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EXECUTIVE SUMMARY

Overview

It has been demonstrated in Emergency Medical Services (EMS) systems throughout the nation that an organized, systematic approach to trauma care results in a reduction in preventable death and morbidity. In recognition of this local public health issue, the California State Emergency Medical Services Authority has authorized the development of this trauma plan for Marin County as a step toward the implementation of an organized injury management strategy.

The trauma system plan is, first and foremost, designed to protect the health of the people of Marin and, as such, it is a patient advocacy effort. Its purpose is to provide a framework for the establishment of a comprehensive injury management strategy that addresses the needs of the injured in a coordinated fashion.

Developed by the county's Department of Health and Human Services, the implementation of this system plan will enhance the delivery of trauma services to the residents of and visitors to Marin County. It is based on the inclusive model, encouraging all hospitals to participate at some level, dependent upon their corporate mission, their resources, and their commitment to the provision of quality trauma care.

Prehospital triage criteria, facility standards and transfer criteria are contained in this document and are based on national and state models.

The effectiveness of this plan will be monitored and assessed in a variety of ways utilizing data collected by the Prehospital Care Information System and trauma registry software located at each facility that receives injured patients. The EMS Office will develop a Continuous Quality Improvement (CQI) program specific to trauma that will assure that review of all cases occurs and that relevant outcomes and goals of the plan are met. Providers will individually review incidents as appropriate, monthly reports and quarterly reviews will occur, as will overall review from the system perspective. On-going evaluation will determine whether system refinements achieve the desired outcomes.

Purpose

The purpose of the Marin County Trauma System Plan is to develop and implement a countywide trauma system that is consistent with the goals of the Department of Health and Human Services and the California Emergency Medical Services Authority. Those goals include the following:

- reduction of morbidity and mortality through the provision of coordinated and integrated emergency medical care and preventive services;
- promotion of physical and mental health;
- prevention of disease, injury and disability;
- provision of affordable, equitable, high quality, appropriate, accessible health services to the community.

A trauma system is the organization of the personnel, resources and procedures needed to care for the injured patient according to a coordinated plan of action. It assures that all resources that are needed are available, ready and consistently respond to significant injuries in a logical and integrated fashion. It links the prehospital and hospital medical resources according to criteria that categorizes the severity of injuries and directs the patient to the appropriate level of care. Multiple studies have repeatedly shown that trauma systems reduce preventable deaths, improve outcomes and decrease length of hospital stay.

Marin County requires a plan that, although it serves an area small in size and population, assures access to all levels of trauma care, providing care for as many injured patients as is appropriate and safe within the county.

Recommendations

As detailed in the Needs Statement (page 7 of the plan), following a review of existing literature, Marin-specific statistical information, existing trauma systems, and input from system participants and citizens of Marin, the Trauma System Plan makes the following recommendations:

1. That Marin County adopt and implement the Trauma System Plan detailed in this document for the purpose of enhancing the provision of care to injured persons.

2. That the Emergency Medical Services Program, within the Division of Health Services in the Department of Health and Human Services, as the regulatory agency for the county, will be the lead agency, responsible for planning, implementing, and managing the trauma system.

3. That the trauma system establishes a method to accurately identify injured patients and assures universal access to the system with consistency of resource allocation.

4. That prehospital care providers utilize a countywide trauma-patient identification and flow process designed to assure that patient destination and resources committed are appropriate to the level of injury sustained with a goal of assuring that, whenever appropriate and possible, patients receive treatment in Marin County.

5. That the Marin County trauma system utilize trauma center facilities which will be established in the following manner: contractual arrangements with Level I, Level II and other specialty centers located outside of Marin county; designation of acute care facilities in Marin county at the III or EDAT levels with the standard for a Level III facility modified to require the availability of a neurosurgeon.

   5a. That the issue of establishment of helipads or EMS Landing Sites is evaluated one year after the designation of centers in Marin County has

occurred. Prospective collection of trauma registry data will continue and be utilized in that evaluation process.

6. That the system include a comprehensive quality improvement monitoring program to assure appropriate access, utilization of resources, triage, transport and treatment of the trauma patient. A report shall be provided to the Board of Supervisors on an annual basis for consideration of amendments to the plan on each of the first three anniversaries following implementation and thereafter at intervals deemed appropriate by the Board.

7. That the system include a specific focused injury control program sensitive to the special needs/epidemiology of Marin County.

8. That the system includes provisions to integrate disaster/emergency preparedness with the trauma system.

To accomplish these recommendations, the plan does the following:

1. Identifies the components of a trauma system and outlines the necessary steps to develop and operate the system;

2. Defines the designation/contracting process for health facilities seeking to provide trauma services;

3. Establishes operational requirements and standards for all levels of trauma care facilities;

4. Establishes a clear line of authority for trauma system administration;

5. Describes a monitoring process which includes data collection, quality management and peer review; and

6. Provides for trauma system modification based on demonstrated need and outcome data.

The Marin County Trauma System Approval Process

This is the final plan that will be submitted to the Marin County Board of Supervisors. The Emergency Medical Care Committee, a Board of Supervisors appointed committee, advisory to the Director of Health and Human Services will review the plan prior to submission. They are expected to recommend that the Director of the Department of Health and Human Services seek Board approval of the plan. Following that approval, the plan will be submitted to the Emergency Medical Services Authority for state review and approval.

Implementation of the trauma system plan is discussed in the Implementation Objectives, page 15, and a Timetable for Implementation is presented on page 21.

Legal Basis

This trauma system plan is developed by the Marin County EMS Office, a program within the Health Services Division of the Department of Health and Human Services under the authority of the State Trauma Regulations, CCR, Title 22, Division 9, Chapter 7.

OVERVIEW AND BACKGROUND

Marin County, with its area of 520 square miles and a population of 245,000 persons (1998 estimate), is geographically the third smallest county in the state. In population, it ranks 17th. In comparison with the Bay Area, for the most part composed of urban areas, Marin has a mix of rural and urban communities, with roughly 50% of the geographic area rural in nature and concentrated to the west of the coastal mountains (which form a north/south barrier). Its rural character and minimal growth policy have necessitated a trauma system plan most like those designed for rural areas.

The majority of the population is located on the eastern side of the county along the north/south Highway 101 corridor. Marin attracts substantial tourist traffic, which results in a seasonal increase of trauma patient volume between the first quarter (lowest volume) and the third quarter (highest volume). In 1997 this increase was 20% and in 1998 it was 15%. The average rainfall is 36.64 inches, the average temperature 58.3 degrees, and there are a number of microclimates that result in simultaneous local weather condition variances. The potential effect of weather on the trauma system plan is discussed on page 12.

The county has four acute care hospitals: Kaiser Permanente in San Rafael, Novato Community Hospital in Novato, Marin General Hospital in Greenbrae, and Ross Hospital in Kentfield. The first three have basic emergency departments and critical care units and receive ambulance traffic.

The Emergency Medical Services (EMS) Program is within the Health Services Division of the Department of Health and Human Services, the County of Marin. This program has regulatory responsibility for EMS activities as enumerated in the California Code of Regulations. It is responsible for planning, evaluation, and oversight of system activities and provides staff support to EMS advisory committees.

Emergency Medical Services through the 9-1-1 system are currently provided in five geopolitical zones by fire departments or district agencies that are contracted with the county. Three privately owned ambulance services provide additional backup when requested, and five air transport and rescue services from surrounding counties are available when needed.

The Prehospital Medical Care Committee (PMCC) includes representatives from all provider agencies and provides technical expertise and advice to the EMS Program and the Emergency Medical Care Committee (EMCC). The EMCC is a Board of Supervisors appointed committee that acts as an advisor to the Director of Health and Human Services and the Board of Supervisors on any and all matters related to prehospital emergency services.

Since the early 1970s, EMS personnel and designated persons from the hospitals, the fire departments, and the community have been meeting regularly with the goal of creating and maintaining a system to assure the provision of quality prehospital care to citizens. Over the years, many discussions and much effort have been directed toward evaluation of the need to establish a formal trauma system. Some related pieces (transport of injured pediatric patients directly from the field to a pediatric center; criteria for use of EMS aircraft for patient

transportation) have been instituted, but a formalized trauma system for Marin County has not been designed and implemented.

A trauma system plan provides consistency of care for the injured patient, helps coordinate all components of care for the patient, and provides data to accurately monitor the quality of care. Guidelines are adjusted based on review and monitoring of patient care. Patients are taken to the facility most able to meet their needs, based on the severity or type of injury sustained.

In early 1998, the Department of Health and Human Services, through its EMS Program, issued a Request for Quote, seeking a consultant to assist with the design of a trauma system that was tailored to meet the unique needs of Marin County.

The Abaris Group, a consulting firm with many years' experience in EMS and trauma system design, was hired and began work on the project in early March, 1998. Stakeholders were invited to provide input and information that resulted in the issuance of a first draft of the system plan in early August. Following three months of public comment, the document has been revised, taking into consideration information provided by stakeholders and the public.

NEEDS STATEMENT

Background

A review of existing literature reveals numerous studies that support the development and implementation of organized trauma systems. In the trauma outcome studies referenced in Appendix A, preventable death rates of 15 to 38 percent have dropped to between 2 and 7 percent following implementation of formal trauma systems.

No studies have been published demonstrating lack of improvement in outcomes following implementation of a trauma system. Counties and EMS regions are therefore commonly implementing systems without performing lengthy studies demonstrating that preventable deaths are occurring.

During the preparation of this system plan, the hospitals in Marin County retrospectively evaluated trauma care provided during 1997, the results of which have been received and evaluated by the Department. The hospital evaluation reviewed trauma care for a total of 246 injured patients who received care in Marin County hospitals. Information for patients injured in Marin County and cared for in other counties was not included in this review. Most patients (63%) were male and were injured in motor vehicle accidents (53%). The majority of patients (50%) were admitted to hospitals, and the second largest group (48%) was discharged from the Emergency Department following treatment for and evaluation of their injuries. A multidisciplinary review of deaths was conducted, concluding that 2 deaths were "possibly preventable" and that 1 was "preventable". This evaluation of care has been a truly collaborative effort and has provided the medical community with a baseline by which results of the trauma system plan implementation can be measured.

Since the unintentional injury death rate for Marin County is the lowest among its neighboring counties (refer to statistics in Appendix C), a prospective, statistically valid study would require a number of years to complete. The Department supports moving forward with a formal system plan that is expected to improve outcomes and decrease length of hospital stay and that enhances the excellent level of care provided within the community.

The following statistical information was reviewed and analyzed and is the basis for the conclusions that follow:

- Death Rates from Unintended Injuries by County, 1996*
- Deaths from Unintentional Injuries, Marin County*
- Motor Vehicle Crash Death Rate, 1996*
- Death Rate per 100,000 Vehicle Miles Driven by County, 1996*
- Persons Injured in Motor Vehicle Crashes, Marin County*
- Persons Injured in Motor Vehicle Crashes, California*
- Hospital Admissions by Injury Severity Level, Marin County, 1993 and 1996*
- Injured Patients Receiving ALS Care, Projected Triage According to Proposed Trauma System (for 1997)*
- Distribution of Injured Patients (by Hospital) for 1997*

- Trauma Center Volumes, 1997*
- Hospital ED volumes, provided by Hospital District Board
- Trauma Information, 1997, provided by Acute Care Hospital Task Force

* indicates information is included in Appendix C

Conclusions

The following conclusions have been reached following review of the existing literature, listed in Appendix A, and statistical information, listed in Appendix C. Trauma Center Standards, Appendix E, incorporates the latest recommendations from the American College of Surgeons, published in late 1998. Also considered were other trauma systems in place or proposed for surrounding counties.

- The death rate (per 100,000) from unintentional injury in Marin County is declining and is less than in surrounding counties and less than in the state as a whole.
- Although death rates are lower than average, the rate of persons injured in motor vehicle crashes in Marin County is increasing while the statewide rate of injury is declining.
- In 1996, the number of individuals hospitalized in Marin County following injury was 927. Of those, 85 individuals met the definition of "major or severe injury" with ISS of 16 or greater. (Refer to Appendix C for definitions and presentation of specific information.)
- In 1997, 784 injured patients received paramedic-level treatment. Application of the triage guidelines proposed in this plan would have qualified these patients for transport in the following manner (refer to #6, Appendix C for a discussion of this evaluation):
  - 46 patients to a Level II center
  - 86 patients to a Level III center
  - 120 patients to an Emergency Department Approved for Trauma (EDAT)
  - 532 patients to any basic Emergency Department (ED)
- The presence of trauma centers in all surrounding counties precludes additional volume in the Marin system originating from other areas.
- The volume of trauma patients that can be expected in Marin County, compared to the volumes seen in designated trauma centers in California (Sonoma County designation is pending) does not support the designation of a Level II center within Marin County. (Refer to discussion on page 11.)
- Information provided by the hospitals' review of care reinforces the need for an organized approach to trauma care.

