A map of California with its counties outlined and colored in various shades. The colors include red, orange, yellow, light blue, medium blue, dark blue, purple, and green. The map is used as a background for the text.

California Statewide Trauma System Planning

**Recommendations of the
State Trauma Advisory Committee**

May 2017

California Statewide Trauma System Planning

Recommendations of the State Trauma Advisory Committee May 2017

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California Statewide Trauma System Planning

Recommendations of the State Trauma Advisory Committee
May 2017

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I. Executive Summary

Death and long-term disability due to traumatic injuries are increasing at an alarming rate across America. In the State of California, traumatic injury is the most common cause of death in persons age 1 to 44 and accounts for more productive years of life lost than cancer and heart disease combined.¹ In 2010 the cost of fatal trauma in California was estimated at more than \$17 billion with national data showing U.S. costs of over \$189 billion.² According to the United States Centers for Disease Control and Prevention, injury-related deaths increased by 18% from 2010-2015. In 2015, just over 214,000 people died from injuries, 19,054 in California.³

The cost of healthcare and the loss of productivity from traumatic injuries cost Californians billions of dollars every year. California hospitals admitted over 250,000 injured patients in 2014. Thirty percent of these patients required further rehabilitation services with the highest percent between the ages of 65 and 84 years.⁴

Rapid diagnosis and specialized treatment is the key to reducing the morbidity and mortality rates of trauma patients. Most states, including California, have developed trauma systems to meet the needs of their diverse populations and to provide optimum patient care. In 2010, the California Emergency Medical Services Authority (EMSA) asked the State Trauma Advisory Committee (STAC) [*Appendix C*] to analyze the current California trauma care system and to provide recommendations to the EMSA director. These Statewide Trauma System Planning recommendations are designed to describe the analysis and provide recommendations for continued improvement of the trauma system to achieve best practices in care of the injured patient.

California's Trauma System

Currently, there are 80 designated Trauma Centers in California [*Appendix D*] that receive and admit over 70,000 trauma patients per year.⁵ Trauma care in California is delivered and governed by a structure of public and private entities working together to prevent injuries, reduce trauma-related mortality and morbidity rates, and maximize cost-benefit of trauma healthcare for all Californians. EMSA is charged with providing oversight and leadership to 33 local emergency medical service agencies (LEMSAs) statewide. These LEMSAs are responsible for assessing, directing, developing, and implementing their local or regional EMS and trauma plans based on local topography, demographics, population density, available healthcare resources, and funding. The trauma systems in California are locally designed to allow for variation and flexibility in order to build a responsive and effective trauma system that is tailored to individual jurisdictions. However, the system operates within state regulations and requires consistent quality standards and protocols for patient transfers across local and regional jurisdictions. To further build on this delivery model and improve the quality of trauma systems across the state,

¹ CDC Injury Response, United States http://www.cdc.gov/injury/overview/leading_cod.html

² WISQARS™ Injury Prevention & Control: Data & Statistics 2010

³ Centers for Disease Control and Prevention (CDC), National Center for Injury Prevention and Control, Fatal Injury Reports, 2015, for National, Regional, and States (WISQARS)[Internet. Available from http://www.cdc.gov/injury/wisqars/fatal_injury_reports.html

⁴ California Department of Health Services EPICenter, Injury Reports. Available from <http://epicenter.cdph.ca.gov/>

⁵ California EMS Information System (CEMSIS)-Trauma, volume count report for 2013-2016.

EMSA must support opportunities for LEMSAs to innovate and share best practices in order to improve patient outcomes.

Components of the Statewide Trauma System Planning Recommendations

The STAC developed these Statewide Trauma System Planning recommendations based on an evaluation of California's current delivery of trauma care [**Appendix A**]. The 2006 American College of Surgeons (ACS) Committee on Trauma *Regional Trauma Systems: Optimal Elements, Integration, and Assessment* guidance document, the 2006 Health Resources Services Administration (HRSA) *Model Trauma System Planning and Evaluation* report, and recommendations from the ACS's Trauma System Consultation Visit were reviewed to address national standards in these Statewide Trauma System Planning recommendations.

These Statewide Trauma System Planning recommendations outline 3 goals for trauma systems:

1. Timely Access to Trauma Care
2. Delivery of Optimal Trauma Care
3. Community Health and Wellness

The California system is mature at the local level with considerable expertise and responsiveness to local need. These Statewide Trauma System Planning recommendations focus on maximizing the benefit of regional and statewide coordination and integration of trauma care, while supporting local and sub-regional system development and quality.

There are fifteen (15) Statewide Trauma System Planning components and associated objectives that support these goals. EMSA, in collaboration with the STAC, LEMSAs, Regional Trauma Coordination Committees (RTCCs), Trauma Centers, and other applicable state departments and EMS stakeholders, should strive to achieve the vision of these Statewide Trauma System Planning recommendations through work on these objectives [**Appendix B**]. EMSA may lead efforts to implement some of the recommendations while LEMSAs, RTCCs, Trauma Centers and other groups will take the lead on other recommendations. The successful implementation of these Statewide Trauma System Planning recommendations depends on participation of a broad range of community partners.

Component	Objectives
Trauma System Leadership	<ul style="list-style-type: none"> • Collaborate with counties to support and share resources for a regionally based trauma system. • Work with the LEMSAs, STAC and the trauma regions to develop a consensus compendium of trauma-related policies, procedures, and clinical guidelines that may be shared throughout the state. • Evaluate current local trauma plans and work to update plans in the context of regional trauma care with input from Trauma Centers and trauma regions. • Establish basic quality and activity reporting standards and report templates for the LEMSAs to provide EMSA, STAC, and Performance Improvement and Patient Safety (PIPS) subcommittee with sufficient data to assess the performance of trauma systems.
System Development Operations	<ul style="list-style-type: none"> • Conduct a systematic review of local trauma plans in the context of these Statewide Trauma System Planning recommendations and the structures and processes it outlines. • Develop processes and mechanisms for providing optimal access and care to special populations; for example, pediatric populations. • Update regulations to define specific standards and requirements for LEMSAs that chose to implement a trauma system, and to address recommendations consistent with these California Statewide Trauma System Planning recommendations, 2017.
Trauma System Financing	<ul style="list-style-type: none"> • Identify new critical trauma system components and the cost to develop and maintain. • Establish a basis for estimating the actual cost for trauma care in California. • Explore sustainable funding sources to support regional infrastructure and planning.

