients (for unstable patients see A. Physiologic Entry Criteria above):

1) Flail Chest

a. Closest level I or II if <40 minutes TXP

- b. Closest level III or IV if >40 min TXP to I or II
- 2) Long bone fracture
  - a. Closest level I or II if <40 minutes TXP
  - b. Closest level III or IV if >40 min TXP to I or II
- 3) Penetrating head injury:  
(Intracranial penetration thought present)
  - a. Level I as long as patient remains stable (intracranial penetration thought not to be present)
  - b. Closest Level I,II,III if <40 minutes TXP
  - c. Closest Level IV if TXP if >40 min to I,II,III
- 4) Burn trauma
  - a. Closest Level I with Burn Center if <40 min TXP
  - b. Closest Level I,II,III if >40 minutes TXP to Level I/Burn Center
  - c. Closest Level IV if >40 min TXP to I,II,III
- 5) Amputation (amputated part recovered and not mangled)
  - a. Closest Level I-II with Implant Service if <60 minutes transport (amputated part not recovered or is mangled)
  - b. Closest Level I-II if <40 minutes TXP
  - c. Closest Level III-IV if >40 min TXP to I or II
- 6) Paralyzed limb(s)
  - a. Closest Level I if <60 minutes TXP
  - b. Closest Level II,III,IV if >60 min TXP to I
- 7) Pelvic fracture
  - a. Closest Level I-II if <40 minutes TXP

- b. Closest Level III-IV if >40 min TXP to I or II

D. EMT Discretion

If a patient has been entered into the system and does not meet specific secondary triage criteria or the EMT has a specific reason to upgrade the triage decision, the EMT may do so and transport the patient to the closest Level I,II, or III Trauma Center if there is less than 40 minutes transport time, or to the Closest Level IV Trauma Center if transport time is greater than 40 minutes to a Level I,II, or III. The EMT is to specifically note on the run report the reason for utilization of this discretion process. The EMT is to specifically inform the TCC at the time the decision is made using the EMT discretion criteria.

E. Co-Morbid Factors

Any patient entered into the Trauma System who is stable but has any of the following factors may have a change in protocol based destination as listed below. Unstable patients follow the unstable physiologic criteria (see A above). No change indicates no change from standard secondary triage protocol.

1. Age greater than 55.....no change
2. Age less than 16 years old
  - a. Pediatric Level I center if transport <40 minutes
  - b. Closest Level I,II,III Trauma Center if >40 minutes TXP to Pediatric Center
  - c. Closest Level IV if transport >40 min to I,II,III
3. Environmental extremes.....no change
4. Previous medical disease history.....no change
5. Pregnancy
  - a. Level I if <40 minutes TXP
  - b. Level II-III if >40 minutes TXP to Level I
  - c. Level IV if >40 minutes TXP to Level I,II,III

- 6. Extrication times >20 minutes.....no change
- 7. Motorcycle crash.....no change

NOTES:

- A. Transport time is the time which the field EMT estimates considering the mode of transport, weather, traffic, and other variables and incorporates the time from scene departure to hospital arrival.
- B. Transport mode (ground versus air) will be generally determined by the field EMT. Medical Control may wish to modify the transport plan. However, no air transport will be used for penetrating trauma within Jefferson County unless time and circumstance justify a specific need and the on scene EMS incident commander communicates this request to the TCC, who will establish immediate direct patched communication link to the helicopter service with the request. All adult Trauma System patients evacuated from the scene by air be triaged on an alternating basis to the two Level 1 Trauma Centers. This alternating will not consider OB trauma, burn trauma, and trauma requiring re-implantation. If an alternating hospital is not available, the triage alternation is not considered.
- C. Based on Prehospital trauma activity, transport needs and resource availability the TCC will assist in coordination of patient destinations plus ground and air transport between the on site EMT's, Trauma Centers, and the helicopter service.
- D. Should a hospital destination be changed from the original destination chosen at the time of TCC contact, a CQI will be initiated. A quarterly report of all of these issues will be made to the TOC.
- E. This triage plan for scene flights be reviewed on a quarterly basis and BREMSS provide monthly reports on trauma scene flight distribution between the two Level 1 Trauma Centers, reports to include, but not be limited to: total flights requested, flights completed, trauma center diversion status as it relates to acceptance or refusal of scene patients, exception(s), and other information as may be requested from time to time by TOC members.