RECOMMENDATIONS AND DISCUSSION

The following is a list of the recommendations that will be made in the plan. Each recommendation will then be presented with a short statement outlining the reason the recommendation has been made. These recommendations will then be presented along with objectives, a timeline and assignment of responsibility for completion in the section that begins on page 15.

Recommendations

1. Adoption of the system plan;
2. Designation of the lead agency;
3. Related to system access and dispatch;
4. Related to triage, transport, destination choices;
5. Designation of trauma centers;
   5a. Helipad/EMS Landing Site issue;
6. Quality Improvement process;
7. Inclusion of injury prevention program;
8. Inclusion of disaster considerations.

Recommendation #1

That Marin County adopt and implement the Trauma System Plan detailed in this document for the purpose of enhancing the provision of care to injured persons.

Reasoning in Support of this Recommendation

Although Marin County has a relatively low rate of death from unintentional injury, a substantial, and increasing number of persons are injured each year. (Refer to the Needs Statement and Appendix C for specific details.)

The implementation of an organized trauma system is expected to improve patient outcomes and to decrease length of hospital stay.

This plan includes a substantial component related to injury prevention. Implementation of that portion will decrease the incidence of injury in the community, consistent with the public health vision of healthy people living in healthy communities.

Recommendation #2

That the Emergency Medical Services Program, within the Division of Health Services in the Department of Health and Human Services, as the regulatory agency for the county, will be the lead agency, responsible for planning, implementing, and managing the trauma system.

Reasoning in Support of this Recommendation

State regulation designating the EMS Program as lead agency exists in Chapter 7, Division 9, Title 22 of the California Code of Regulations. As the lead agency, the EMS Program will generate all written documents pertaining to the system, including the Request for Proposal, necessary contracts, Continuous Quality Improvement Program and the results of all studies or evaluations conducted. EMS staff will collaborate with, facilitate, and oversee hospital and paramedic provider functions relative to the implementation and on-going activities of the system.

Recommendation #3

That the trauma system establishes a method to accurately identify injured patients and assures universal access to the system with consistency of resource allocation.

Reasoning in Support of this Recommendation

Consistent use of pre-determined guidelines that prescribe the appropriate level of initial response to the request for assistance will be implemented. The guidelines will be finalized by the EMS Office following input from system participants once the system configuration is determined. Tasks related to this recommendation will deal with consistency of citizen access to the system and consistency in the resources dispatched in response to a request for assistance.

Recommendation #4

That prehospital care providers utilize a countywide trauma-patient identification and flow process designed to assure that patient destination and resources committed are appropriate to the level of injury sustained with a goal of assuring that, whenever appropriate and possible, patients receive treatment in Marin County.

Reasoning in Support of this Recommendation

The goal of the plan is to assure that patients are taken to the most appropriate destination with a minimum amount of over- or under-triage occurring. Currently, most injured patients are transported to the closest facility with a basic emergency department. If special needs are identified (such as the need for obstetrical services, pediatric trauma services or neurosurgical services) then patients are transported to a facility that meets those needs.

When the trauma system is in place, patients will be evaluated in the field and the extent of their injuries evaluated according to established triage guidelines. The destination is then determined by this assessment of injury or potential injury in combination with the amount of time needed to reach that level of care and transportation resources available.

If the most appropriate destination is not available within a reasonable amount of time (to be defined as the system is implemented) due to weather considerations or lack of timely availability of resources, the patient will be taken to the next most appropriate destination. The need for subsequent transfer and the method for accomplishing that transfer will be determined following initial evaluation and stabilization.

Final triage guidelines and mechanisms for determination of destination will be established when center designation determinations have been made.

Recommendation #5

That the Marin County trauma system utilize trauma center facilities which will be established in the following manner: contractual arrangements with Level I, Level II and other specialty centers located outside of Marin county; designation of acute care facilities in Marin county at the III or EDAT levels with the standard for a Level III facility modified to require the availability of a neurosurgeon.

Reasoning in Support of this Recommendation

Access to Level I and Level II trauma centers and other specialty services (such as those needed for burns, reimplantation or pediatric trauma) is a necessary part of any trauma system plan. This plan recommends that patients requiring or qualifying for these levels of service be transported to facilities as established and approved in surrounding jurisdictions. In 1997, that number is estimated to have been 46 patients. (Refer to Appendix C.)

This plan does not recommend the establishment of a Level II trauma center in Marin County, as the expected volume of severely injured trauma patients is inadequate to assure continued clinical competency of the trauma team. Although the proposed trauma regulations for California do not include a volume requirement and the newly published recommendations from the American College of Surgeons specify a volume requirement only for Level I centers (refer to Appendix E), the relationship of patient volume to improved outcome and maintenance of team skills is described in literature (see Konvolinka and Smith, Appendix A). More detailed information about patient volume in currently designated centers in California is found in Appendix C.

The upgrade of the Level III standard requires that a neurosurgeon be on-call at all times and is made to enhance services and improve clinical outcomes.

The establishment of a Level III center in Marin County according to the standards of this plan would require that a trauma team be present within a period of time following activation of the team. This parameter will be set during implementation of the system, but is expected to be 30 minutes.

Activation of the trauma team occurs when a trauma patient is identified and usually happens in the field, prior to the patient's arrival at the hospital. A trauma team includes an emergency physician, a surgeon, anesthesiologist, trauma nurses and ancillary services. Other

physicians, in particular a neurosurgeon, orthopedist, plastic surgeon and radiologist, would be on-call and able to respond within a defined period of time.

The Department wishes to encourage all local facilities to participate to the greatest but most practical extent possible. Facilities may exceed, but not fall below, the standards established for designation.

The timelines for implementation of the Trauma System Plan indicate that the center designation process will be completed by the end of 1999. The first tasks following approval of the plan will be to formalize the Trauma Triage Guidelines as they relate to patients qualifying for care at a Level II center, to contract with one or more Level II centers, and to implement the transport of that group of patients to those centers as soon as possible.

Recommendation #5a

That the issue of establishment of helipads or EMS Landing Sites is evaluated one year after the designation of centers in Marin County has occurred. Prospective collection of trauma registry data will continue and be utilized in that evaluation process.

Reasoning in Support of this Recommendation

With the facility configuration in place, air transport utilization patterns and secondary patient transfers will be analyzed to determine what level of air transport will be required within the system.

Air transport to out-of-county centers from the field will continue and may result in a greater than necessary number of patients being sent to the Level II center (overtriage) during the first year of implementation of the system plan.

The ability to use air transport is not affected by the presence of rain, wind, or darkness, with fog and low clouds most likely to affect flight capability. Ability to fly is dictated by the level of the "ceiling" (vertical visibility) and by the amount of forward visibility. A helicopter must have a minimum of a 500-foot ceiling and a forward visibility of one mile at three locations—the place of departure, the site of the patient, and the destination hospital. The ability to use instrument flight rules (IFR) versus visual flight rules (VFR) increases the likelihood that the aircraft will not be grounded by weather.

In 1998 helicopter dispatch was requested 132 times. Of those 132 requests, only 36% resulted in the air transport of a patient. Of the 47 patients transported by air, 24 were injured patients and 23 had an illness requiring the use of a helicopter. There were 6 instances when weather conditions prevented flight and required the use of ground transport.

The Department believes that timely access to air transport is a vital piece of the Marin trauma system that impacts both the timeliness and appropriateness of patient care and will monitor this issue closely and make the appropriate recommendations after the first year of system operations.

Recommendation #6

That the system include a comprehensive quality improvement monitoring program to assure appropriate access, utilization of resources, triage, transport and treatment of the trauma patient. A report shall be provided to the Board of Supervisors on an annual basis for consideration of amendments to the plan on each of the first three anniversaries following implementation and thereafter at intervals deemed appropriate by the Board.

Reasoning in Support of this Recommendation

The Department is recommending that a trauma system plan be implemented to enhance care currently available to injured patients. It will be required that on-going evaluation of the effectiveness of those changes and their impact on patient care be a part of the trauma system.

A quality improvement model is chosen because the goal of this system component is to measure, evaluate, and continue to constantly improve that care. Following development of a Trauma-specific Quality Improvement Program by the EMS Program, all hospitals and emergency providers will be required to participate according to established standards. Provider components will then be coordinated at the system level by EMS Program staff, with a resulting system-wide overview.

Recommendation #7

That the system include a specific focused injury control program sensitive to the special needs/epidemiology of Marin County.

Discussion in Support of this Recommendation

A component of the comprehensive treatment of injured patients must include efforts to identify the reasons for the injuries that are occurring in the community and methods and educational outreach programs to prevent the occurrence of those injuries. For example, if there is a substantial number of head injuries resulting from bicycle accidents, a bicycle injury prevention program stressing helmet use, road safety rules, and the importance of carrying identification might be implemented.

Recommendation #8

That the system includes provisions to integrate disaster/emergency preparedness with the trauma system.

Discussion in Support of this Recommendation

The implementation of a Trauma System Plan changes the system view of injured patients, managing them in a different fashion. Disaster situations can be expected to generate unusual numbers of trauma patients and their management during a disaster must be considered as it relates to the trauma system.

Collaboration with the Office of Emergency Services will occur to assure that planning efforts are compatible.

IMPLEMENTATION OBJECTIVES

This section of the plan will list the objectives to be accomplished in order to implement those recommendations made in the previous section, provide a target date for completion of the objective, and specify responsibility for completion. Target dates are projections only and may be readjusted as needed during the implementation of the system plan.

Recommendation #1: That Marin County adopt and implement the Trauma System Plan detailed in this document for the purpose of enhancing the provision of care to injured persons.

Objectives:

1.1 Recommend Board of Supervisor approval of the Trauma System Plan.
Timeline: March 16, 1999 Who: Department Director

1.2 Seek approval of the Plan from the state EMS Authority.
Timeline: April, 1999 Who: EMS Staff

Recommendation #2: The EMS Program, within the Division of Health Services in the Department of Health and Human Services will be the lead agency, responsible for planning, implementing, and managing the trauma system.

Objectives:

2.1 Develop staff functions and begin working toward full implementation of the plan, following the timeline located on pages 19 and 20.
Timeline: July, 1999 Who: EMS Staff

2.2 Seek on-going advice from the Emergency Medical Care Committee and its subcommittees who will identify details and recommend solutions to facilitate implementation of the Trauma System Plan.
Timeline: Ongoing Who: EMS Staff, Department Director

2.3 Determine the need for the formation of additional subcommittees, task forces, or ad hoc groups to achieve plan objectives.
Timeline: July, 1999 Who: EMS Staff, EMCC

2.4 Assure that EMS program oversight is available to all components of the system and to all groups organized to perform tasks related to the achievement of objectives in this plan.
Timeline: Ongoing Who: EMS Staff

Recommendation #3: That the trauma system establishes a method to accurately identify injured patients and assure universal access to the system with consistency of resource allocation.

Objectives:

3.1 Evaluate the availability of rapid and consistent system access to citizens.
Timeline: July, 2000 Who: EMS Staff

3.2 Review and update, if necessary, Emergency Medical Dispatch, EMS Aircraft, and Trauma Treatment guidelines as they relate to injured patients.
Timeline: September, 1999 Who: EMS Office

3.3 Develop a single medical dispatch center.
Timeline: July, 2002 Who: EMS Office

3.4 Consistently apply dispatch guidelines and allocation of resources.
Timeline: Ongoing Who: Provider agencies

Recommendation #4: That prehospital care providers utilize a countywide trauma-patient identification and flow process designed to assure that patient destination and resources committed are appropriate to the level of injury sustained with a goal of assuring that, whenever appropriate and possible, patients receive treatment in Marin County.

Objectives:

4.1 Finalize a countywide standard for trauma triage based on documented reliability of criteria utilized.
Timeline: December, 1999 Who: EMS Staff

4.2 Conduct field trials of the triage criteria prior to final implementation.
Timeline: October, 1999 Who: EMS Staff

4.3 Implement a system component that will allow for retrospective review of patient destination, evaluating the accuracy or appropriateness of triage guidelines. (Refer to recommendation #6.)
Timeline: December, 1999 Who: EMS Staff

4.4 Provide training materials for system personnel regarding triage and patient destination criteria.
Timeline: October, 1999, ongoing Who: EMS Staff

4.5 Develop and begin implementation of trauma transfer criteria.
Timeline: July, 2000 Who: EMS Office

Recommendation #5: That the Marin county trauma system utilize trauma center facilities which will be established in the following manner: contractual arrangements with Level I, Level II and other specialty centers located outside of Marin County; designation of acute care facilities in Marin County at the III or EDAT levels with the standard for a Level III facility modified to require the availability of a neurosurgeon.