Component	Objectives
EMS System: Prehospital Care	<ul style="list-style-type: none"> • Utilize the most current national standard for prehospital triage as the foundation for prehospital trauma triage guidelines. Based on specific environments (e.g., urban vs. rural) and presence or absence of Trauma Center resources, some local modifications may be required. • Develop definitions to study over-/under-triage with a mechanism to track on a regional basis. • Work with Office of Statewide Health Planning and Development (OSHPD) to obtain specified data on major trauma patients transported to non-trauma facilities and not subsequently transferred. • Improve the transfer of documented information from field units to receiving hospitals with the goal that prehospital care reports are available as part of the medical record for all trauma patients. • Explore the need for special population field trauma triage criteria, e.g., pediatric and geriatric. • Develop EMS protocol guidance for field trauma care.
EMS System: Ambulance and Non-Transporting Medical Units	<ul style="list-style-type: none"> • Develop minimum prehospital equipment inventory for EMS units specific to trauma needs. • Recommend air resource utilization guidelines applicable statewide including access to air resources.
EMS System: Communications	<ul style="list-style-type: none"> • Develop guidance for priority dispatch protocols for trauma and investigate process changes that improve dispatch effectiveness while improving outcomes. • Study the hospital alert systems currently in place to identify hospital capability, capacity, and specialty care availability (e.g., burns, pediatrics) and complete a gap analysis.
Definitive Care: Acute Care Facilities	<ul style="list-style-type: none"> • Develop guidelines outlining a process for the assessment of Trauma Center compliance with California Code of Regulations (CCR) Title 22, Chapter 7. • Outline the responsibilities and expected participation in the trauma system for non-designated acute care hospitals. • Establish EMSA guidelines to standardize the Trauma Center designation process across LEMSAs.
Definitive Care: Re-triage Interfacility Transfer	<ul style="list-style-type: none"> • Capture re-triage and Interfacility Transfer (IFT) data for statewide analysis and develop a map of re-triage and IFT movement within the state. • Explore the development of centralized re-triage/transfer coordination within the state. • Assist in the development of regional cooperative arrangements between sending and receiving centers that will facilitate re-triage, reduce delays, and ensure that patients are re-triaged to an appropriate level of care.

Component	Objectives
Definitive Care: Rehabilitation	<ul style="list-style-type: none"> • Improve the data collection for evaluation of rehabilitative needs and degree of access to rehabilitation throughout the state. • Adopt a standardized measure of functional recovery suitable for use throughout the trauma system.
Data Collection	<ul style="list-style-type: none"> • Improve data sharing. • Improve data quality and compliance. • Evaluate data validity.
System Evaluation and Performance Improvement	<ul style="list-style-type: none"> • Develop and implement a statewide comprehensive trauma PIPS Plan consistent with the elements of these Statewide Trauma System Planning recommendations. • Evaluate state data, identify regional opportunities for improvement, determine if similar opportunities are occurring in other regions, and explore mechanisms for shared resolution. • Create a policy, in coordination with the California Office of Health Information Integrity (CalOHII), regarding the sharing of data for the performance improvement process, recognizing hospital confidentiality and HIPAA regulations. • Benchmark individual systems, hospitals, LEMSAs, and trauma regions to the group as a whole, and to an outside standard including a comparative analysis of risk-adjusted outcomes.
Education and Training	<ul style="list-style-type: none"> • Develop a plan for providing information to the public regarding the structure and function of the trauma system. • Perform a needs assessment prior to developing new or additional trauma-related professional educational programs. • Encourage the use of the ACS's Rural Trauma Team Development Course, video conferencing, and online education. • Encourage development of telemedicine connections between non-trauma facilities and level III and IV Trauma Centers with level I and II Trauma Centers.
Research	<ul style="list-style-type: none"> • Develop a research agenda and collaborate with established investigators to conduct research projects. • Periodically review trauma system data derived from the state trauma registry, Office of Statewide Health Planning and Development (OSHPD), and other sources, and make a recommendation to various system stakeholders regarding potential areas of research.

Component	Objectives
Injury Prevention	<ul style="list-style-type: none"> • Develop a compendium of regional injury prevention programs. • Collaborate with the Department of Public Health to evaluate, implement, and determine the effectiveness of initiatives to reduce intentional and unintentional injuries.
Emergency/Disaster Preparedness	<ul style="list-style-type: none"> • Incorporate the role of the trauma system in the California Public Health and Medical Emergency Operations Manual. • Develop a recommended inventory for a trauma cache to be utilized at Trauma Centers in the event of a disaster. • Plan for trauma system surge capacity in collaboration with local Public Health and Medical Emergency Function (EF 8), depending on disaster risk assessment.

II. Purpose of Statewide Trauma System Planning Recommendations

EMSA assessed trauma care in California in the 2006 report, “*California Statewide Trauma Planning: Assessment and Future Direction*”. Guided by this report, and the 2016 ACS’s Trauma System Consultation Report, these Statewide Trauma Systems Planning recommendations are a culmination of an extensive process that began in 2010. .

California, in addition to being the most populous state in the Union, is unique as it is the only state where the statutory responsibility for the EMS system, including local trauma systems, rests predominately with local EMS agencies (LEMSAs). California's 33 LEMSAs provide local flexibility and allow tailoring of regional trauma systems to individual jurisdictional demographics, population density, and available resources.

The LEMSAs design trauma systems that meet minimum state standards and regulations. The intent of these Statewide Trauma System Planning recommendations is to provide a roadmap for improving overall trauma care in California, promote best practices throughout the state, identify and resolve issues impacting the quality of care, and enhance the movement of patients across jurisdictions while allowing ample local flexibility to deliver high quality care within a locally organized system.

These Statewide Trauma System Planning recommendations analyze current trauma care in California, provide an updated trauma system status, and make specific recommendations for further coordination of the trauma system across the state. These Statewide Trauma System Planning recommendations are not immutable and will require periodic review and revision as changes occur within the EMS and healthcare environment.

III. History and Background

What is Trauma?

For the purposes of these Statewide Trauma System Planning recommendations, the trauma patient is a seriously injured person who requires timely diagnosis and treatment of actual or potential injuries by a multidisciplinary team of health care professionals, supported by the appropriate resources, to diminish or eliminate the risk of death or permanent disability.⁶

Multidisciplinary Team—an EMS responder, trauma surgeon, emergency physician, anesthesiologist, other medical and surgical specialists, nursing, radiology, laboratory, operating suites, and ancillary services

What is a Trauma System?

A trauma system is an organized, coordinated effort in a defined geographic area that delivers the full range of care to all injured patients and is integrated with the local medical and public health systems. Trauma systems, including specialized Trauma Centers, offer a highly effective, integrated approach to reducing the incidence and impact of major injury to society; they exist in most states in the United States.⁷ The true value of a trauma system derives from the coordinated transition between each phase of care (prehospital, hospital, and rehabilitation), integrating existing resources to achieve improved patient outcomes. Injuries occur across a broad spectrum, and a trauma system must determine the appropriate level of care for each type of injury.⁸

Trauma systems may be regionalized, making efficient use of limited health care resources. Trauma systems are based on the unique requirements of the population served, such as rural, inner-city, urban, or Native American communities, all of which are found in California. Trauma systems emphasize preventing injuries in the context of community health.