2. Hospital Destination

Hospital destination will be determined by secondary triage evaluation and the activity status of hospitals in the system at the time the injury occurs. The hospital status is tracked by the Emergency Resources display at the TCC. That equipment is described in the component section and details the status of

individual resources in the hospital and therefore, the activity status of the hospital. Hospitals will usually be either at a green (active) or a red (inactive) status.

Green status means the hospital has all resources available and may receive trauma victims based on location and secondary triage criteria at that time. Green status requirements involve the following.

1. All levels of Trauma Center must have the following resources (which are on the Emergency Resources display grid) active and available at that time as pertains to their Trauma Center Level:

Emergency Department, Anesthesia, Operating Room, X-ray, ICU, and Orthopedic Surgery.

2. For Level I Centers the Neurosurgeon and CT must be actively available.
3. The primary call Trauma Surgeon must be actively available at that time for all levels of Trauma Center.
4. If a hospital has a secondary surgeon call schedule (backup surgeon), this is not involved in the determination of hospital "green status."

Red status indicates at least some primary trauma care resources in that hospital are not actively available and the hospital is not to receive trauma victims at that time. Red status criteria are:

1. If any of the following resources are unavailable: Emergency Department, Anesthesia, Operating Room, X-ray, ICU, and Orthopedic Surgery.
2. Trauma Surgeon is unavailable and there is no secondary surgeon backup call schedule.
3. Patients with neurologic injuries will not be triaged to a Level I center with no Neurosurgeon or a CT Scanner actively available at that time (NS or CT red status).

Yellow status can occur under certain circumstances. Yellow status means at that moment some resources are not available and patients should be triaged to that facility only under certain specific conditions. Criteria for yellow status include:

1. A Level I hospital that does not have a Neurosurgeon or a CT Scanner available.
2. A hospital with a secondary surgeon backup call schedule may be at yellow status if the primary trauma surgeon is unavailable, but the

secondary backup surgeon backup is available. A hospital that does not have a secondary backup surgeon call schedule cannot be at a yellow status based on trauma surgeon availability.

The green, yellow, and red status for combinations of Trauma Surgeon and secondary surgeon are summarized in the following table:

<u>Trauma Surgeon</u>	<u>2nd Call Surgeon</u>	<u>Trauma Center Status</u>
G	G	G
G	R	G
R	G	Y
R	R	R

#### HOSPITAL DESTINATION NOTES

- A. Hospital destination for patients entered into the system will be the closest appropriate trauma receiving facility based on secondary triage and Trauma Center availability.
- B. When a hospital is on yellow status for the Trauma Surgeon/secondary backup surgeon status, trauma patients are directed to that hospital only when equivalent facilities are unavailable or beyond the routine 40 minute transport time, or there are multiple casualties requiring care at that level.
- C. A yellow status due to the unavailability of a Neurosurgeon or a CT scanner at a Level I facility means patients with neurologic trauma are to be transported to another facility unless unavailable.
- D. No facility should receive more than one unstable patient at one time if there are other hospitals on green status within a reasonable transport time.
- E. In the event a patient or family member requests transport to a specific facility that does not meet system guidelines, efforts will be made to clarify and encourage the advantage of using the Trauma System and a specific request to follow the established Trauma System plan will be made of the family. The patient's or family members' wishes will, however, ultimately prevail.
- F. If an event occurs where there are multiple patients meeting Trauma System entry criteria, the patient who is most critically injured (yet potentially salvageable) should go to the nearest appropriate green hospital based on secondary triage criteria. The other patients should go to appropriate green and yellow hospitals as coordinated through the TCC.
- G. If the patient is unstable (cannot be effectively ventilated by the EMT or need volume replacement, but an IV sufficient to provide volume resuscitation cannot be established/maintained) and is over 40 minutes transport time from a green Level I facility, the patient should be transported to the closest hospital with full

time Emergency physician coverage (Trauma Center preferably) as coordinated by the TCC.