Objectives:

5.1 With approval of the Trauma System Plan, formalize the recommended Trauma Center Standards and the trauma center selection process.
Timeline: June, 1999 Who: EMS Staff

5.2 Issue an RFP for trauma center designation.
Timeline: July, 1999 Who: EMS Staff

5.3 Designate and contract with appropriate trauma facilities; contract with non-designated facilities that will receive injured patients.
Timeline: December, 1999 Who: EMS Staff

5.4 Identify necessary specialty center linkages and assure that contractual linkages are created and incorporated into the trauma system plan.
Timeline: December, 2000 Who: EMS Staff

Recommendation #5a: That the issue of establishment of helipads or EMS Landing Sites be evaluated one year after the designation of centers in Marin County has occurred. Prospective collection of trauma registry data will continue and be utilized in that evaluation process.

Objectives:

5a.1 Monitor transport issues utilizing the Prehospital Care Information System and Trauma Registry data.
Timeline: Ongoing Who: EMS Office

5a.2 No later than one year following designation of in-county center(s) provide an evaluation of the need for a hospital-based or near hospital-based helipad or EMS Landing Zone, including the impact on patient destination during the preceding period.

Timeline: December, 2000 Who: EMS Office

5a.3 Work collaboratively, utilizing the assistance of an independent facilitator, with neighborhood, hospital and prehospital care agencies to achieve the establishment of a limited number of appropriate landing areas including:

- Clear standards for use;
- Defined collaborative methods for review and evaluation of policies, utilization and patient impact;
- Periodic evaluation to address global issues and planning; and
- Sanctions for violation of approved procedures.

Timeline: February 2002 Who: EMS Office

Recommendation #6: That the system include a comprehensive quality improvement monitoring program to assure appropriate access, utilization of resources, triage, transport and treatment of the trauma patient. *A report shall be provided to the Board of Supervisors on an annual basis for consideration of amendments to the plan on each of the first three anniversaries following implementation and thereafter at intervals deemed appropriate by the Board.*

Objectives:

6.1 Expand the Marin County Prehospital Care Information System to capture appropriate trauma data in the prehospital setting.
Timeline: January, 1999 (completed) Who: EMS Office

6.2 Approve and contractually implement a countywide trauma registry including standardized data collection, reporting and analysis.
Timeline: April, 1999 Who: Hospitals

6.3 Coordinate quality improvement activities to include all aspects of the system and all agencies that treat or receive patients injured in Marin County.
Timeline: June, 2000 Who: EMS Staff

6.4 Schedule and develop initial and ongoing education of system participants related to trauma care, recommend and develop requirements for same.
Timeline: December, 1999 Who: EMS Staff, Medical Directors

6.5 Develop a countywide Trauma System Quality Improvement Program that will identify specific tasks and outcomes to be accomplished and designate the timing of those activities and persons or agencies responsible. The program will include the following:

- System overview and demand data
- Trauma plan compliance (macro to micro analysis as appropriate)
- Trauma triage validation
- Trauma center standards validation
- Financial overview and impact of injury and injury care
- Topic specific and patient centered audits and outcomes analysis
- Best practice reviews and comparisons
- System and provider outcomes analysis
- Annual report of system impact and achievements
- Periodic system re-review by independent agency
- Sanctions for noncompliance with system standards

Timeline: July, 2000 Who: EMS Staff

6.6 Perform review and countywide monitoring as approved in the plan through:

- Trauma registry data review (see 6.2)

- Internal trauma center audits
- Special studies as necessary
- Periodic county staff site visits
- Re-designation/site survey process

Timeline: Ongoing Who: EMS Staff, Providers

6.7 Study, monitor, evaluate and modify trauma system components to assist with the financial stability of the trauma system. Evaluate the following and review as appropriate:

- system costs
- provider costs
- system funding alternatives
- provider funding alternatives
- preferential funding options for system participants and initiatives

Timeline: Ongoing Who: EMS Staff

6.8 Develop a managed care task force to study and make recommendations on the needs, mutual objectives, and policy issues relevant to the trauma system.
Timeline: January, 2001 Who: EMS Staff

Recommendation #7: That the system includes a specific focused injury control program sensitive to the special needs/epidemiology of Marin County.

Objectives:

7.1 Identify and review sources of data providing information about injury in Marin County and select those to be utilized; evaluate Marin-specific injury issues.
Timeline: October, 1999 Who: EMS Staff

7.2 Define and identify benchmarks, including criteria that will indicate program success.
Timeline: December, 1999 Who: EMS Staff

7.3 Locate and identify current programs dealing with injury prevention, including all types of programs and all providers; reconcile current programs with identified needs.
Timeline: February, 2000 Who: EMS Staff

7.4 Design an injury prevention program to include the following: target strategies; suggested programs for target strategies; resource referrals; implementation timelines; and established review mechanisms to assure regular updating of the plan.
Timeline: June, 2000 Who: EMS Staff

7.5 Support the efforts of trauma centers, other EMS providers and injury prevention coalitions to implement target goals.
Timeline: Ongoing Who: EMS Staff

Recommendation #8: That the system includes provisions to integrate disaster/emergency preparedness with the trauma system.

Objectives:

8.1 Evaluate the specific impact of emergency incidents on the trauma system.
Timeline: October, 2000 Who: EMS Staff

8.2 Evaluate and address the interfaces between the Emergency Medical Response Plan, the Medical/Health DOC Plan, the Operational Area Disaster Plan, the Trauma System Plan and the hospital facility disaster plans.
Timeline: December, 1999 Who: EMS Staff

8.3 Require the use of the Standardized Emergency Management System (SEMS) by all system providers.
Timeline: July, 1999 Who: EMS Staff

8.4 Assess the need for interhospital communication options (e.g. CHORAL, Redinett) and, if indicated, adopt a system of radio communication for use during system overload and major emergencies.
Timeline: July, 2000 Who: EMS Staff, Hospitals

8.5 Monitor disaster program needs related to the treatment of trauma patients.
Timeline: Ongoing Who: EMS Staff

TRAUMA SYSTEM IMPLEMENTATION TIMELINE

Obj-ective	Activity	1999				2000				2001				2002			
Recommendation 1: Adoption of the System Plan																	
1.1	Recommend Board of Supervisors approval of the trauma system plan.	■															
1.2	Seek approval of the plan from the EMS Authority		■														
Recommendation 2: Designation of the Lead Agency																	
2.1	Develop staff functions, begin plan implementation.		■														
2.2	Seek on-going input from the EMCC and other appropriate entities.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
2.3	Determine need for additional subcommittees, task forces, ad hoc groups to achieve plan objectives.		■														
2.4	Assure availability of EMS program oversight to all components and groups performing tasks related to achieving plan objectives.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Recommendation 3: System Access and Dispatch																	
3.1	Evaluate the availability of rapid and consistent system access to citizens.							■									
3.2	Review and update EMD, EMS aircraft, trauma treatment guidelines as they relate to injured patients.			■													
3.3	Develop a single medical dispatch center.															■	
3.4	Consistently apply dispatch guidelines and allocation of resources.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Recommendation 4: Triage, Transport, Destination Choice																	
4.1	Finalize countywide standard for trauma triage.				■												
4.2	Conduct field trials of triage criteria				■												
4.3	Implement component to allow retrospective review of patient destination, evaluate accuracy/appropriateness of triage guidelines.				■												
4.4	Provide training materials for system personnel re triage and destination criteria.				■	■	■	■	■	■	■	■	■	■	■	■	■
4.5	Develop and begin implementation of trauma transfer criteria							■									
Recommendation 5: Designation of Trauma Centers																	
5.1	Formalize trauma center standards and trauma center selection process.		■														
5.2	Issue an RFP for trauma center designations.			■													
5.3	Designate and contract with appropriate trauma facilities; contract with non-designated facilities that will receive injured patients.				■												
5.4	Identify specialty center linkages and assure that contractual linkages are created and incorporated into system plan				■												
Recommendation 5a: Helipad and/or EMS Landing Sites																	
5a.1	Monitor transport issues using the Prehospital Care Information System and the Trauma Registry Data.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Obj-ective	Activity	1999				2000				2001				2002			
5a.2	Provide an evaluation of the need for hospital-based or near hospital-based helipad or EMS Landing Sites, including impact on patient destination during preceding period.								■								
5a.3	Work collaboratively to achieve/establish appropriate helipad/landing sites.									■							
Recommendation 6: Quality Improvement Process																	
6.1	Expand the Prehospital Care Information System to capture appropriate trauma data in the prehospital setting.	■															
6.2	Approve and implement a countywide trauma registry.		■														
6.3	Coordinate quality improvement activities to include all aspects of the system and all agencies who treat or receive patients injured in Marin County.						■										
6.4	Schedule and develop initial and ongoing educational needs of the system participants related to trauma care, recommend and develop requirements for same.				■												
6.5	Develop countywide trauma system CQI program.							■									
6.6	Perform review and countywide monitoring as approved in the plan.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6.7	Study, monitor, evaluate and modify trauma system components to assist with the financial stability of the trauma system.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
6.8	Develop a managed care task force to study and make recommendation on the needs, mutual objectives, and policy issues relevant to the trauma system.									■							
Recommendation 7: Injury Prevention																	
7.1	Identify and review sources of data providing information about injury in Marin County and select those to be utilized; evaluate Marin-specific injury issues.				■												
7.2	Define and identify benchmarks, including criteria that will indicate program success.				■												
7.3	Locate and identify current programs dealing with injury prevention, including all types of programs and all providers; reconcile current programs with identified needs.					■											
7.4	Design an injury prevention program to include target strategies, suggested programs for target strategies, resource referrals, implementation timelines and establish review mechanisms to assure regular updating of the plan.						■										
7.5	Support the efforts of trauma centers, other EMS providers and injury prevention coalitions to implement target goals.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Recommendation 8: Disaster Preparedness																	
8.1	Evaluate the specific impact of emergency incidents on the trauma system.								■								
8.2	Evaluate and address the interfaces between the Emergency Medical Response Plan, the Medical/Health DOC Plan, the Operational Area Disaster Plan, the Trauma System Plan and the hospital facility disaster plans.				■												
8.3	Require the use of the Standardized Emergency Management System by all system providers.			■													
8.4	Assess the need for interhospital communication options (e.g. CHORAL, Redinett) and adopt a system of radio communication for use during system overload and major emergencies.							■									
8.5	Monitor disaster program needs related to the treatment of trauma patients.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

FISCAL IMPACT

Implementation of the proposed Trauma System Plan requires significant commitment on the part of all of the agencies involved. Hospital and provider staff at all levels will be expected to participate in educational programs and working groups to assure that appropriate tools are available within the system and that all personnel receive appropriate education in the enhanced care to be provided to victims of trauma. Some portions of the plan require on-going efforts—data collection and interpretation, evaluation of care provided, and injury prevention efforts will all be long-term activities. Each participating agency will be required to make the commitments necessary to achieve the desired system and will individually fund or seek funding to support the necessary activities.

The following is a list of expected cost-items:

Facilities seeking designation

- Assessment of upgrades necessary to meet desired designation level
- Preparation of response to Request for Proposal
- Implementation of the necessary upgrades
- Fee for designation application
- Initial and on-going education for facility staff
- Costs related to maintaining standards required for designation
- Staff participation in on-going CQI and planning committee efforts

Facilities not seeking designation

- Assessment of costs necessary to participate as a basic ED receiving injured patients
- Education for facility staff
- Staff participation in on-going CQI and planning committee efforts

Prehospital care provider agencies

- Additional initial and on-going education for staff
- Staff participation in on-going CQI and planning committee efforts

EMS Program

- Additional staff requirements to oversee and support implementation activities
- Additional staff requirements to oversee and support CQI program, including data collection

There are no published cost figures for the establishment of Level III or EDAT facilities. Costs will vary significantly and depend on current capabilities as well as existing contractual commitments and availability of resources. The Abaris Group estimates, in addition to start-up costs, new costs of $100,000-350,000 per year to establish a Level III facility, with an EDAT upgrade costing about half of that amount. The percentage of these new costs that will be offset by new revenue sources will vary according to volume and payer mix.