The benefits of a successful trauma system include a reduction in death and disability caused by trauma, resulting in an increase in the number of productive working years. Years of potential life lost because of injury far exceed those of cancer, heart disease, or stroke.⁹ The impact of injuries on society can be mediated by assuring that the more severely injured are treated at Trauma Centers. Opportunities exist for improving overall cost-effectiveness by assuring our systems are inclusive in their design, and that triage guidelines are effective in matching the right patient with the right facility.¹⁰ Being cost effective with initial treatment and continued rehabilitation of trauma victims leads to a reduced burden on local communities in support of disabled trauma victims and a decrease in the impact of the disease on "second trauma"

⁶ 2002 Trauma System Agenda for the Future. U.S. Department of Transportation, National Highway Traffic Safety Administration

⁷ "Access to Trauma Centers in the United States" Charles C. Branas, PhD; Ellen J. MacKenzie, PhD; Justin C. Williams, PhD; C. William Schwab, MD; Harry M. Teter, JD; Marie C. Flanigan, PhD; Alan J. Blatt, MS; Charles S. ReVelle, PhD, Journal of American Medical Association, Volume 293 Issue 21 pages 2626-2633, June 2005

⁸ 2002 Trauma System Agenda for the Future. U.S. Department of Transportation, National Highway Traffic Safety Administration

⁹ WISQARS Leading Causes of Death Reports. Available at <http://webappa.cdc.gov/sasweb/ncipc/leadcaus10.html>.

¹⁰ *The Value of Trauma Center Care*, The Journal of Trauma Injury, Infection, and Critical Care, volume 69, Number 1, July 2010.

victims— families. Second trauma is the emotional trauma/upheaval of the family when a loved one suffers a life-threatening injury or sudden illness.¹¹

An organized trauma system is not only essential to deliver trauma care to seriously injured patients; it is also the foundation for disaster and terrorism readiness. It allows for consistent and effective care of patients across geographic boundaries, with the ability to expand to meet the medical needs of the community from a human-made or natural disaster.

Disaster medical response includes planning and integration of trauma system resources into the local Emergency Operational Area Plan operating within the Standardized Emergency Management System (SEMS). As demonstrated by catastrophic events occurring in California such as the Northridge and Loma Prieta earthquakes, La Conchita mudslide, Chatsworth train collision, and the Asiana Airlines crash, emergency preparedness must include a strong trauma system infrastructure that will deal with daily injuries and have the capacity to rapidly expand (surge capacity) to respond to the demands of an unconventional or natural disaster that creates casualties of greater magnitude.

National Efforts in Trauma System Development

In 1966, the National Academy of Sciences White Paper entitled “Accidental Death and Disability: The Neglected Disease of Modern Society,” identified deficiencies in providing emergency medical care in the country. This paper was the catalyst prompting federal leadership toward an organized approach to emergency medical services (EMS) and trauma care.

The Trauma Care Systems Planning and Development Act was developed in response to a 1986 U.S. Government Accountability Office Report (GAO/HRD-86-132) that found severely injured individuals in a majority of both urban and rural areas of the United States were not receiving the benefit of trauma systems, despite considerable evidence that trauma systems improve survival rates. A subsequent report in 1999 by the Institute of Medicine (IOM), “Reducing the Burden of Injury,” called on Congress to “support a greater national commitment to, and support of, trauma care systems at the federal, state, and local levels. An estimated 20-40 percent of deaths due to severe injury could be prevented if all Americans lived in communities that are organized to transport severely injured patients promptly to an area hospital that is staffed and equipped to provide expert trauma care.”

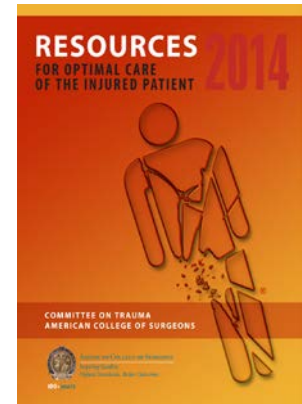
While an emergency department (sometimes referred to as an emergency room) is responsible for evaluation and stabilization with definitive care in some cases, Trauma Centers maintain a higher level of service both within and beyond a basic emergency department for victims of multi-system trauma. Operating rooms, anesthesia, surgical intensive care units, surgical recovery, and a multidisciplinary team of highly trained physicians and nurses is available to respond rapidly.

Multi-system trauma— injury to more than one body system, (e.g. orthopedic, cardiac, pulmonary, renal, neurologic) usually deemed serious.

ACS and its Committee on Trauma championed the development of Trauma Centers and trauma systems with the development of “Resources for Optimal Care of the Injured Patient.” Published

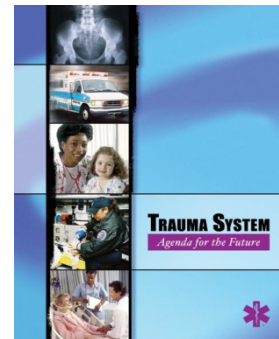
¹¹ American Trauma Society, *Second Trauma Course*, accessed at www.amtrauma.org

in 1976, this document provided guidelines for hospital and prehospital resources necessary for optimal trauma care. Since that time, this document has gone through numerous revisions, with the most recent published in 2014. These guidelines describe, in detail, the qualifications and level of commitment required of hospitals, medical and surgical personnel, and local communities to provide high-quality trauma care. The ACS guidelines have been adopted by state and regional trauma systems throughout the nation. Studies have shown that systems employing these standards have significantly reduced preventable deaths due to injury.



In 2002, the American Trauma Society, supported by the U.S. Department of Transportation, National Highway Traffic Safety Administration, issued the Trauma System Agenda for the Future. This report noted that:

Trauma systems should possess a distinct ability to identify risk factors and related interventions to prevent injuries in the community, and should maximize the integrated delivery of optimal resources for patients who ultimately need acute trauma care. Trauma systems should address the daily demands of trauma care and form the basis for disaster preparedness. The resources required for each component of a trauma system should be clearly identified, deployed and studied to ensure that all injured patients gain access to the appropriate level of care in a timely, coordinated and cost-effective manner.



The ACS Committee on Trauma, along with the Coalition for American Trauma Care, commissioned Harris Interactive to conduct a public opinion poll on the public's awareness, knowledge, and perception of the importance of trauma care and trauma systems of care. The results were released during a Congressional Briefing on March 2, 2005. Some of the key findings were:

- Almost all Americans feel it is extremely or very important to be treated at a Trauma Center in the event of a life-threatening injury.
- Almost all Americans feel it is extremely or very important for their state to have a trauma system.
- The majority of Americans feel having a Trauma Center nearby is equally as important as or more important than having a fire department or police department.