- H. In a situation where TCC notification has occurred and no medical direction is needed, the TCC will notify the receiving hospital of the patient transport and provide information of condition, mechanism of injury, estimated arrival time, etc.
- I. If the patient meets physiologic criteria and the appropriate level Trauma Center hospital determined by protocol based destination is not available, the patient should be transported to nearest currently active ("green") Trauma System hospital.
- J. If the patient is stable and there is no hospital available as per the secondary triage destination protocol, the patient should be taken to the nearest actively available ("green") Trauma System hospital.

3. Prehospital System Activities

Prehospital care will be carried out following the guidelines of the Regional Medical Control Plan. The state Prehospital care protocols will be used for primary guidance in Prehospital trauma management. Patients entered into the Trauma System will receive their medical control from the trauma receiving hospital, which will be immediately accessible through the communications link between the TCC and that destination hospital per regional secondary triage protocols, and the activity status of the hospitals in the system at that time. Any significant patient condition changes are to be communicated directly to medical control at the receiving Trauma Center as those changes may result in updating the orders and altering the destination hospital Trauma Team activation. Field time should be kept to a relative minimum as trauma patients may be in a state of temporary compensated physiologic response at which time they appear stable, but may rapidly advance into an uncompensated and unstable status at any time resulting in a significant threat to life. Frequently trauma resuscitation maneuvers can only be carried out in a hospital Emergency Department or in an operating room. Therefore, "free field time" (time following extrication during which the EMTs are free to either stay in the field to perform additional evaluations and management procedures or they are free to initiate transport to the destination hospital) should be kept to a minimum. BTLIS standards call for initiation of transport within 10 minutes following extrication completion in cases of major trauma.

4. Hospital System Activities

Hospital trauma management is an essential part of any Trauma System. This phase of trauma care requires adequate resources (equipment and facilities) and personnel with adequate training and commitment to carry out rapid initial assessment, stabilization, and definitive care including surgery plus critical care and recuperative care as necessary. In addition, rehabilitation services should be initiated as appropriate. Resources necessary to provide care are documented through the Trauma Center standards while patient care management protocols are described in the American College of Surgeons Advanced Trauma Life Support course.

#### IV. SYSTEM COMPLIANCE EVALUATION AND ACTION

This Trauma System is designed to provide specialized care to patients with actual or a significant probability of serious or critical injury. The system is based on hospital requirements to participate as a Trauma Center and system function protocols. Compliance with the requirements and protocols is essential for proper trauma victim management. Therefore, a specific program for monitoring compliance with requirements and function protocols will be a part of the Trauma System. This will be a function of the Trauma Operations Committee. Reports regarding compliance issues will be made to the BREMSS Executive Committee. Maintenance of compliance with requirements, standards, and system function protocol activities for individual personnel and agencies involved in the Trauma System means:

- A. Maintaining component and organization standards as established by the plan.
  - 1. Prehospital
    - a) Prehospital entities have the responsibility to assure their individual EMTs have a basic knowledge and awareness of the Trauma System including entry criteria and basic operations.
    - b) Prehospital providers are expected to work with the Regional EMS Agency to have all their EMT-I/EMT-P employees BTLs/PHTLS trained within a year of system initiation.
  - 2. Hospital Component
    - a) Continue to meet all Trauma Center Resource requirements for their level Trauma Center.
    - b) Maintain a designated General Surgeon as the Trauma Program leader with written responsibilities as indicated in the Regional Trauma System Plan.