The cost of providing survey teams (refer to section D) will be met with fees paid by hospitals seeking and maintaining designation and are estimated to be $10,000 per facility per year.

Trauma Registry software is in place at all three facilities in Marin and is not expected to require additional funding at this time.

The County of Marin's EMS Program is expected to add a Trauma Nurse Coordinator at 1.0 F.T.E. to provide staff support and oversight for trauma system related activities. Injury prevention activities are expected to require an additional 0.5 F.T.E., to be shared with other programs within the Department of Health and Human Services.

As part of the Quality Improvement Process, the cost to hospitals for providing trauma care and the costs to the patient who receives that care will be tracked, allowing the system to further evaluate the provision of trauma services and to modify system components when appropriate.

EMS Program staff will be involved in the redrafting or update of all policies and procedures related to the operation and implementation of the trauma system.

APPENDIX A

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APPENDIX B

GLOSSARY

The following terms and abbreviations may be used throughout this plan. The definitions are provided for clarification and an enhanced understanding of trauma systems.

Activation of the Trauma System: Procedure whereby a prehospital provider or hospital identifies an individual with significant trauma (by using the trauma triage guidelines) and resources (prehospital and hospital) are mobilized to care for the patient in accordance with established procedures.

Advanced Life Support (ALS): Services designed to provide definitive prehospital emergency medical care including, but not limited to, cardiopulmonary resuscitation, cardiac monitoring, cardiac defibrillation, advanced airway management, intravenous therapy, administration of specified drugs and other medicinal preparations, and other specified techniques and procedures administrated by authorized personnel under the direct supervision of a hospital as part of a local EMS system at the scene of an emergency, during transport to an acute care hospital, during interfacility transfer, and while in the emergency department of an acute care hospital until the responsibility is assumed by the emergency or other medical staff in that hospital.

Approved: As used in this plan, indicates that the item in question has met standards prescribed by the Department of Health and Human Services.

Attending Surgeon: A physician who is Board certified or Board eligible in general surgery and who has surgical privileges delineated by the facility's medical staff. The attending surgeon is responsible for the care of the trauma patient, participates in all major therapeutic decisions and is present during operative procedures.

Board Certified or Board Eligible: Board certified is successful application by the physician specialist with the appropriate Board specialty recognized by the American Board of Medical Specialties, the Advisory Board for Osteopathic Specialties, a Canadian board, or other appropriate foreign board. All physician specialists are expected to be Board certified or Board eligible in the specialty of practice unless otherwise specified in this document.

Catchment Area: Service area of a trauma center established by the County.

Continuing Medical Education (CME): Ongoing education subsequent to initial certification or licensure for the purpose of maintaining and enhancing medical skills and knowledge.

Continuous Quality Improvement (CQI) Program: An organized method of evaluating and improving care provided with the use of the quality continuum system.

Department: The Marin County Department of Health and Human Services.

Designated Trauma Center: An institution holding a Level I, II, III, or an Emergency Department Approved for Trauma (EDAT) designation.

Designation: A formal determination made by the Department as authorized by state regulation, that a hospital or health-care facility meets the criteria for providing designated trauma center services.

Designated trauma patient: A patient who meets the approved trauma triages criteria and is therefore managed as stipulated in these regulations.

Director: The Director of the Marin County Department of Health and Human Services.

Dispatch Center: The location from which an emergency response is designated and directed.

E-code: The external cause code, which is an etiology included in the International Classification of Diseases (ICD).

EDAT: An Emergency Department Approved for Trauma, which is an emergency department that has made additional commitments for the care of the trauma patient as specified in Appendix E.

Emergency Department (ED): A licensed health care institution that offers emergency medical services, is staffed twenty-four hours a day, has specialty physicians on call and holds a Title XXII permit as Basic.

Emergency Medical Dispatch (EMD): The use of personnel trained to state and national standards on emergency medical dispatch techniques including call screening, resource priority and pre-arrival instruction.

Emergency Medical Services (EMS): Those services utilized in responding to a medical emergency.

EMS Landing Site: "A site used for the landing and taking off of EMS helicopters that is located at or as near as practical to a medical emergency or at or near a medical facility and has been designated an EMS landing site by an officer authorized by a public safety agency…using criteria that the public safety agency has determined is reasonable and prudent for the safe operation of EMS helicopters and is used, over any twelve month period, for no more than an average of six landings per month with a patient or patients on the helicopter, except to allow for adequate medical response to a mass casualty event even if that response causes the site to be used beyond these limits; is not marked as a permitted heliport…and is used only for emergency medical purposes." (California Code of Regulations, Title 21, Section 3527)

EMS Medical Director: A physician contracted by the Department of Health and Human Services to provide medical control and assure medical accountability throughout the planning, implementation and evaluation of the EMS system.

<u>EMS Program</u>: The Marin County EMS Program in the Division of Health Services, Department of Health and Human Services.

<u>EMS System</u>: The specially organized arrangement which provides for the personnel, facilities, and equipment for the effective and coordinated delivery in an EMS area of medical care services under emergency conditions.

<u>Facility Patient Care Protocols</u>: The written procedures adopted by the medical staff that directs the care of the patient. These procedures shall be based upon the assessment of the patient's medical needs. As relates to trauma patients, the procedures shall follow minimum countywide standards for trauma care service.

<u>First Responder</u>: In this document, refers to fire agency engine company personnel, usually trained to an EMT-I level, usually the first to arrive at the scene of an injury or illness.

<u>Heliport</u>: An area of land, water, or structure used or intended to be used for the landing and takeoff of helicopters.

<u>Hospital Trauma Service</u>: A service designed by the hospital within state guidelines for the treatment of trauma patients, including a formal commitment by the hospital and medical staff to an organized trauma system and to participation in the regional/county system.

<u>ICD</u>: The International Classification of Diseases that is a coding system developed by the World Health Organization.

<u>ICU</u>: An intensive care unit.

<u>Immediately Available</u>: The physical presence of the health professional in the stated location at the time of need by the trauma patient that is continuously monitored by the quality improvement process. The professional must be: (a) unencumbered by conflicting duties or responsibilities; (b) responding without delay when notified; and (c) within the specified area of the trauma center when the patient is delivered in accordance with approved policies and procedures. Refer to "*Promptly Available*".

<u>Indicator</u>: A quality improvement tool or performance measure used to monitor the quality of important governance, management, clinical and support processes and outcome.

<u>Indicator Monitoring System</u>: A method in which indicators are used to monitor important processes or outcomes of care or service and indicator data are used to evaluate that care.

<u>Injury Prevention</u>: Any combination of educational, legislative, enforcement, engineering and emergency response initiatives used to reduce the number and severity of injuries.

<u>Injury Severity Score (ISS)</u>: An index developed by the Association of Automotive Medicine to objectively rate the severity and impact of injuries and predict potential patient outcome with a higher score indicating greater severity of injury and an decreased probability of survival. See discussion, item 5, Appendix C.

Level I Trauma Center: Trauma center services specific to the teaching and research environment as specified by California Title XXII. A Level I trauma center is expected to provide leadership and total care for every aspect of injury from prevention, outreach to rehabilitation.

Level II Trauma Center: Trauma center for initial definitive care as specified by California Title XXII. At a minimum, meets the criteria for a Level II center as listed in Appendix E. A Level II trauma center is expected to provide initial resuscitation and ongoing care for all but the most complicated cases.

Level III Trauma Center: Trauma center that provides initial assessment, resuscitation and emergency surgery and stabilization as specified by California Title XXII. Anatomically or physiologically impaired trauma patients would usually be overflown to the Level II facility. Refer to Appendix E.

Medical Control: The oversight functions provided by the EMS medical director, hospital physicians and the appropriate committees assigned to this function.

Medical Record: Any patient record including clinical records, prehospital care records, medical reports, laboratory reports and statements, any file, film, record or report or oral statements relating to diagnostic findings, treatment or outcome of patients, whether written or recorded, and any information from which a patient or the patient's family might be identified.

Paramedic Unit: An ambulance or first-responder unit staffed and equipped to provide advanced life support at the scene of a medical emergency or during transport of a patient(s) and designated as a paramedic unit by the Medical Director.

Pediatric Trauma Patient: Trauma patients who are known or estimated to be less than fifteen years of age.

Promptly Available: The physical presence of the health professional in the stated location within a short period of time, which is defined by the trauma system and continuously monitored by the quality improvement process. Refer to "*Immediately Available*".

Public Education/Prevention: The education of the population at large, targeted groups or individuals and efforts to alter specific injury-related behaviors.

Rehabilitative Services: A formal program of multi-disciplinary, coordinated and integrated services for evaluation, treatment, education and training to help individuals with disabling impairments achieve and maintain optimal functional independence in physical, psychosocial, social, vocational and avocational realms.

Trauma Center: Any acute-care hospital that provides immediately available 24-hour daily-dedicated trauma surgical services and is so designated by the appropriate agency.

Trauma Hospital: Any acute-care hospital that is recognized and contracted by the Marin County EMS Office as a Level III or EDAT based on criteria provided in the County's approved Trauma Plan.

Trauma Registry: Data collected by the Department on trauma patients and on the incidence, causes, severity, outcomes and operation of a trauma system and its components.

Trauma Program: A trauma program is those collective trauma services, functions and activities of a hospital that are identified by the hospital as required to meet and maintain the appropriate level of trauma designation according to the approved Marin County Trauma System Plan.

Trauma System: An integrated and organized arrangement of health care resources designed to meet the needs of all injured patients.

Trauma Clinical Services: The prehospital coordination, hospital resuscitation, hospital inpatient treatment, rehabilitation and follow-up medical care services for designated trauma patients which are the responsibility of the designated trauma center and the appropriate physician specialist as defined by this plan.

Trauma Committee: The trauma committee is a multi disciplinary hospital sponsored committee which meets regularly to provide input to the trauma program and to the hospital's administrative and medical staff.

Trauma Director: A Board certified or Board eligible surgeon who is responsible for the overall medical care system for trauma patients at a designated trauma center.

Trauma Nurse Coordinator: An R.N. with experience, special training and certification who is assigned by a trauma hospital to manage the requirements as provided for in this plan and to provide trauma program coordination, leadership and direction according to an approved job classification.

Trauma Resuscitation Nurse: An R.N. with experience, special training and certification in the treatment of the trauma patient who is assigned to the trauma team to manage trauma patients within the trauma hospital setting.

Trauma Surgeon: A physician who is Board certified or Board eligible in general surgery and who has trauma surgery privileges delineated by the facility's medical staff.

Trauma Triage Criteria: The trauma triage decision scheme that is part of the approved trauma system plan.

Triage: The sorting of patients in terms of disposition, destination or priority. Triage of prehospital trauma victims includes identifying injury severity so that the appropriate care level can be readily accessed according to established guidelines.

Triaged Trauma Patient: A patient identified in the field, by a transferring hospital or by a contracted trauma hospital as meeting the system plan criteria for inclusion in the trauma system.

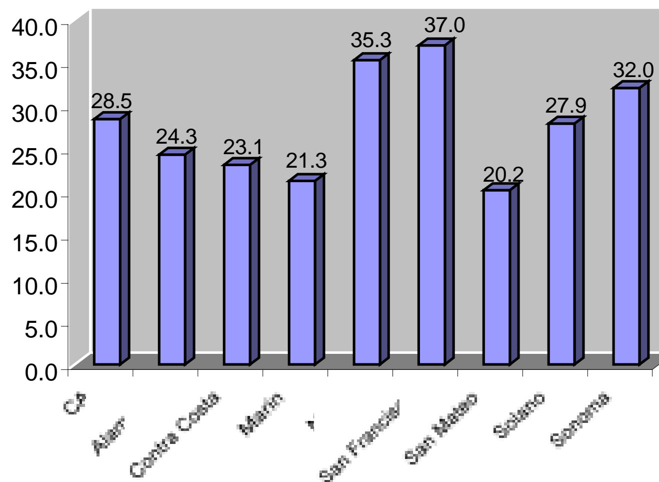
APPENDIX C

STATISTICAL INFORMATION

1. *The death rate from unintentional injuries in Marin County is less than the average in surrounding counties and less than in the state as a whole.*

In 1996, the death rate per 100,000 from unintended injuries in Marin County was 21.3. This is below the rate for California (28.5) and almost all the counties surrounding Marin.