A study published in the September 2010 Journal of Trauma found:

Triaging severely injured patients to hospitals that are incapable of providing definitive care is associated with increased mortality. Attempts at initial stabilization at a non-

trauma facility may be harmful. These findings are consistent with the need for continued expansion of regional trauma systems.¹²

Cost of Trauma Care

The total lifetime medical and work loss costs of injuries and violence in the United States was \$671 billion in 2013. The cost associated with fatal injuries was \$214 billion, while nonfatal injuries accounted for over \$457 billion. Injuries, including all causes of unintentional and violence-related injuries combined, account for 59% of all deaths among people ages 1-44 years of age in the U.S.—that is more deaths than non-communicable diseases and infectious diseases combined. Injuries killed more than 214,000 in 2015—one person every three minutes.¹³ The cost of fatal trauma in California is estimated at more than \$17 billion each year. These costs include medical and work loss costs.¹⁴

¹² Journal of Trauma 2010, Scoop and Run to the Trauma Center or Stay and Play at the Local Hospital: Hospital Transfer's Effect on Mortality, Nirula, Ram MD, MPH, FACS; Maier, Ronald MD; Moore, Ernest MD; Sperry, Jason MD, MPH; Gentilello, Larry MD

¹³ WISQARS Injury Prevention & Control: Data & Statistics

¹⁴ WISQARS™ Injury Prevention & Control: Data & Statistics

IV. Development of California’s Trauma System

In California, state EMS leadership began in 1980 when the legislature added Division 2.5 of the Health and Safety Code that established EMSA (SB125, 1980). In the early 1980’s, some LEMSAs such as Los Angeles, Orange, San Diego, and Santa Clara established local trauma care systems. In 1983, Article 2.5 Regional Trauma Systems was added to the Health and Safety Code to allow, but not require, development of local trauma care systems. In September 1986, trauma care regulations (California Code of Regulations, Title 22, Division 9, Chapter 7 -Trauma Care Systems) were promulgated to provide minimum standards for local trauma systems and locally designated Trauma Centers. These regulations were updated in August 1999 to reflect standards based on the ACS 1999 version of “Optimal Resources for the Care of the Injured Patient”. In 2016, EMSA began the revision process, now based on the 2014 ACS Optimal Resources document.

State leadership of trauma care is vested in EMSA, providing statewide coordination, guidance, and technical assistance to the LEMSAs in their development of local trauma systems including

- reviewing and approving local trauma plans and annual Trauma System Status Reports,
- promulgating trauma system and Trauma Center requirements,
- facilitating participation in a statewide trauma registry,
- coordinating the activities of the STAC and its subcommittees, and
- liaising with other state departments regarding trauma system issues.

The American College of Surgeons is a scientific and educational association of surgeons founded to improve the quality of care for the surgical patient by setting high standards for surgical education and practice.

The following represent milestones in the development of California’s Trauma System.

- **Changes to the Health & Safety code (1983)**
Changes to the Health & Safety code enabled but did not require the development of local trauma care systems. LEMSAs may implement a trauma care system contingent upon meeting minimum regulatory standards, and may formally designate as well as limit the number of hospitals meeting a set of specific requirements as Trauma Centers.
- **The California Code of Regulations, Title 22, Division 9, Chapter 7 - Trauma Care Systems (1986)**
Regulations for development of the trauma systems were first promulgated in 1986 as part of the California Code of Regulations, Title 22, Division 9, Chapter 7 (Trauma Care Systems). By this time, there were already 28 Trauma Centers, designated by their local EMS agencies, throughout California.

- **Trauma Regulations Updated (1999)**
 Trauma regulations were updated to reflect minimum Trauma Center standards based on the ACS 1999 edition of the “Optimal Resources for the Care of the Injured Patient”. These regulations established Pediatric Trauma Centers which currently number 17, and Level IV Trauma Center standards. As the 2014 edition of the ACS document has been released, California is beginning the process of revising the trauma regulations.
- **Implementation of Standardized Reporting (2003)**
 The implementation of standardized reporting criteria for trauma patients to local trauma registries was initiated as required in Health and Safety Code Division 2.5 §1797.199 (k).
- **Formal Assessment of Trauma Care in California (2006)**
 Under the direction of the EMSA Director, the STAC completed a formal assessment of trauma care in California, making recommendations regarding state trauma leadership, regionalization, a statewide trauma data system, trauma system funding and education. The resulting report “California Statewide Trauma Planning: Assessment and Future Direction” was published to guide further trauma system coordination.
- **Assessments Put Into Action at First State Trauma Summit (2008)**
 Following the recommendations made in the 2006 trauma care assessment, EMSA convened its first Trauma Summit for trauma stakeholders from around the state. Five RTCCs were established based on a LEMSA survey by EMSA of transport and transfer patterns of injured patients to Trauma Centers. The RTCCs formulated their membership and preliminary goals and objectives and began to meet in late 2008. At this time, there were 65 designated Trauma Centers.
- **System Goals Developed at Second State Trauma Summit (2009)**
 Convened by EMSA, the second State Trauma Summit identified five (5) major goals for coordinating trauma care in California.

 1. Establish a structured relationship for the RTCCs with the LEMSAs and EMSA
 2. Profile best practices of the RTCCs
 3. Implement a state trauma registry with participation from the LEMSAs
 4. Write inclusive Statewide Trauma Systems Planning recommendations
 5. Involve non-trauma hospitals in a statewide trauma system.
- **Collection of Data with California EMS Information System (2009)**
 The California EMS Information System (CEMSIS) was established for the collection and analysis of statewide trauma registry data and began to accept data from Trauma Centers around the state. The data standards and inclusion criteria were vetted through a public comment process with final approval by the Commission on EMS.