3. Communications Component - Each entity is responsible for maintaining communications equipment used in the Trauma System in proper working order.
4. Data/CQI Component
  - a) Each entity is responsible for maintaining and providing data to the Trauma System as indicated in the Regional Trauma System Plan. For prehospital EMS services this means providing data to the Trauma Communications Center which is then placed in the Trauma System Database. For hospitals this means maintaining and providing the hospital based information in the Trauma CQI dataset.
  - b) Participating entities need to maintain their individual Trauma CQI Programs as specified in the Regional Trauma System Plan. They are to provide reports of these activities to the Regional Trauma CQI Committee on a timely basis.
  - c) Active continuing participation in the Regional Trauma CQI program is expected (all individual personnel from participating organizations must attend at least 75% of the Regional CQI meetings). Individual entities are to support the regional focused review of individual topics by providing data and participating in the evaluation process. Information (dataset, trauma death audit, etc.) is to be provided in a timely manner on a month to month basis.
5. Personnel from prehospital and hospital organizations are to participate in Trauma Operations Committee activities per membership responsibilities. It is expected there will be 75% attendance of meetings by members.

B. Maintaining system function as noted in the Regional Trauma System Plan.

1. System entry criteria as specifically defined in the plan or currently active protocols are to be used by EMTs to determine patient entry into the Trauma system.
2. Communications as outlined in the plan and currently approved protocols are to be initiated and maintained by EMS units. This involves initiating communications, providing information and participating in the use of the system operations protocols along with the TCC for coordination of Prehospital trauma care activities including patient entry into the system, determination of Trauma Center destination, and in conjunction with medical control orders for provision of care using the MCAC approved Prehospital care protocols.

3. System operations are provided by individual entities as per the Regional Trauma System plan including currently approved protocols. This includes the use of secondary triage protocols to determine hospital destination, accurate maintenance of trauma care resource status by hospitals participating in the Trauma System, and adherence to other system Prehospital and hospital activity protocols.

Failure of compliance with contract performance criteria or requirements, standards, or adherence to system function protocols as stated in the most current version of the written BREMSS Regional Trauma System Plan will result in specific actions to be taken by the BREMSS Executive Committee. Questions of compliance will be generated by system oversight review by the Trauma Operations Committee. Issues regarding a question of compliance when brought to the attention of BREMSS will be directed to the Trauma Operations Committee for evaluation. The Operations Committee will evaluate questions of compliance and if a compliance infraction has occurred a report will be forwarded to the BREMSS Executive Committee.

- A. The prehospital component requirements, standards, and system function protocols are part of the Regional Medical Control Plan and deviation from that plan will result in the following actions by the BREMSS Executive Committee
  1. First breach of activity standards will result in a letter of explanation to the prehospital service indicating there has been a breach of activity standards with an explanation of the situation and an indication of the need for corrective action to be taken. There will be a one month time period for implementation of the corrective action.
  2. The second breach of the same activity will result in another letter to the prehospital service with a copy to the local credentialing or regulatory authority indicating that a second breach has occurred and again allowing a one month period for corrective action.
  3. A third breach of the same activity will result in a letter to the State EMS Office for evaluation and action.
- B. Hospital participation in the system is governed by the contract between BREMSS and each hospital. Deviations from requirements, standards or system function protocols governed by the contract will result in the following actions by the BREMSS Executive Committee:
  1. The first breach of an activity standard will result in a letter of explanation indicating there has been a breach of an activity standard with an explanation and an indication that there is a need for corrective action. A one month period for corrective action implementation will be allowed.

2. If a second breach of the same activity occurs a letter to the responsible entity indicating that a second breach has occurred with a warning that a third breach in that activity standard will result in suspension from the Trauma System for a 30 day period of time. A one month period for corrective action implementation will occur.
3. A third breach of the same activity will result in contract failure and suspension of that facility from the Trauma System for a period of 30 days as per decision of the BREMSS Executive Committee with the suspension time doubled for subsequent deviations of the same standard.

It will be the duty of the Executive Committee to carry out these pre-determined actions in cases of violation of requirements, standards, or failure of adherence to system function protocols.

## **SUMMARY**

Trauma continues to be a major public health problem in the United States of America today. Although the incidence of car crash fatalities has shown some minimal decrease recently, violence in America has reached a crises level. It is estimated firearms will become the leading cause of trauma deaths nationwide by the year 2003, and the National Center for Health Statistics reported that in 1991 firearms became the leading cause of trauma deaths in California, Nevada, New York, Virginia, the District of Columbia, Texas and Louisiana. The domestic firearm death toll in this country is greater than the combined total of All-American soldiers killed in every war ever fought.