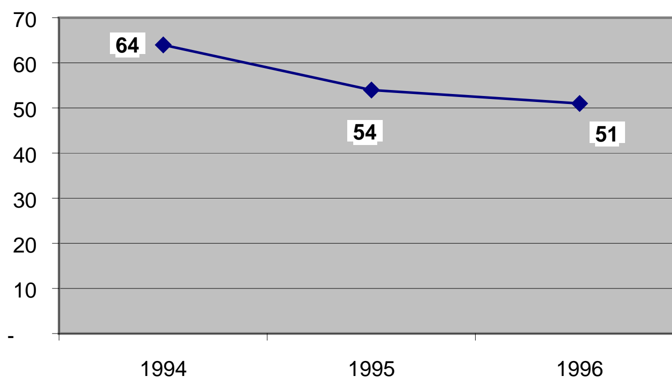
Death Rates from Unintended Injuries by County, 1996



Source: CA Department of Health Services, Death Records.

The number of deaths from unintended injuries has been declining in Marin County since 1994. Deaths that occur up to one year following the injury are included.

Marin County, Deaths from Unintentional Injuries

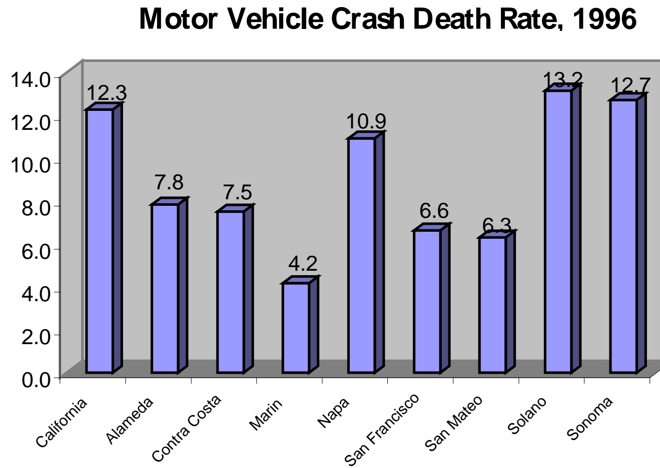


Source: CA Department of Health Services, Death Records.

2. *Marin County has the lowest motor vehicle crash death rate amongst all surrounding counties in the Bay Area.*

The motor vehicle crash death rate per 100,000 in 1996 for Marin County (4.2) is substantially lower than the comparable rate for California (12.3). It is the lowest amongst the seven surrounding counties.

Motor Vehicle Crash Death Rate, 1996

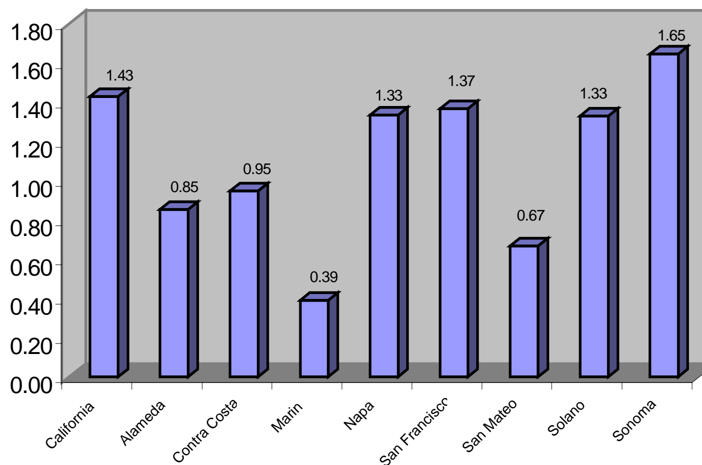


Source: Dept. of California Highway Patrol

3. *In 1996, Marin County had the lowest death rate per 100,000 vehicle miles driven.*

The death rate per vehicle miles driven was lowest for Marin County, compared to the surrounding counties. It is also significantly lower than the state's rate.

Death Rate per 100,000 Vehicle Miles Driven by County, 1996

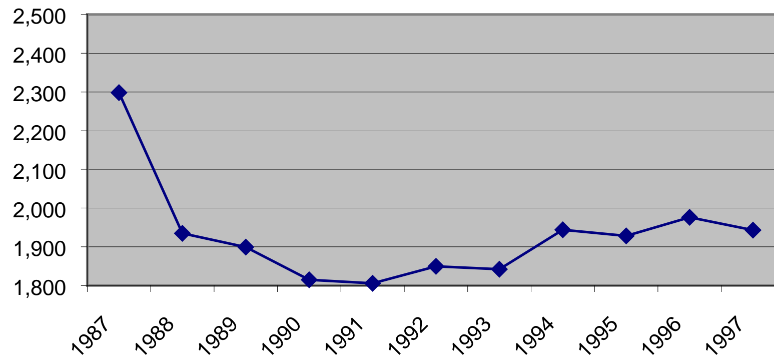


Source: Dept. of California Highway Patrol & CA Dept. of Transportation

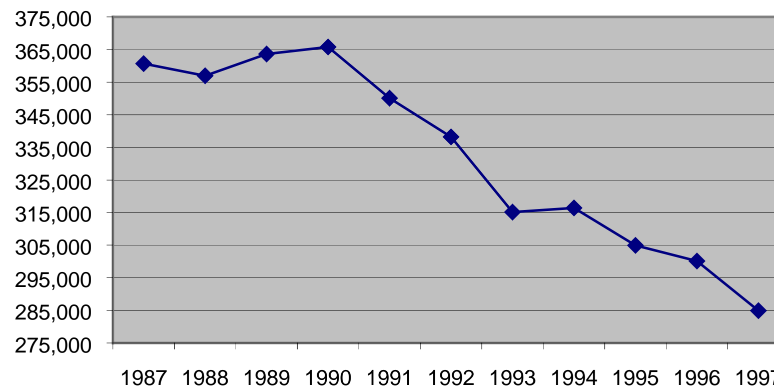
4. *Although the death rate is low, the trend in the total number of persons injured in motor vehicle crashes is rising in Marin County while the reverse is true for the state as a whole.*

From 1993 -1997 the number of persons injured in motor-vehicle crashes in California has substantially dropped (9.6 percent). During that same time period the number of persons injured in Marin County has risen by 5.5 percent. While the number of 1997 Marin County injuries dropped by 33 cases from 1996, the total Marin County injuries during 1997 still represents approximately 100 more cases per year than were injured in 1993.

Marin County, Persons Injured in Motor Vehicle Crashes



California, Persons Injured in Motor Vehicle Crashes



Source: Dept. of the California Highway Patrol

5. *To determine the expected number of patients in the Marin County system and the severity of their injury, the following analysis of 1993 and 1996 trauma admissions in Marin is presented.*

Marin County
Hospital Admissions by
Injury Severity Level, 1993 & 1996

Injury Severity of Patients	**Admitted to Local Hospitals**	
	1993	**1996**
ISS < 9 (Minor)	757	638
ISS = 9-15 (Moderate)	196	204
ISS = 16-24 (Major)	68	70
ISS >= 25 (Severe)	19	15
Total	1,040	927

Source: CA Hospital Discharge Dataset Study, The Abaris Group

All hospital discharges for the ICD codes N850-N959 were identified through purchase of data from the Office of Statewide Health Planning. Injuries due to late effects (N909) and burns (940-949) were excluded.

Injury severity scores were determined using a computerized mapping system applying scores to ICD codes using the technique described by MacKenzie (refer to References, Appendix A, page 24).

Injuries caused by other than external causes were then excluded from the sample. An example of excluded injury would be pathological (spontaneous) fractures caused by an illness. Another 10% of patients were excluded because their "injury score" was less than 4 (isolated injury to a single body area) or because they did not fall into one of 12 patient management categories. The most common exclusion was patients admitted for back sprains with unknown etiology.

ICD codes were assigned predetermined scores and a total Injury Severity Score (ISS) determined by the sum of the highest injury score in each body area. Scores range from 0 to 75, with higher numbers indicating more severe injuries and 75 being fatal. The higher the ISS, the more likely that the patient will benefit from treatment in a designated trauma center.

It should be noted that the ISS is a retrospective tool used to identify the injury severity of trauma cases. It is used here to provide an overall review of the severity of injury in injured patients hospitalized in Marin County for the two years presented. 1996 was the most recent year for which data was available, 1993 is used to provide a balance and was chosen at random.

6. *Estimates of patient distribution according to the proposed triage guidelines and center designations show few patients would have qualified for Level II center care in 1997.*

Injured Patients Receiving ALS Care, 1997
Projected Triage According to Proposed Trauma System

	Proposed System
Level II	46
Level III	86
EDAT	120
ED	532
Total	784

Using data from the Marin County Prehospital Care Information System, the triage guidelines recommended in the Trauma System Plan were applied to all patients who received paramedic level of care in the prehospital setting. The goal was to impartially determine the number of trauma patients that would have "qualified" for care at the various levels of trauma centers in 1997.

Records were selected from the Prehospital Care Information System according to Patient type (Trauma), Mechanism of Injury field not blank, Advanced Life Support skill(s) utilized (paramedic level of care), patient transported to a hospital, destinations within and outside of Marin County.

A state-licensed paramedic, not employed in Marin County, was retained to review the individual patient care records. He was asked to apply the proposed Triage Guidelines, determining the appropriate level of care for the patient based on the record. For the purpose of this evaluation, availability of air resources, conditions precluding their use and time variables in the triage guideline were not considered, although they would affect destination under real conditions.

The determination of appropriate level was based on field assessment and was not directly related to any hospital data, including ED outcomes, discharge information, or ISS scoring. Determination was not made with any follow-up information available.

The chart reflects the distribution of 784 patients injured in Marin and transported, with paramedic level care, to a hospital.

This distribution underestimates in the following ways:

- Some additional patients treated with only basic skills might have qualified, due to mechanism of injury or because they were a "high risk patient", for transport to an EDAT.

- Some additional patients treated with only basic skills might have qualified, due to "paramedic judgment" for transport to a Level III center, but if so, should have been identified through the current Continuous Quality Improvement System in place as needing ALS skills. No patients were so identified.

7. *The hospital destination distribution of injured patients in 1997 (information from the Prehospital Care Information System) was as follows:*

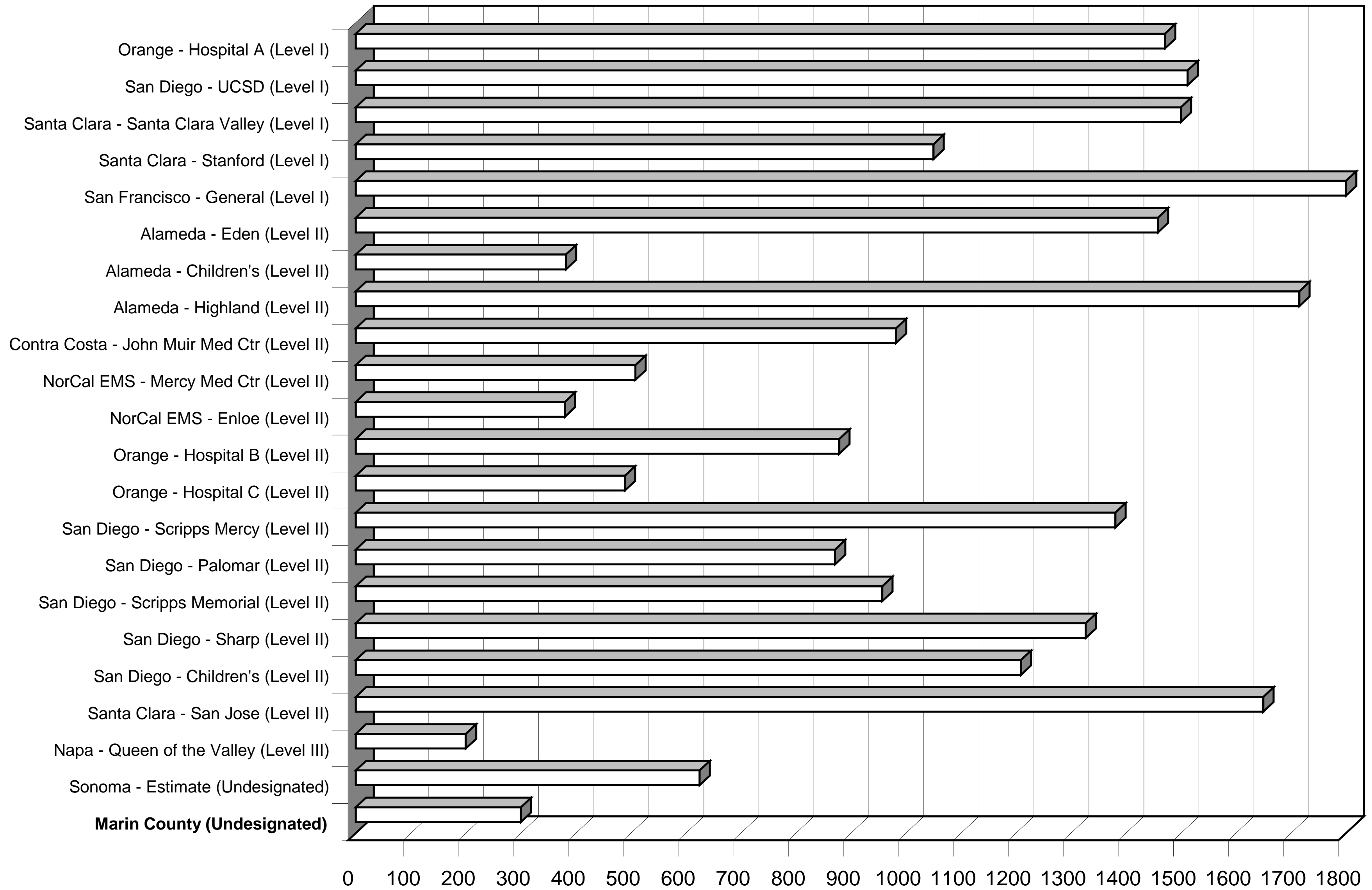
Marin General Hospital	59%
Kaiser San Rafael Hospital	25%
Novato Community Hospital	14%
Transported out of county	2%

8. *The number of injured patients expected to be treated at designated centers can be compared with volumes at designated trauma centers in other California counties.*

   Of the centers listed, only five are noted to have volumes less than 500 per year. One of these (Childrens' Hospital in Alameda County) is a Pediatric Trauma Center; and two (Mercy Medical Center and Enloe, both in the Nor-Cal EMS region) service predominately rural and isolated areas.