- **Forum for Regional Trauma Coordinating Committees (2010)**
 EMSA convened the third State Trauma Summit that provided a forum for the RTCCs to report on their projects. The STAC membership was updated to include representation from the RTCCs.
- **State Trauma Summit IV (2012)**
 The fourth Trauma Summit was held in conjunction with the *UCSD Trauma and Resuscitation Conference* and presented information on trauma system performance improvement, access to trauma care, and provided an update on RTCC activities. It concluded with an open forum: “Where Do We Go From Here”?
- **State Trauma Summit V (2014)**
 The fifth Trauma Summit was held in collaboration with the Stanford University Medical Center and Santa Clara Valley Medical Center Trauma Symposium. Presentations covered “State of the State”, the Affordable Health Care Act, Trauma Performance Improvement: A National Program, and Regional Best Practices.
- **State Trauma Summit VI (2015)**
Trauma 2015: California’s Future was held in both Southern California (San Diego) and Northern California (San Francisco). Presentations included The Evaluation of California’s Trauma System from a National Perspective, Trauma System Advocacy and The Optimal Model for Pediatric Trauma Care. Case Studies were presented to illustrate system challenges.
- **American College of Surgeons Trauma System Consultation (2016)**
 ACS conducted a Consultative Trauma System Review for California in March 2016. The review process assessed all key areas of a trauma system based on national standards and provided EMSA with recommendations to improve the system.
- **State Trauma Summit VII (2016)**
Trauma 2016: Yesterday, Today, Tomorrow was held in San Francisco and focused on the ACS consultation visit report adding presentations on prevention, rehabilitation, and system management of senior falls. Case studies that crossed jurisdictional lines were also presented along with a panel on the San Bernardino mass shooting incident.

California Trauma Center Financing

In 1987, the Assembly Office of Research described California's trauma care system as being in a state of medical and fiscal crisis, pointing to financial losses experienced by Trauma Centers. Multiple hospitals, particularly in Los Angeles, had dropped their Trauma Center designation, citing monetary losses. The closure or threatened closure of Trauma Centers in several areas of the state resulted in media attention and policy initiatives to increase state subsidies or develop alternative funding sources.¹⁵ Physicians and hospitals indicated that the root problem of emergency and trauma care issues was the high level of uncompensated care. They believed that appropriate funding for trauma care would provide continued operation of existing Trauma Centers and lead to the establishment of new Trauma Centers.

Most of the efforts to increase California's trauma funding have focused on the direct reimbursement for patient care because of significant shortfalls reported by Trauma Centers. The main source of funding to compensate hospitals and physicians for uninsured and under-compensated emergency services, including trauma services for adults and children, comes through the Maddy Fund (HSC Division 2.5, Chapter 2.5). Additional revenues are derived from tobacco taxes that are earmarked, in part, for programs to provide health care services to indigent patients. Declining revenues from the tobacco tax have resulted in reduced support for trauma care. While the impact is yet to be seen, the expansion of both public and private insurance coverage through the Affordable Care Act may result in payment shifts that may drive new care models and fiscally benefit local trauma system efforts.

California statute (Health and Safety Code 1798.162-166) allows local trauma system development. Initially, funding from the State Trauma Fund (HSC 1797.198-199; 2001) was allocated to LEMSAs for Trauma Centers with a small amount earmarked for local trauma system development. Other statutes (HSC 1797.103, 1798.161) and regulations (CCR, Title 22, Division 9, Chapter 7, §100253) created significant EMSA responsibilities related to trauma care systems. No funding was provided for state or regional coordination, oversight, and evaluation of statewide trauma care. The only on-going funding source for EMSA for statewide trauma system coordination, data aggregation and analysis, and quality improvement activities is the Federal Preventive Health and Health Services (PHHS) Block Grant.

Two counties, Los Angeles and Alameda, have developed funding mechanisms for trauma care through assessments on property value. Other counties have established local fees to fund the coordination and administration of a trauma care system as authorized by HSC 1798.164.

Maddy Fund: The Maddy EMS Fund is financed through an additional penalty assessment on certain motor vehicle fines and forfeitures. The Legislature enacted Chapter 1240, Statutes of 1987 (SB 12), amended in 1988 (SB 612) allowing counties to establish a Maddy Emergency Medical Services Fund (Maddy EMS Fund) to compensate health care providers (hospitals and physicians) for emergency services for the uninsured and medically indigent, and to ensure the population has continued access to emergency care. A charge of \$2 per \$10 is levied on applicable fines, penalties, and forfeitures pursuant to Government Code 76000 and 76104 and section 42007 of the Vehicle Code. Although this funding is not specifically earmarked for

¹⁵ Richard A. Narad and Daniel R. Smiley, *Trauma Care: System in Crisis?* California Policy Choices, Volume 7, University of Southern California, Los Angeles/Sacramento/Washington DC, 1991.

trauma care, it can be used for uncompensated emergency care reimbursements. Each county may establish an EMS Fund, upon the adoption of a resolution by the Board of Supervisors. Currently, 50 (86%) counties have established Maddy EMS funds pursuant to HSC Section 1797.98a.

Courts collect the penalty assessments or surcharges and forward them to the County. Ten percent of these revenues may be used by the county for the administration of the EMS Fund. The remaining funding is allocated as follows:

- 58% to the Physicians Services Account for payments made to physicians who care for patients who have no insurance coverage or are otherwise unable to pay for the emergency visit. Physicians may receive reimbursement for up to 50% of their claims;
- 25% to the Hospital Services Account for payments to hospitals for the provision of disproportionate trauma and emergency medical care services. Hospital costs may be reimbursed up to 100%;
- 17% to the Discretionary Account for other EMS purposes as determined by each county. Many LEMSAs depend on this funding to carry out mandated statutory EMS responsibilities, including trauma system administration.

An additional provision was enacted in 2006 (SB 1773, Alarcon) to allow a county to augment the Maddy EMS Fund from penalty assessments. This optional provision adds an additional penalty assessment of \$2 per \$10 and requires that 15% of the money deposited into the EMS fund from Government Code 76000.5 be allocated for funding pediatric trauma care (Richie's Fund¹⁶). The Alarcon penalty assessment has been implemented by 31 (53%) counties. SB 1465 signed in 2014, increased the transparency of the Maddy EMS Fund by requiring the local jurisdictions to report income and expenditures to EMSA, which aggregates and reports on the use of these funds.

AB 430: AB 430 (Cardenas, Chapter 171, Statutes of 2001), created the Trauma Care Fund (HSC §1797.198-199) to provide funding for trauma care to uninsured patients with a formula for distribution of funds by the LEMSAs for designated Trauma Centers. The funds were passed from EMSA to the LEMSA for distribution. From 2002 through 2005 a total of \$55 million was provided for Trauma Center funding and \$2.5 million was provided for planning and implementing trauma care systems for LEMSAs without a local Trauma Plan. The Trauma Care Fund has not received funding since 2005.

Local Data System Funding: Funds were made available to LEMSAs by EMSA as part of the Office of Traffic Safety and/or Federal Block Grants to modify their local data systems to be compliant with national standards and to participate in the California EMS Information System (CEMSIS). The total amount of funding provided from 2009 through 2016 was \$1,527,637.