An organized system of care to improve Trauma survival and outcome is a vital part of an overall healthcare plan. The Trauma Task Force has developed a region-wide Trauma System based on voluntary participation. The Trauma Committee realizes voluntary participation has drawbacks, but at this time there is no alternative for establishment of a legislatively mandated system. A volunteer system may serve as an interim step toward a more advanced level Trauma System in the future. An adequate degree of overall regional support is necessary for this or any Trauma System to be able to function in a continuing manner. It is hoped the healthcare resources of our region will be able to come together and there will be the realization this plan is not perfect in every aspect. However, it is only with the concept of moral commitment for improved care for this public health problem we will be able to maximize the survival and outcome following trauma in our region through the development and implementation of an organized Regional Trauma Care Plan.

**APPENDIX A**

**TRAUMA CENTER RESOURCES REQUIREMENTS**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b><u>EMERGENCY DEPARTMENT</u></b>				
Fully equipped resuscitation area for trauma	X	X	X	X
Licensed Emergency Physician on duty * (Meeting BREMSS MCAC plan criteria - ACLS/ATLS cert. ** for adults & ATLS/PALS for pediatric emergency physicians)	X	X	X	X
Nursing support - 2 RN's current in TNCC/ACLS - 1 RN current in TNCC - At least 1 RN	X	X	X	X
Equipment for resuscitation of patients of all ages shall include but not be limited to:				
1. Airway control and ventilation equipment, including laryngoscopes and endotracheal tubes of all sizes, bag-mask resuscitator, pockets masks, and oxygen.	X	X	X	X
2. Pulse oximetry	X	X	X	X
3. End-tidal CO2 determination devices	X	X	X	X
4. Suction devices	X	X	X	X
5. Electrocardiograph-oscilloscope-defibrillator	X	X	X	X
6. Apparatus to establish central venous pressure monitoring	X	X	X	X
7. Standard intravenous fluids and administration devices, including large-bore intravenous catheters	X	X	X	X
8. Sterile surgical sets for				
a. Airway control/cricothyroidotomy	X	X	X	X

b.	Thoracotomy	X	X	X	X
c.	Vascular access	X	X	X	X
d.	Chest decompression	X	X	X	X
9.	Gastric decompression	X	X	X	X
10.	Drugs necessary for emergency care	X	X	X	X
11.	X-ray availability to ED, 24 hours a day	X	X	X	X
12.	Two-way communication with vehicles of emergency transport system	X	X	X	X
13.	Skeletal traction devices	X	X	X	X
14.	Arterial catheters	X	X	X	X
15.	Thermal control equipment	X	X	X	X
a.	For patient				
b.	For blood and fluids				

**RADIOLOGY**

Fully staffed x-ray suite and in hospital technician available on patient arrival at hospital	X	X	X	
X-ray suite fully staffed on patient arrival in x-ray area				X
May be fulfilled by hospital response Trauma Surgeon in being present in Emergency Department on patient arrival				

\*\* 12 months to obtain

**OPERATING ROOM**

Immediately available, fully equipped for trauma	X	X		
Available in a prompt period, fully equipped for Trauma			X	
No requirement				X

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b><u>ANESTHESIOLOGY</u></b>				
CRNA or Anesthesiology resident in hospital and staff Anesthesiologist promptly available and in the hospital during trauma cases	X	X		
CRNA or Anesthesiology resident or an Anesthesiologist promptly available			X	
CRNA or Anesthesiology resident available within a reasonable time				X
<b><u>ICU BED</u></b>				
ICU/CCU JCAHO recognized bed available when needed, equipped for multisystem monitoring	X	X	X	
No requirement - triage/transfer agreements in place				X
<b><u>SURGEON TAKING PRIMARY TRAUMA CALL</u></b>				
General Surgeon current in ATLS,*** Must be in E.D. <u>on patient arrival</u> *** if entered into Trauma system by unstable physiological criteria	X	X		
General surgeon current in ATLS** or PGY3 or greater surgery resident current in ATLS promptly available upon notification by Emergency Department			X	
General Surgeon available upon notification by E.D.				X
<b><u>STANDBY GENERAL SURGEON</u></b>				
General surgeon on call by dedicated pager available to the Emergency Department				
<b><u>NEUROSURGEON</u></b>				
Neurosurgeon promptly available when notified by on call surgeon	X			