   The estimates for Marin County, based on the numbers previously indicated in this appendix, are that 250-300 patients per year would qualify for treatment in a Level II, Level III, or EDAT center.

Trauma Center Volumes, 1997



APPENDIX D

CONTRACTING/DESIGNATION PROCESS

I. Contracting and Designation Process

Following approval of the Trauma System Plan by the EMS Authority, the Department of Health and Human Services, through the EMS Program, will issue a request for proposals (RFP) for contracting or designation of trauma centers for the county. The RFP will include the following:

1. A description of the Marin County EMS and trauma system;
2. A description of the trauma center recognition and verification process;
3. A listing of trauma center/hospital criteria. Applicants will be required to describe their current compliance with these criteria or to indicate plans, including a time line, for compliance;
4. A list of trauma hospital conditions and requirements which the applicant will be required to accept;
5. If the hospital is contracted with, a proposed contract between the applicant hospital and the County will be completed. Applicants will be required to indicate acceptance of the contract or to submit alternative language for any clause which they are unwilling to accept;
6. A schedule of fees for trauma hospital application and trauma contracting and designation.

II. Request for Proposals Process

The RFP will be sent by registered, return-receipt-requested mail to all appropriate acute-care hospitals in the area. Any hospital that is interested in submitting a proposal will be required to indicate interest by submitting a statement of interest and by paying an application fee by a specified date and time (unless the fee was paid earlier). Thereafter, all communications regarding the process will be sent only to hospitals that have indicated their interest.

Hospitals will have up to 90 days to submit an original and the specified copies of their proposal to the EMS Office. The original will be sealed and stored by the EMS Office for use in any later challenge. EMS Office staff or their designee will review proposals for completeness and for compliance with process requirements. Applicants will be notified of any missing or non-compliant parts and will have approximately 14 days to submit or revise the item.

Approximately 30 days after submission of proposals, a site visit by a team of individuals will be conducted. The team will be knowledgeable with trauma systems and trauma center operations, will have no conflict of interest, and will be from outside of California (Level II centers), or outside Marin County (Level III and EDAT). The number and credentials of the survey team will be commensurate with

the level of designation or contract but may include: a trauma surgeon(s), emergency physician(s), trauma nurse coordinator(s), hospital administrator(s), EMS Office administrator(s) and other appropriate experts.

The site survey process may be abbreviated for trauma centers that have had a trauma center survey within 18 months.

The site visit will include objective confirmation of the information submitted as well as subjective evaluation of the hospital's capability and commitment to serve as a trauma center. The survey team will identify proposal strength and weakness according to the following categories:

1. Compliance with minimum standards
2. Quality and scope of service
3. Applicant's demonstrated commitment to the care of major trauma patients
4. Comprehensiveness
5. Cost effectiveness of the proposed service

III. Contract or Designation

Following the site visits, the site visit team will rank the applicants and the EMS Office will offer contracts to appropriate and designated Level II hospitals and the designation(s) to applicants for Level III and EDAT that best meet the needs of the county. If that applicant is willing to accept the proposed contract or has offered alternative language which is acceptable to the EMS Office the contracts and designations will be finalized.

The EMS Office's preliminary decision on designation may be appealed within 30 days of the announcement of the designation. Grounds for appeals are limited to alleged failure to follow the RFP process and criteria and conflicts of interest.

A specific appeals process will be prepared but in general, if an applicant appeals, and that appeal meets the determined minimum criteria for appeal then an appeal hearing officer will be appointed by the Department of Health and Human Services. The appeal hearing officer will be a person with appropriate expertise who is not connected with the respective trauma process. The hearing officer will review the facts and may schedule meetings with involved parties. The Director of the Department of Health and Human Services will review the findings of the appeal-hearing officer and render a decision that will be final.

IV. Possible Environmental Impact Report

This Trauma System Plan does not require any facility to implement services or facility adjuncts that would require the performance of an Environmental Impact Report (EIR). As part of a hospital’s effort to achieve designation, it is possible that an EIR might be required, in which case that EIR would be subject to any customary and usual state and local requirements.

APPENDIX E
Trauma Center Standards

	Trauma Facilities Criteria	Levels			
		I	II	III	EDAT*
		E= Essential D = Desired			
1	**Institutional Organization**				
2	Documented institutional medical staff, administrative and financial commitment and physical capacity at the program and volume level of designation.	E*	E*	E*	E
3	Trauma Program	E	E	E	D
4	Trauma Service	E	E	E	
5	Trauma Team	E	E	E	E
6	written protocols on makeup, skill set and expectations	E*	E*	E*	E
7	written triage, activation protocols and QI review plan	E*	E*	E*	E
8	Trauma Program Medical Director	E	E	E	D
9	Directed by a general surgeon who has demonstrated commitment, expertise and training with injured patients and is responsible for the overall clinical direction and management and administration of the trauma program.	E*	E*	E*	D
10	Trauma Multidisciplinary Committee	E	E	E	D
11	Trauma Coordinator	E	E	E	E
12	Has demonstrated expertise in trauma care by a minimum of 5 years of recent nursing experience in trauma system/care, or emergency departments, critical care or flight medicine.	E*	E*	D*	D
13	Minimum of 16 hours/year in trauma CE or related area, of which 4 hours/year in pediatric trauma and participates in the development implementation and monitoring of the trauma system at the local, state or national levels. Must have current TNCC or equivalent.	E*	E*	E*	D
14	Approved divert/redistribution plan.	E*	E*	E*	E
15	Approved plan for case management and managed care coordination	E*	E*	E*	-
16	Trauma team/staff credentialing process (including formal CEU procedures and plan of trauma service staff*).	E	E	E	E
17	**Hospital Departments/Division/Sections**				
18	Surgery	E	E	E	-
19	Neurological Surgery	E	E	E*	D
20	Neurosurgical Trauma Liaison	E	E	-	-
21	Orthopedic Surgery	E	E	E	D
22	Orthopedic Trauma Liaison	E	E	E	
23	Emergency Medicine	E	E	E	E
24	Anesthesia	E	E	E	D
25	**Clinical Capabilities**				
26	Published on call schedule	E	E	E	E
27	On call and immediately available 24 hours/day				
28	General Surgery	E	E	-	-
29	Published backup schedule	E	E	-	-
30	Dedicated to single hospital when on-call	E	E	-	-
31	Anesthesia	E	E	-	-
32	Emergency Medicine [1]	E	E	E	E
33	On call and promptly available 24 hours/day				
34	General Surgery	-	-	E	E
35	Published backup schedule	-	-	E*	E

36	Dedicated to single hospital when on-call	-	-	D	D
37	Anesthesia	-	-	E	E
38	Cardiac Surgery	E	D	-	-
39	Hand Surgery	E	E	D	-
40	Microvascular/replant Surgery	E	D	-	-
41	Neurologic Surgery	E	E	E*	-
42	Dedicated to one hospital or back-up call	E	E	D	-
43	Obstetrics/Gynecologic Surgery	E	E	D	-
44	Ophthalmic Surgery	E	E	D	-
45	Oral/Maxillofacial Surgery	E	E	D	-
46	Orthopedic Surgery	E	E	E	-
47	Call dedicated to a single hospital or back-up call	E	E	D	-
48	Plastic Surgery	E	E	E	D
49	Critical Care Medicine	E	E	D	-
50	Radiology [2]	E	E	E	E
51	Thoracic Surgery	E	E	D	-
52	**Clinical Qualifications**				
53	General/Trauma Surgeons				
54	Current Board Certification	E	E	E	D
55	16 hours CME/year (trauma related)	E	E	D	D
56	ATLS Completion	E	E	E	E
57	Peer Review Committee attendance >50%	E	E	E	-
58	Multidisciplinary committee attendance	E	E	E	-
59	Emergency Medicine				
60	Board Certification	E	E	E*	E
61	Trauma Education – 16 hours CME/year	E	E	E*	E
62	ATLS completion	E	E	E	E
63	Peer Review Committee attendance >50%	E	E	E	-
64	Multidisciplinary committee attendance	E	E	E	-
65	Neurosurgery				
66	Current Board Certification	E	E	D*	-
67	16 hours CME/year (trauma or neurotrauma related*)	E	E	D	-
68	ATLS completion	D	D	D	-
69	Peer Review Committee attendance >50%	E	E	E	-
70	Multidisciplinary committee attendance	E	E	E	-
71	Orthopedic Surgery				
72	Board Certification	E	E	D	-
73	16 hours CME in skeletal trauma (or trauma*) per year*	E	E	D	E
74	ATLS completion	D	D	D	-
75	Peer review committee attendance >50%	E	E	E	-
76	Multidisciplinary committee attendance	E	E	E	-
77	**FACILITIES/RESOURCES/CAPABILITIES**				
78	**Volume Performance**				
79	Trauma Admissions 1,200	E	-	-	-
80	Patients with ISS > 15 (35 cases per surgeon)	E	-	-	-
81	**Emergency Departments**				
82	Personnel				
83	Designated physician director	E	E	E	E
84	Presence of surgeon at resuscitation				
85	immediately available	E	E	-	-

86	promptly available	-	-	E	E
87	Trauma resuscitation/ED nurses				
88	at least two in the ED at all times	E*	E*	D*	-
89	at least one in the ED at all times	-	-	E*	E
90	TNCC, ATCN or equivalent, orientation to role. Participates in TQI, 6 hours/year trauma and pediatric CE.	E*	E*	E*	E
91	Trauma social worker or crisis intervention based on an approved hospital protocol.	E*	E*	E*	D
92	Trauma Resuscitation Room – Dedicated	E*	E*	D*	-
93	Trauma Resuscitation Room – Designated	-	-	E*	E
94	Equipment for resuscitation for patients of all ages				
95	Airway control and ventilation equipment	E	E	E	E
96	Pulse oximetry	E	E	E	E
97	Suction devices	E	E	E	E
98	Electrocardiograph-oscilloscope-defibrillator	E	E	E	E
99	Internal paddles	E	E	E	E
100	CVP monitoring equipment	E	E	E	E
101	Standard IV fluids and administration sets	E	E	E	E
102	Large bore intravenous catheters	E	E	E	E
103	Sterile surgical sets for				
104	Airway control/Cricothyrotomy	E	E	E	E
105	Thoracostomy	E	E	E	E
106	Venous cutdown	E	E	E	E
107	Central line insertion	E	E	E	E
108	Thoracotomy	E	E	E	E
109	Peritoneal lavage	E	E	E	E
110	Arterial catheters	E	E	D	D
111	Ultrasound	D	D	D	D
112	Drugs necessary for emergency care	E	E	E	E
113	X-ray availability 24 hours/day	E	E	E	E
114	Cervical traction devices	E	E	E	E
115	Broselow tape	E	E	E	E
116	Thermal control equipment				
117	For patient	E	E	E	E
118	For fluids and blood	E	E	E	E
119	Rapid infuser system	E	E	E	E
120	Qualitative End-tidal CO2 determination	E	E	E	D
121	Designated and authorized helicopter landing zone	D*	D*	D*	D
122	Communication with EMS vehicles	E	E	E	E
123	**Operating Room**				
124	Immediately available 24 hours/day[3]	E	D	D	D
125	Personnel				
126	In-house 24 hours/day	E	E*	-	D
127	Available 24 hours/day	-	-	E	D
128	Presence of surgeon at operative procedures	E	E	E	-
129	Age Specific Equipment				
130	Cardiopulmonary bypass	E	D	-	-
131	Operating microscope	E	E*	D	-
132	Thermal Control Equipment				
133	For patient	E	E	E	E