Regional Trauma Care Committee (RTCC) Funding: Funding was provided by EMSA to support the development of the RTCCs by funding regional summits and conference calls from

¹⁶ California Health and Safety Code § 1797.98a: California Code - Section 1797.98a - See more at: <http://codes.lp.findlaw.com/cacode/HSC/1/d2.5/2.5/s1797.98a#sthash.AhNKhs9Z.dpuf>

the Federal Preventive Health and Health Services Block Grant. Each of the five RTCCs was allocated up to \$10,000 per year during FY 2010/11 and FY 2011/12 for regional activities. Subsequently, due to financial limits at both the state and federal level, there has been no funding available since FY 2011/12 to fund the activities of the RTCCs.

V. Current Organization of Trauma Care in California

Trauma care systems in California are aligned with the two-tier regulatory structure of EMS in California consisting of EMSA and LEMSAs. EMSA is the state department responsible for developing statewide standards for local trauma care systems and Trauma Centers; providing coordination and leadership for the planning, development, and implementation of trauma care systems; and reviewing and approving local trauma care system plans.

State Trauma Advisory Committee (STAC)

The STAC is an 18 member body, appointed by the Director of EMSA under Health and Safety Code 1797.133, to assist in implementing trauma care and coordinating statewide activities. The STAC is comprised of physicians, nurses, administrators, and other EMS providers and personnel for the purpose of advising the EMSA Director on matters pertaining to the planning, development, and implementation of the local trauma systems (*Appendix C*). The Chair of the STAC has historically been a senior practicing trauma surgeon, recognized nationally for his/her experience and knowledge of trauma care and trauma systems. In 2009, the committee was reorganized to have broad representation with term limits from the major stakeholder groups in California.

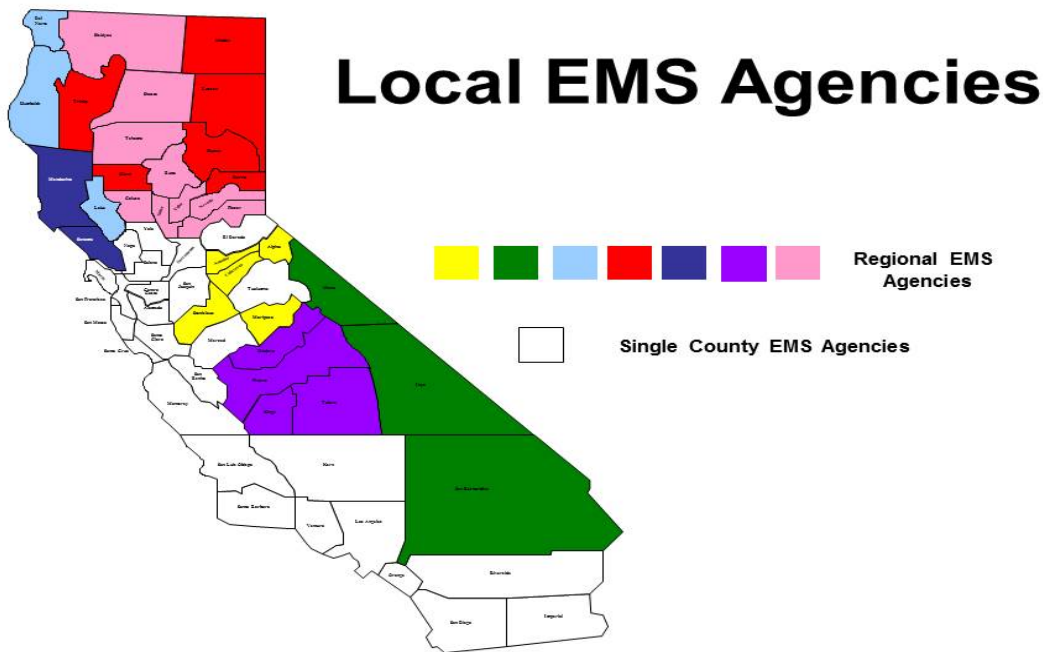


Figure 1

Local EMS Agency (LEMSA)

The LEMSA is charged with implementing statute, regulations, and local policy for trauma services in their area of jurisdiction, ensuring the system components function in concert

throughout the continuum of care. There are currently 33 LEMSAs (Figure 1) within the State of California; 26 are a single county and 7 have a multi-county jurisdiction. The LEMSA is responsible for:

- local trauma system plan development and implementation;
- local trauma system policy development;
- Trauma Center designation;
- monitoring compliance with contractual agreements in accordance with California statute, regulations and local policy;
- providing PIPS programs for ongoing review of trauma system performance and outcomes;
- facilitating a confidential and collaborative local trauma advisory committee;
- maintaining a local trauma database and participating in the State Trauma Registry (CEMSIS-Trauma); and
- participating in injury prevention, public and professional education.

Each LEMSA with a trauma care system is required by statute and regulation to submit a Trauma Plan for EMSA approval followed by annual Trauma System Status Reports. This Plan is designed to meet state minimum trauma system standards, and address local short and long term trauma system needs. Plans outline the number and level of Trauma Centers and patient destination, but do not necessarily address inter-county needs. All 33 LEMSAs have approved trauma plans.

Regional Trauma Coordinating Committees (RTCC)