No requirement	X	X	X
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\* May be fulfilled by PGY3 or above General Surgery resident who is in house, has had previous trauma rotation, is current in ATLS and is available to the Emergency Department to provide trauma management

\*\* One year to obtain ATLS verification

\*\*\* With 5 minutes pre-notification

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
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**ORTHOPEDIC SURGEON**

Orthopedic Surgeon on call by dedicated pager promptly available to Emergency Department	X	X		
Orthopedic Surgeon on call			X	
Transfer agreement with Level I				X

**COMPUTERIZED TOMOGRAPHY**

CT Scanner in house, equipped for fluid resuscitation with CT technician in house	X
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## APPENDIX B

### COMMUNICATIONS COMPONENT COST

TCC

Alternatives for provision TCC functions:

- 1) RFP and contract with existing or formed organization (no hospital affiliation)
- 2) BREMSS

#### Draft budget from BREMSS

1)	Modification of building (one time)	\$	6,000.00
2)	Procurement of HEAR Radio (one time)	\$	6,000.00
3)	Procurement of taping equipment, telephone system, cellular phones, furniture, computer system and software (one time)	\$	21,000.00
4)	Telephone line cost (annual recurring)	\$	4,800.00
5)	Staffing: (annual recurring)		
	1 person on duty at all times at \$15.00 per hour no fringe benefits	\$	131,400.00
	1 person on duty, 10% overage	\$	13,140.00
	1 person on duty 12 hours at \$15.00 per hour per day	\$	67,700.00
	plus 5% overage	\$	3,285.00
	Supervisor/scheduler 40% FTE	\$	<u>10,800.00</u>
	<b>TOTAL:</b>		
	(annual recurring)	\$	229,125.00
	(one time)	\$	33,000.00

## APPENDIX C

### TRAUMA COI DATA SET

1. Identification number - provided by the TCC upon initial contact by prehospital provider. The same number would follow the patient through the system.
2. Location of the incident - City, County - possibly information from a city map grid (needs further investigation).
3. Prehospital unit(s) responding
4. Times
  - a. Prehospital
    - 1) incident
    - 2) unit dispatch
    - 3) unit scene arrived
    - 4) extrication ended (if applicable)
    - 5) unit scene departure
    - 6) unit hospital arrival
  - b. Communication
    - 1) initial contact with TCC
    - 2) TCC contact/link to receiving Trauma Center
    - 3) additional contacts to TCC by EMT's
5. Receiving hospital
6. System entry data:

- a. primary entry triage criteria
  - b. secondary entry criteria, if present
  - c. co-morbid criteria
  - d. EMT discretion - Narrative field for why
  - e. patient age
  - f. patient sex
  - g. GCS\*
  - h. scene vital signs\*  
(\*TCC will compute T.S. from this data)
7. Prehospital outcome:
- a. loss of vital signs and time
    - 1) lived
    - 2) expired (time)
8. Hospital readiness:
- a. hospital trauma score
  - b. physician arrival time in E.D.
    - 1) ED attending
    - 2) General/trauma surgeon
    - 3) Neurosurgeon
    - 4) Orthopedist
    - 5) Other: state \_\_\_\_\_
9. Procedures done within the first 24 hours (includes all procedures performed by initial receiving hospital or receiving hospital if patient is transferred)
10. Disposition
- a. Emergency Department disposition