134	For fluids and blood	E	E	E	E
135	X-ray capability including C-arm image intensifier	E	E	E	E
136	Endoscopes, bronchoscope	E	E	E	E
137	Craniotomy instruments	E	E	D	D
138	Equipment for long bone and pelvic fixation	E	E	E	E
139	Rapid infuser system	E	E	E	E
140	**Postanesthetic Recovery Room (SICU is acceptable)**				
141	Registered nurses available 24 hours/day	E	E	E	E
142	Equipment for monitoring and resuscitation	E	E	E	E
143	Intracranial pressure monitoring equipment	E	E	D	E
144	Pulse oximetry	E	E	E	E
145	Thermal control	E	E	E	E
146	**Intensive or Critical Care Unit for Injured Patients**				
147	Registered nurses with trauma education (as identified by the hospital and formal orientation to the trauma service*).	E	E	E	D
148	At least 8 CEUs in trauma or trauma related subjects each year for nurses responsible for trauma patient care.	E*	E*	E*	E
149	Designated surgical director or surgical co-director	E	E	E	D
150	Surgical ICU service physician in-house 24 hours/day (dedicated or available through Approved protocols)	E	D	D	D
151	Surgically directed and staffed ICU service	E	D	D	-
152	Equipment for monitoring and resuscitation	E	E	E	E
153	Intracranial monitoring equipment	E	E	-	E
154	Pulmonary artery monitoring equipment	E	E	E	E
155	**Respiratory Therapy Service**				
156	Available in-house 24 hours/day	E	E	D	D
157	On call 24 hours/day	-	-	E	D
158	**Radiology Services**				
159	Available in-house radiology technician	E	E	D	D
160	Angiography	E	E	D	D
161	Sonography	E	E	E	E
162	Computerized tomography	E	E	E	E
163	In-house CT technician	E	D	-	D
164	Magnetic Resonance Imaging	E	D	D	-
165	**Clinical Laboratory Service Available 24 hours/day**				
166	Standard analyses of blood, urine, and other body fluids including micro sampling when appropriate	E	E	E	E
167	Blood typing and cross-matching	E	E	E	E
168	Coagulation studies	E	E	E	E
169	Comprehensive blood bank or access to a community central blood bank and adequate storage facilities	E	E	E	E
170	Blood gases and pH determination	E	E	E	E
171	Microbiology	E	E	E	E
172	Drug/alcohol screening	E*	E*	E*	E
173	In-house technologist and promptly available	E*	E*	E*	E
174	**Acute Hemodialysis**				
175	In-house	E	D	-	-
176	Transfer agreement	-	E	E	E
177	**Burn Care - Organized**				
178	In-house or transfer agreement with Burn Center	E	E	E	E

179	**Acute Spinal Cord Management**				
180	In-house or transfer agreement with Regional Acute Spinal Cord Injury Rehabilitation Center	E	E	E	E
181	**Rehabilitation Service**				
182	In house service or transfer agreement to an Approved (*)rehabilitation	E	E	E	D
183	Physical therapy	E	E	E	E
184	Occupational therapy	E	E	D	E
185	Speech therapy	E	E	D	D
186	Social Service	E	E	E	E
187	**Replantation Services**				
188	In-house or transfer agreement with replantation service	E	E*	E*	E
189	**Performance Improvement**				
190	Performance improvement programs	E	E	E	E
191	Trauma Registry				
192	In-house	E	E	E	E
193	Participation in state, local, or regional registry (including the use of an Approved registry software program*)	E	E	E	E
194	Orthopedic Database	D	D	-	-
195	Formal trauma process improvement plan with identified measures (process and outcomes) and feedback and closure loop.	E*	E*	E*	E
196	Periodic reports in a format and with detail specified and submitted to the appropriate state and regional agencies	E*	E*	E*	E
197	Audit of all trauma deaths	E	E	E	E
198	Morbidity and mortality review	E	E	E	E
199	Trauma conference – multidisciplinary	E	E	E	D
200	Medical nursing audit	E	E	E	E
201	Review of prehospital trauma care	E	E	E	E
202	Review of times and reasons for trauma related bypass	E	E	D	D
203	Review of times and reasons for transfer of injured patients	E	E	E*	E
204	Participate in state and/or regional performance improvement program	E*	E*	E*	E
205	Willingness to participate in approved local and regional trauma triage and hospital referral plans.	E*	E*	E*	E
206	Performance improvement personnel dedicated to care of injured patients	E	E	D	E
207	**Continuing Education/Outreach**				
208	General Surgery Residency Program	E	D	-	-
209	ATLS provider	E	D	D	-
210	Programs provided by hospital for:				
211	Staff/Community Physicians (CME)	E	E	E[4]	E
212	Nurses	E	E	E	E
213	Allied health personnel	E	E	E	E
214	Prehospital personnel provision/participation	E	E	E	E
215	Participation in regional disaster planning, rehearsal and communication activities/procedures.	E*	E*	E*	E
216	Formal outreach prehospital and hospital education, prevention and research program plan to other trauma and non-trauma hospitals or agreement to participate in a collaborative regional approach.	E*	E*	E[5]*	-
217	**Prevention**				
218	Injury control studies	E	D	-	
219	Collaboration with other institutions	E	D	D	D
220	Monitor progress/effect of prevention programs	E	E*	D	D

221	Designated prevention coordinator – spokes person for injury control	E	E	D	D
222	Outreach activities	E	E	E*	D
223	Information resources for public	E	E	D	E
224	Collaboration with existing national, regional, and state programs	E	E	E*	E
225	Provide or agreement to participate in a collaborative model with targeted prevention programs based on data driven epidemiology	E*	E*	E*	E
226	**Research**				
227	Trauma Registry Performance Improvement Activities	E	E	E	E
228	Research Committee	E	D	-	-
229	Identifiable IRB Process	E	D	-	-
230	Extramural Education Presentations	E[6]	D	D	-
231	Number of Scientific Publications	E[7]	D	-	-
232	**Additional Standards for Injured Children**				
233	Trauma surgeons credentialled for pediatric trauma care	E	E	D	-
234	6 hours pediatric CME per surgeon per year (trauma or pediatric critical care related*)	E	E	D	-
235	Pediatric ED area	E	E	D	-
236	Pediatric resuscitation equipment in all patient care areas	E	E	E	E
237	Micro-sampling	E	E	E	E
238	Pediatric specific performance improvement program	E	E	E	E
239	PICU – onsite	E	D	-	-
240	PICU transfer agreement	-	E	E*	E

* Exceeds or adjusts the American College of Surgeons' standards.

1- When emergency medicine specialists are not involved with the care of the injured patient, these criteria are not required.

2- May be met through teleradiology services as patient condition and requesting specialist needs dictate.

3- An operating room must be adequately staffed and immediately available in a Level I and II (*) trauma center. This is met by having a complete operating room team in the hospital at all times so if an injured patient requires operative care, they can receive it in the most expeditious manner. Individuals who are also dedicated to other functions within the institution cannot meet these criteria. Their primary function must be the operating room.

4- In areas where the Level III hospital is the lead institution, these educational activities are an essential criteria. When the Level III is in an area that contains other hospital resources, such as a Level I or II, then this criteria is no longer essential.

5- If there is no Level I or II outreach program for the area.

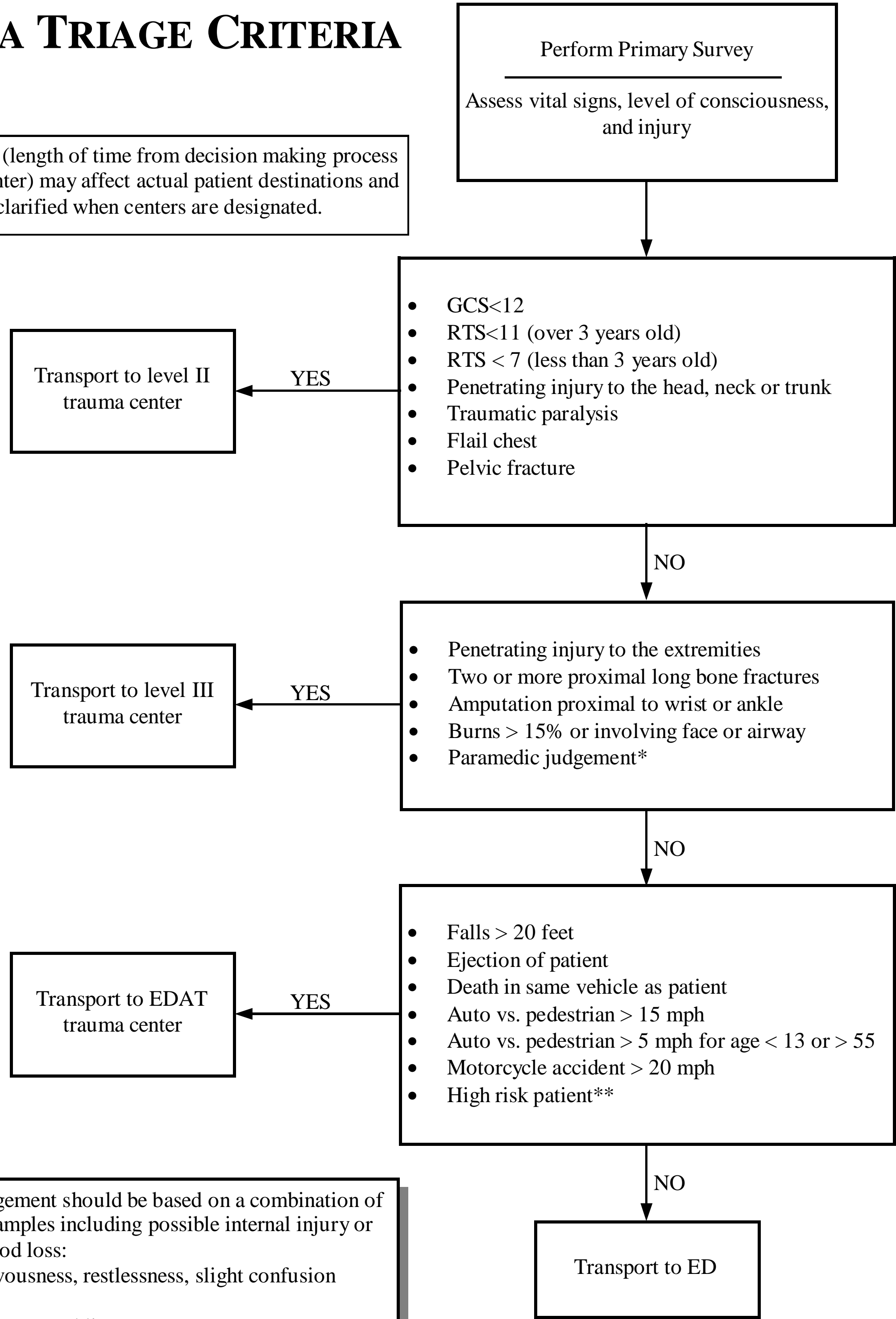
6- Four educational presentations per year for the program. These presentations must be given outside the academically affiliated institutions of the trauma center.

7- Publications should appear in peer reviewed journals. An Index medico listing is preferable. In a three-year cycle, the minimum acceptable number is ten for the entire trauma program. This must include a minimal activity of one publication from the physicians representing each of the four following specialties: emergency medicine, general surgery, Orthopaedic surgery, and neurosurgery per review cycle.

APPENDIX F

TRAUMA TRIAGE CRITERIA

Transport times (length of time from decision making process to delivery at center) may affect actual patient destinations and will be clarified when centers are designated.