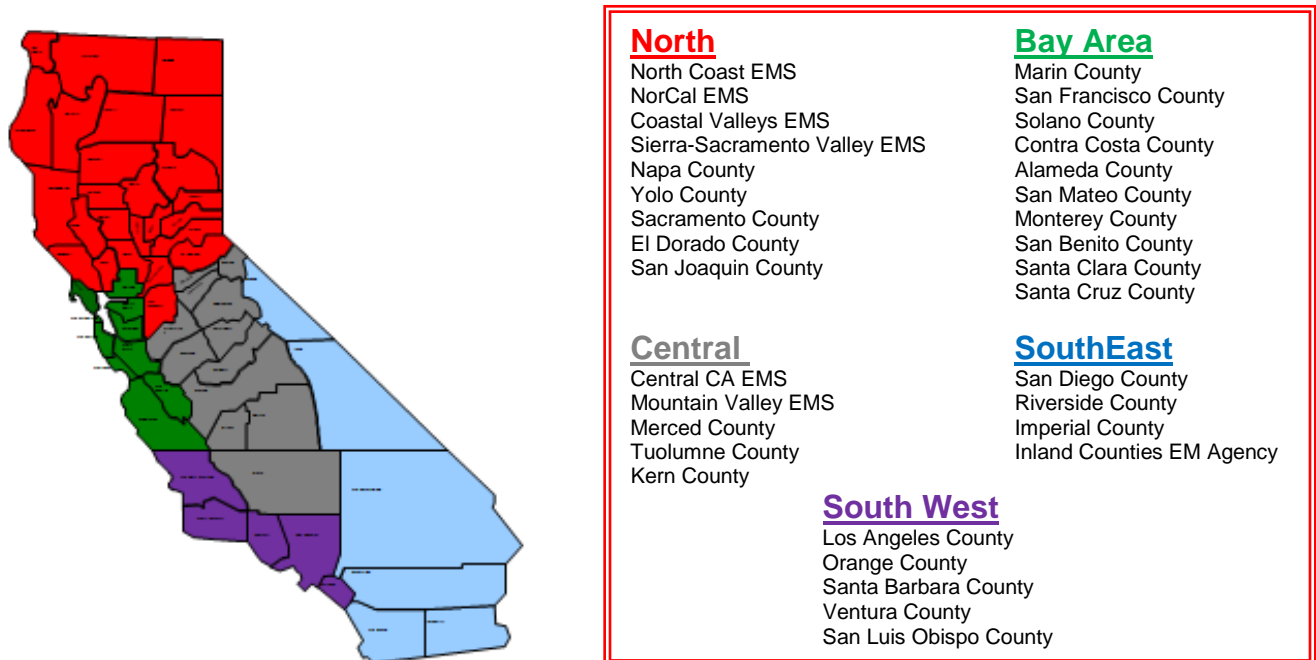


Figure 2

As a result of recommendations made by the STAC and the 2006 *California Statewide Trauma Planning, Assessment and Future Direction* document, five trauma regions were defined by EMSA and corresponding RTCCs were created in 2008 (Figure 2). RTCCs function as a conduit between the regions and EMSA/STAC to aid in statewide coordination and development of local trauma systems. In addition, the RTCCs leverage a broad range of voluntary expertise within the five regions to facilitate communication and collaboration within and between regions, to share and support best practices, to assist with the interpretation of regional data, and to provide requested technical assistance to LEMSAs and to EMSA related to the development and operation of a system of trauma care for the State of California. RTCCs may facilitate discussions related to trauma care challenges within the region working towards resolutions to minimize variations in practice. Additional regional issues may include addressing geographic isolation, coordination of trauma care resources, and funding for out-of-county patients. RTCC membership is currently voluntary and is drawn from trauma system partners within each region to include, but not be limited to, LEMSAs Trauma System Coordinators, EMS Directors and Administrators, Trauma Center Directors, Trauma Center Managers, non-trauma facility representatives, EMS providers, and CA Hospital Association representatives. State-level activity includes representation on the STAC, (acting as a subcommittee) reporting regional activities and issues, sharing regional work products, and relaying STAC information and decisions back to the region.

Trauma Centers

Trauma Centers are the key element in a trauma system and the focal point for trauma care. Many Trauma Centers participate in state and regional trauma system planning and development. Lead Trauma Centers (Level I and II) contribute administrative and medical leadership, and academic expertise to the system. Many of these lead Trauma Centers, in collaboration with the LEMSAs, engage all other Trauma Centers (Level III and IV), and a few include non-trauma acute care facilities, in the performance improvement process.

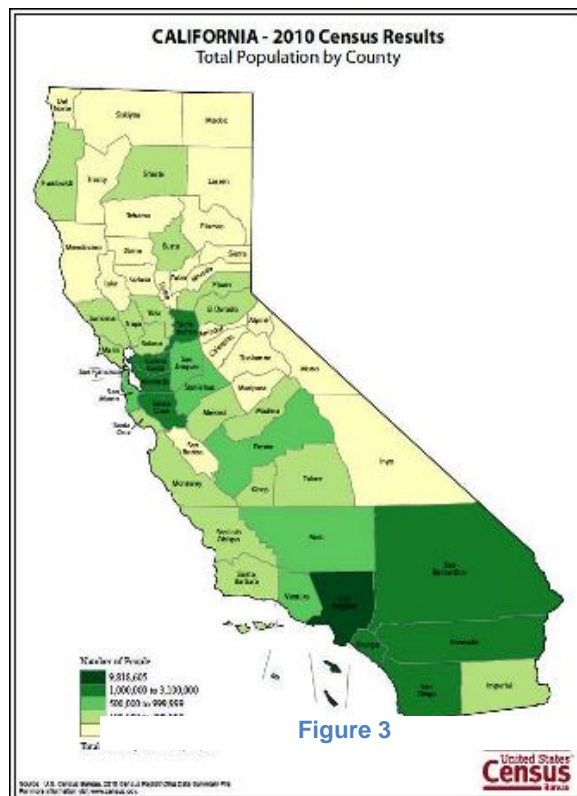
As of April 2017 there are 80 designated Trauma Centers (Table 1) in California (*Appendix D*.) It is estimated that over 70,000 trauma patients are admitted to Trauma Centers in the state annually.

TOTAL TRAUMA CENTERS BY DESIGNATION	
Level I Pediatric Trauma Center Only	2
Level II Pediatric Trauma Center Only	3
Level I Trauma Center & Level I Pediatric Trauma Center	5
Level I Trauma Center & Level II Pediatric Trauma Center	3
Level II Trauma Center & Level II Pediatric Trauma Center	4
Level I Trauma Center	5
Level II Trauma Center	34
Level III Trauma Center	13
Level IV Trauma Center	11
TOTAL:	80

Table 1

LEMSAs may designate Trauma Centers that have the capability and willingness to demonstrate a commitment to trauma care based on population needs and meet state trauma regulation requirements. The designation process is locally controlled and may include a hospital site visit by the ACS's Surgeon's Verification Review Team or teams developed by the LEMSA consisting of trauma care experts. Contracts are developed between the LEMSA and the Trauma Center, and compliance is monitored by the LEMSA periodically.

Trauma Center designations include Levels I – IV and Pediatric Levels I and II. Level I and II Trauma Centers (including pediatric Trauma Centers) have the greatest number of specialty personnel, services, and resources. Level I Trauma Centers are also research and teaching facilities. Level III Trauma Centers provide a surgical service for patients with less critical injuries which may or may not need surgery. Level IV Trauma Centers provide initial stabilization of trauma patients. Level III and IV Trauma Centers provide secondary transfer to a higher level of Trauma Center care when appropriate.



The participation of all acute care hospitals in the trauma system, providing initial assessment and care with appropriate transfer to Trauma Centers, is also a key component of an inclusive trauma system. Hospitals that are not Trauma Centers will see both patients brought by private transportation as well as patients not initially identified as having severe trauma by EMS transport providers.

System Challenges

There are many challenges and complexities for California related to trauma care, including the vast geographic area of the state with variation in terrain, population density, (Figure 3) diverse EMS cultures, weather, resources, hospital and health facility locations, and the decentralized nature of EMS in the state.

The current trauma care delivery system is an optional, locally based, decentralized trauma system as prescribed in the Health and Safety Code. Given the vast and diverse topography, transportation and access issues exist in varying degrees across the State.