- 1) disposition time - patient goes to initial hospital care location (not just leaves ED - i.e. to CT)
- 2) disposition location
  - a) discharged
  - b) admitted - ICU, OR, Ward
  - c) transferred - higher level Trauma Center  
- equal level Trauma Center  
- lower level Trauma Center  
- reason \_\_\_\_\_
  - d) expired

b. Final hospital disposition/date/location

- 1) home
- 2) to rehabilitation center
- 3) to another acute care facility
- 4) to extended care facility
- 5) expired

## APPENDIX D

### CONTINUOUS QUALITY IMPROVEMENT

- A. Quality improvement is a vital part of a Trauma System. It is used to document continuing proper function of the system and evaluation of that function to implement improvements in system function and trauma victim management. In a Trauma System patients have virtually no time to make specific choices regarding acute and critical medical care and therefore, the system itself has a moral responsibility to evaluation functions to assure that the highest level of care is being provided and that improvements are implemented whenever possible in a timely manner.
- B. Such a program will be system wide. There will be individual agency efforts on the part of all participating agencies, plus a Regional Oversight Committee is necessary for overall review of system function. Every participating facility or organization will be represented on the Regional QI Committee and continuing participation of all the various entities involved in trauma care is mandatory.
- C. The appropriateness, quality, and quantity of all activities of the system must be continuously evaluated.
  - 1. Medical Care
  - 2. Prehospital care
  - 3. System function (dispatch activities, scene time, triage process and destination, response level, etc.)
- D. Prehospital Inter-Hospital Care
  - 1. Items evaluated
    - a. patient assessment
    - b. protocol adherence (when applicable)
    - c. procedures initiated/completed

- d. on-scene time
  - e. medical control interaction
  - f. transport-mode (ground/air)
  - g. resource availability/needs match
  - h. arrival report
  - i. record/documentation
  - j. inter-facility care/transport
2. Process - primarily performed by EMS organizations
- a. Each organization assigns QI person to oversee process
  - b. Standards established - regional/authorized
  - c. Determine audit filters
  - d. Collect data
  - e. Evaluate data
  - f. Determine QI issues present
  - g. Develop corrective action plan
    - 1) professional resolution
    - 2) administrative resolution
  - h. Re-evaluation to document results/effectiveness of corrective action plan
- E. Hospital Care QI
- 1. Medical care
    - a. Complications
    - b. Deaths
    - c. Outcome Review

- 1) internal review
- 2) external comparison
- d. Process for medical care QI (performed by each institution)
  - 1) Establish written care standards
  - 2) Collect data
    - a) trauma data elements
    - b) complications or events lists
  - 3) Data QI evaluation
    - a) establish audit filters (indicators)
    - b) determine presence of potential QI issues
    - c) primary review (permissible)
    - d) multi-disciplinary peer review of QI issue
  - 4) Corrective action
    - a) professional resolution
    - b) administrative resolution
  - 5) Re-assess for effectiveness of corrective action
  - 6) Documentation essential utilizing QI tracking flow sheet
2. Trauma Center Function
  - a. Trauma Center operations via audit filter review
    - 1) Continuous
    - 2) Intermittent
    - 3) Focused audit filter review
  - b. Specific event evaluation when event problem noted by trauma team member

- c. Medical nursing audit
- d. Utilization review
- e. Tissue review
- f. Divert utilization review
- g. Process same as for Medical Care Review with the addition of some form or method for noting events that occur that need evaluation to try to improve Trauma Center functions.

F. Regional System Function

- 1. Primarily performed by Regional EMS staff QI individual
- 2. Evaluation of overall Regional System function
- 3. Process
  - a. Establish standard
  - b. Collect data
  - c. Evaluate data - determine audit filters
  - d. Devise plan of corrective action for QI issues
  - e. Re-evaluate to determine effectiveness of corrective action
  - f. participation on Regional Trauma QI Committee

G. Regional QI Committees (staffed by BREMSS)

- 1. Goals - review entire Regional Trauma Program
  - a. System administration/organization/activities
  - b. Prehospital care
  - c. Hospital care
- 2. Members
  - a. EMS Office