* Paramedic judgement should be based on a combination of the following examples including possible internal injury or compensated blood loss:

- anxiety, nervousness, restlessness, slight confusion
- tachycardia
- poor skin signs, trembling
- chest or abdominal pain

** Includes: age < 5 or > 55, cardiac or respiratory disease, pregnancy, immunosuppressed, bleeding disorders, diabetes

APPENDIX G

TRANSFER GUIDELINES

Criteria for Consideration of Transfer

Central Nervous System

Head Injury

- penetrating injury or open fracture (with or without cerebrospinal fluid leak)
- depressed skull fracture
- GCS < 14 or GCS deterioration

Spinal cord or major vertebral injury

Chest

Major chest wall injury or pulmonary contusion
Wide mediastinum or other signs suggesting great vessel injury
Cardiac injury
Patients who might require prolonged ventilation

Pelvis/Abdomen

Unstable pelvic ring disruption
Pelvic fracture with shock or other evidence of continuing hemorrhage
Open pelvic injury
Solid organ injury

Major Extremity Injuries

Fracture/dislocation with loss of distal pulses
Open long-bone fractures
Extremity ischemia

Multiple System Injuries

Head injury combined with face, chest, and abdominal or pelvic injury
Burns with associated injuries
Multiple long bone fractures
Injury to more than two body regions

Comorbid Factors

Age > 55 years, Children <= 5 years
Cardiac or respiratory disease
Insulin dependant diabetics, morbid obesity
Pregnancy
Immunosuppression

Secondary Deterioration (late sequelae)

Mechanical ventilation required
Sepsis

Single or multiple organ system failure (deterioration in central nervous, cardiac, pulmonary, hepatic, renal, or coagulation systems)
Major tissue necrosis

Source: Resources for Optimal Care of the Injured Patient: 1999, American College of Surgeons, 1998.

APPENDIX H
JOB DESCRIPTIONS (SAMPLE)

Medical Director of Trauma Services

Job Description:

The trauma medical director is the surgeon who leads the multidisciplinary activities of the trauma program. The director must be a Board-certified surgeon with special interest in trauma care. The trauma director's responsibility extends beyond the technical skills of surgery. The trauma director should have the authority to affect all aspects of trauma care. This would include:

- granting trauma team privileges.
- cooperating with nursing administration to support the nursing needs of the trauma patient.
- developing treatment protocols.
- coordinating the quality improvement peer review process.
- correcting deficiencies in trauma care or excluding from trauma calls those trauma team members who do not meet guidelines.
- coordinating the budgetary process for the trauma program.
- provide medical direction and act as a liaison between the medical staff and hospital.

Qualifications:

- Board Certified general surgeon with demonstrated special competence in trauma care.
- Education in trauma care should include Advanced Trauma Life Support (ATLS) and ATLS instruction certification; participation in trauma CME courses of at least sixteen hours per year and provision of instruction to other health-care providers.
- Involvement in professional trauma organizations.
- Member of the active medical staff at hospital.
- Clinical involvement with at least 50 trauma patients > ISS 15 per year.

Term of Office:

Serves a two-year term, unless otherwise stipulated by the hospital.

Trauma Center Standards Responsibilities:

- Be responsible for overall medical supervision, direction, and operation of the trauma center.
- Ensure that all emergency department physicians and trauma surgeons at the trauma center are oriented to the EMS system and the trauma care system.
- Supervise surgeons within the trauma service.
- Oversee the multi-disciplinary quality assurance process within the trauma center.

- Be responsible for reporting deficiencies in patient care to the EMS Office, regardless of personnel involved.
- Represent the trauma center on the Regional Trauma Review Committee and the Regional Trauma Advisory Committee. Represent or appoint representative to county and regional disaster committee(s).
- Participate in the development and monitoring, within the hospital and within the region, of policies and procedures for a multi-disciplinary approach to trauma care, including triage criteria.
- Establish rapport and coordinate efforts with emergency, surgery, intensive care, laboratory, pharmacy, radiology, respiratory therapy, and other appropriate service areas.
- Recruit and assume responsibility for qualifies trauma surgical coverage.
- Maintain liaison with other trauma centers and non-trauma center hospitals, both within and outside of the region.
- Supervise training development for all trauma team members.
- Develop and implement trauma operations protocols.
- Assume responsibility for accuracy and validity of trauma statistics.
- Organize and conduct grand rounds, morbidity and mortality conferences, and medical audits on trauma patients.
- Participate in outreach training with other hospitals.

Additional Responsibilities:

- Plan, coordinate and implement trauma service policies, procedures and protocols.
- Plan and participate in ongoing trauma education to trauma service physicians and other trauma care providers.
- Oversee the overall quality assurance plan; chair the QA Committee and co-chair the Multidisciplinary Committee; oversee yearly presentation of outcome data.
- Removal of physicians from the trauma panel who have failed to abide by the trauma section's "rules and regulations", in accordance with medical staff bylaws.
- Review credentials and appoint new physicians to the trauma panel.
- Annual re-appointment of trauma surgeons.
- Attend and participate in the Trauma Steering Committee.
- Supervise outreach and prevention programs.
- Oversee the activity of trauma services department including Director of Trauma Services and Clinical Coordinator.
- Ensure trauma surgeon participation in EMS education and CQI activities.
- Remain involved and up to date on trauma care systems at community, state and national levels.
- Maximize care and outcomes for trauma patients.

JOB DESCRIPTION (SAMPLE)

Director of Trauma Services/Trauma Nurse Coordinator

JOB SUMMARY:

Manages trauma services to provide safe, effective, and appropriate care in a fiscally responsible manner through direction, support, and development of nursing staff, and through collaboration with medical staff, other hospital managers and administrative staff.

JOB QUALIFICATIONS:

Education: Baccalaureate degree required, graduate of an approved school of professional nursing.

License: Current California Registered Nurse license, ACLS and CEN or CCRN required.

Experience: Four (4) years as a Staff Nurse in a trauma center acute health care setting in Emergency or Critical Care areas and two (2) years in position where management skills have been practiced and proven. May be required to meet additional certification requirements in specialty areas as outlined in department specific Staff Nurse II job description. Minimum of 16 hours trauma CME/year.

WORKING CONDITIONS:

Works in typical acute health care setting with infant, child, adolescent, adult, and geriatric patients who are experiencing a wide range of acute medical conditions. Flexible, varied schedule.

PHYSICAL EFFORT:

Prolonged standing and walking required with ability to lift and move patients.

TRAUMA CENTER STANDARDS RESPONSIBILITIES:

- Coordinate communications between the hospital and the EMS agency on matters related to day-to-day operation of the trauma center;
- Serves as liaison for the trauma center with
  - Field care provider agencies
  - Other trauma centers
  - Non-trauma center receiving hospitals
- Attend meetings of the Trauma Advisory Committee and other EMS and county meetings relating to quality control and trauma care as necessary. Represent trauma service on county and regional disaster committee(s).
- Perform routine critiques and evaluations of trauma care through reviews of patient records.

- Maintain the Trauma Registry, including gathering and evaluating data. Submit statistics relating to the trauma care system as requested by the EMS Office.
- Identify and report trauma care problems to the EMS Office.
- Assess education and performance skill areas requiring development and establish individual trauma team member priorities.
- Assist staff members in maintaining special certifications.
- Identify patient education needs for incorporation in community service projects and regional educational programs.
- Participate in the development, coordination, and monitoring of trauma treatment and operations policies and procedures, both within the hospital and the region.
- Maintain communication and coordinate trauma matters with pre-hospital and hospital personnel.
- Coordinate liaison with support services.
- Coordinate public education and prevention programs.
- Participate in outreach training with other hospitals

APPENDIX I

OUTLINE OF TRAUMA HOSPITAL RFP
(Sample)

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APPENDIX J

Trauma System Policies

In accordance with requirements set forth in the California Code of Regulations, Chapter 7, Division 9, Title 22, the EMS Program will develop and implement EMS system policies that address the following issues.

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1. Multi-Disciplinary Nature of the Trauma Care System

A. Recognize the multidisciplinary nature of a systemized approach to trauma care. MARIN COUNTY.

B. Adopt policies, guidelines, and triage criteria that will provide for the coordination of all resources and ensure the accessibility to the closest, most appropriate medical facility for all injured patients, regardless of the nature or severity of their injury or their ability to pay for such services.

C. Establish quality review processes and committees representing all involved disciplines to ensure a broad-based quality review of all trauma system activities.

2. Public Information and Education About the Trauma System

A. A commitment to the establishment of trauma system support and the promotion of injury prevention and safety education.

B. Facilitation of speakers to address public groups.

C. Serve as a resource for trauma information/education.

D. Assist community and professional groups in the development and dissemination of education to the public on such topics as injury prevention, safety education programs, legislative education and access to the trauma care system.

E. Require that each designated/contracted facility participate in the development of public awareness and education campaigns for their service area.

3. Marketing and Advertising

A. In accordance with California Health and Safety Code, Division 2.5, Section 1798.165 (C), prohibit use of the terms “trauma facility”, “trauma hospital”, “trauma center”, “trauma care provider”, “trauma vehicle”, or similar terminology in its signs or advertisements, or in printed materials and information it furnishes

to the general public, unless its use has been so authorized by the Marin County EMS Office.

B. Require the submission for review, prior to implementation, all marketing and promotional plans with respect to trauma center designation. Such plans will be reviewed based on the following guidelines:

1. Shall provide accurate information.
2. Shall not include false claims.
3. Shall not be critical of other providers.
4. Shall not include financial inducements to any providers or third parties.

4. Service Areas for Hospitals

A. Define the service area, as part of the designation/contracting process.

5. EMS Dispatching

A. Approve dispatching policies and procedures countywide. The dispatch of ALS units for trauma patients will continue, as per the operational procedure for the County, to include the simultaneous dispatch of air ambulances for selected trauma cases.

6. Communication System

A. Utilize the 9-1-1 universal emergency number.

B. Require that all approved Advanced Life Support Service Provider have designated communication equipment.

C. Adopt policies that specify requirements for field to hospital contact, procedures/skills that may be performed prior to hospital contact, and communication failure policy/protocols.

7. Transportation Including Intra-trauma Center Transfers and Transfers from a Receiving Hospital to a Trauma Center

A. Define the role all hospitals will have a role in providing trauma care to injured patients as part of an inclusive trauma system.

B. Require that designated/contracted facilities establish and maintain transfer agreements with all affiliated trauma facilities for the transfer of patients that require a higher level of care. It shall be the responsibility of the designated/contracted facilities to ensure that all necessary trauma data is available for review from any non-designated/contracted facility with which they routinely transfer trauma patients for higher level of care.

C. Require that higher level facilities work with and establish transfer guidelines for the lower level facilities with which they are associated.

D. Define the responsibilities of facilities to obtain the appropriate level of transportation when transferring trauma patients.

8. Integration of Pediatric Hospitals into the Overall Trauma Care System to Ensure that all Trauma Patients Receive Appropriate Trauma Care in the Most Expeditious Manner Possible

A. Require that designated/contracted facilities maintain a transfer agreement with a pediatric trauma center or pediatric hospital with an ICU approved by the California Children's Services.

B. Require that consultation with appropriate pediatric specialists occur as soon as possible after presentation at the emergency department.

C. Assign responsibility for obtaining the appropriate level of care during transportation.

9. Training of Prehospital EMS Personnel

A. Facilitate training for all prehospital providers on trauma triage guidelines and any other policy and/or operational changes associated with the implementation of the trauma system plan and/or designation process.

B. Require that designated/contracted facilities provide training to hospital staff on trauma system policies and procedures.

10. EMS and Trauma Care Coordination and Mutual Aid Between Neighboring Jurisdictions

A. Coordinate with all surrounding jurisdictions for the integration of the emerging trauma system with existing or developing systems.

B. Work cooperatively and execute agreements as necessary with adjacent EMS systems in order to ensure that patients are transported to the closest appropriate facility.

C. Marin County will work cooperatively with other EMS agencies in data collection and evaluation efforts when patients from another EMS jurisdiction are served by the Marin County EMS system.

11. Coordination and Integration of Trauma Care with Non-medical Emergency Services

A. Ensure that all non-medical emergency service providers are apprised of the trauma system plan as it relates to their agency/organization. This will be

accomplished through the ongoing participation of EMS staff in committee and/or professional organization meetings.

B. Include non-medical emergency service providers in committee memberships as appropriate.

C. Disseminate information to non-medical emergency service agencies through written communication as necessary.

12. Fees – Application Designation, Monitoring, and Evaluation

A. Complete a cost analysis to determine a fee structure that will cover the direct costs of the designation process, effective monitoring and evaluation of the trauma care system. The fee will be based upon system requirements.

13. Medical Control and Accountability, including Triage and Treatment Protocols

All facilities receiving injured patients shall:

A. Participate in the Marin County data collection system.

B. Participate in the Continuous Quality Improvement Process, in accordance with the Marin County Trauma Plan and future facility agreements.

C. Comply with the medical control standards as established within the trauma plan.