- 1) Regional EMS Off-Line Medical Director
  - 2) Regional EMS Executive Director
  - 3) Regional EMS Office QI Coordinator
  - 4) Regional EMS Office Data Coordinator
- b. Prehospital provider representation - the designated QI coordinator for each county, (from an EMS organization)
  - c. Participating hospital representation
    - 1) Trauma Director
    - 2) QI Coordinator
  - d. Coroner
3. Process
    - a. Brief report of QI activities from each participating county/EMS organization and hospital
    - b. General system information
    - c. Focused review of items of major concern/impact including selected cases
    - d. Develop consensus of issues that represent QI concerns
    - e. Develop action plan
    - f. Have re-evaluation process to determine effectiveness of action plan results
    - g. Complete documentation of all activities including any recommendations for change or action to the Trauma Operations Committee and the BREMSS Executive Committee
  4. Hospital Medical Care Review Sub-Committee
    - a. Members
      - 1) Trauma Director from each participating Trauma Center

- 2) Emergency Department Medical Director from each active Trauma Center
  - 3) Regional EMS Medical Director
  - 4) Coroner/Medical Examiner
  - 5) Trauma Coordinator from Level I Trauma Center as recorder
  - 6) The chairman of this committee will be the chairman of the Trauma Operations Committee
- b. Activities are to review the trauma medical care issues including specific death audit review and major complications review as determined by the committee chairman. Other CQI issues will be reviewed as deemed appropriate.
  - c. The process used will be the same process as outlined in the CQI Section of the Regional Trauma System Plan.
  - d. Reports of a summary nature will be made to the Regional CQI Committee. Individual physician medical care issues will initially only be reported to the trauma director of the facility providing care in that situation and be made by personal communication. In general, discussions at the sub-committee meeting will fulfill this notification requirement. If a persistent individual problem trend occurs, this situation will be referred to the appropriate hospital CQI Committee.
5. All members are expected to attend at least 75% of the Regional CQI Committee meetings and the Hospital Medical Care Review subcommittee meetings.

**APPENDIX E**

**TRAUMA IMPLEMENTATION COMMITTEE NOMINATION FORM**

- Hospital committed to Trauma System participation

Name \_\_\_\_\_, application for Level I, II, III, IV

Area of Representation

Name of Nominee

Hospital Administration

\_\_\_\_\_

Emergency Nursing

\_\_\_\_\_

Trauma Nursing

\_\_\_\_\_

Surgeon (1E trauma call)

\_\_\_\_\_

Surgeon, Orthopedic

\_\_\_\_\_

Surgeon, Neurological

\_\_\_\_\_

Emergency Medicine Physician

\_\_\_\_\_

Anesthesiologist

\_\_\_\_\_

- Hospital not directly involved in Trauma System

Name \_\_\_\_\_

Area of Representation

Name of Nominee

Physician

\_\_\_\_\_

Administrator

\_\_\_\_\_

- Prehospital provider agency

Name \_\_\_\_\_

<u>Area of Representation</u>	<u>Name of Nominee</u>
EMT-Transporting/Non-transporting	_____
Fire service administration	_____
Ambulance Service administration	_____

**APPENDIX F**

**TRAUMA OPERATIONS COMMITTEE NOMINATIONS FORM**

- Hospital participating in system as Trauma Center

Name \_\_\_\_\_

<u>Area of Representation</u>	<u>Name of Nominee</u>
Hospital Administration	_____
Emergency Nursing	_____
Trauma Nursing	_____
Surgeon (primary trauma call)	_____
Surgeon, Orthopedics	_____
Surgeon, Neurological	_____
Emergency medicine Physician	_____
Anesthesiologist	_____
Trauma prevention personnel	_____
Trauma registry personnel	_____

- Hospital not participating in system as Trauma Center

Name \_\_\_\_\_

<u>Area of Representation</u>	<u>Name of Nominee</u>
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Physician - Surgeon or E.M. Physician \_\_\_\_\_

Prehospital provider agency

Name \_\_\_\_\_

Area of Representation

Name of Nominee

EMT - Transporting or Non-transporting \_\_\_\_\_

Fire service administration \_\_\_\_\_

Ambulance service administration \_\_\_\_\_