The examples below illustrate some of the variation in transportation issues that are inherent between urban and rural trauma systems within California. These differences illustrate the need for coordination across the state. It is common for patients from the isolated rural areas to be

stabilized then transferred long distances to a higher level Trauma Center.

Urban California

Los Angeles and San Diego Counties have well-established trauma systems that began in the early 1980s with numerous designated Trauma Centers. San Mateo County has a coordinated trauma system without a designated Trauma Center, utilizing out-of-county Trauma Centers.

Rural California:

The entire northern geographic one-third of the State (counties of the North RTCC as described in Figure 2) has one designated Level I Trauma Center (also Pediatric Level I), six Level IIs, eight Level IIIs and eight Level IVs. The higher level centers tend to be in the more populated areas, leaving vast rural and remote sections of the State with no hospitals, few designated Trauma Centers and long transport distances over difficult terrain. Large portions of these areas experience weather extremes, periodic isolation and lack immediately available medical resources.

The northern coast of California typically experiences extended patient discovery and transport times due to difficult terrain and winding roads with no air medical resources based within the region. Prompt and efficient transport of patients to higher level Trauma Centers is extended due to distance to urban centers and, as a result, many cases are interfacility transfers. In the more southern portion of the north coast, air medical resources are more readily available resulting in direct transport from the scene to a higher level Trauma Center whenever possible.

Geographic areas with gaps in trauma service include North Eastern and Central California (east of Interstate 5 to the Nevada border, including Yosemite), and parts of the Central Coast area including the vacation and college town of Santa Cruz. While transport to a Trauma Center occurs, it requires use of limited air transport resources, long ground transport times, or a secondary transfer resulting in delays to definitive care. In addition, these transports remove patients from their community and family support as well as placing additional burdens on the receiving Trauma Center that is already serving its own community.

VI. Statewide Trauma System Planning: Project Approach and Methods

The STAC has developed these Statewide Trauma System Planning recommendations to assist EMSA in the implementation of best practices and system improvements for the trauma system in California. The STAC created an expert writing group for each planning component to assist in the recommendations. The lead for each group was chosen based on their knowledge of the assigned component. The writing groups reviewed and analyzed information related to current trauma care in the state, including statute and regulations, national standards and guidelines, trauma care costs and losses, and national trauma and emergency care reports to develop recommendations.

The Statewide Trauma System Planning development process included the following.

Review of Current Trauma Care in California

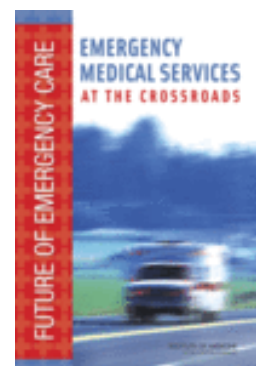
Regulations and statutory authority were reviewed to determine the current framework for how trauma care is delivered in California. In addition, this review considered how local optional systems for trauma care delivery in California were developed and the limitations of that approach.

The 2008 ACS Committee on Trauma “Regional Trauma Systems: Optimal Elements, Integration, and Assessment offers a guide to assist in trauma system development and implementation in line with the HRSA Model. The California Statewide Trauma System Planning recommendations are more in line with the context and substance found in the ACS document, taking into consideration HRSA’s public health conceptual model.

ACS provided a trauma system assessment in March 2016 based on this document. The review team complimented EMSA on well written Statewide Trauma System Planning recommendations. Recommendations from the ACS Assessment Report were then integrated into the Statewide Trauma System Planning objectives. (*Appendix B*)

Review of the 2006 Institute of Medicine (IOM) Report on the Future of Emergency Care in the United States Health System

The report, released in June 2006, is the first comprehensive look by the IOM at hospital-based emergency and trauma care, emergency medical services, and emergency care for children. The STAC used some of the report’s findings in making recommendations contained in these Statewide Trauma Systems Planning recommendations.



Analysis of National Standards for Trauma Care Delivery Systems and how they relate to California’s Trauma Care Needs

California’s current trauma care system was evaluated based on two nationally recognized authorities in trauma system development. In 2006, the Health Resources and Services Administration (HRSA) revised its previous *Model Trauma Care System Plan* and re-titled it *Model Trauma System Planning and Evaluation*. This document continues to emphasize the need

for a fully inclusive trauma care system. It provides a modern system development guide using the public health approach to the development and evaluation of trauma systems. A primary strategy of the public health approach is to identify a problem based on data, devise and implement an intervention, and evaluate the outcome.¹⁷

The ACS *Regional Trauma Systems: Optimal Elements, Integration, and Assessment* guide takes the concepts from the HRSA document and provides a self- assessment tool for trauma system planning, development and evaluation. In addition, the ACS Committee on Trauma’s 2014 *Resources for Optimal Care of the Injured Patient* provides detailed descriptions of the organization, staffing, facilities, and equipment needed to provide state-of-the-art treatment for the injured patient at every level of trauma system participation.

The HRSA document is the standard model for the development of the administrative components of a trauma plan, and the ACS standards provide important organizational and clinical standards related to systems and Trauma Center designation. These two documents, when used together, form the typical approach to trauma system planning and evaluation.

The HRSA and ACS documents were consulted in the development of the California Statewide Trauma System Planning recommendations and provided the major functional components of an inclusive statewide trauma system, which were used to develop the fifteen components in the Statewide Trauma System Planning recommendations:

1. Administrative Components
 - A. Leadership—an identified lead agency with the authority, responsibility and resources to lead the development, operations, and evaluation of the trauma system
 - B. System Development—a defined planning process for trauma system development, assessment, and evaluation
 - C. Finance—financial forecasting and accountability by the State, local trauma systems, and Trauma Centers
2. Operational and Clinical Components
 - A. Prehospital Care
 - B. Ambulance and Non-Transporting Medical Unit Guidelines—regulations, medical control, and geographic boundaries for prehospital medical units
 - C. Communication System—fully integrated with EMS and emergency/disaster preparedness systems
3. Definitive Care
 - A. Trauma Care Facilities—uniform standards for Trauma Center designation; identified role and responsibilities for other acute care facilities

An Inclusive trauma system uses all available hospital resources to ensure rapid access to trauma care by prehospital personnel for all injured patients regardless of their geographic location, and will increase surge capacity in a traumatic disaster. The Trauma Center remains the key component in this system; however, all facilities are matched with a patient’s needs. Other components include injury prevention, medical examiners and rehabilitation services.

¹⁷ **Model Trauma System Planning and Evaluation**, Health Resources and Services Administration, February 2006.

- B. Interfacility Transfer—development of policies and procedures for appropriate and expeditious transfer
 - C. Medical Rehabilitation—coordinated post-acute care for trauma patients with permanent or long-standing impairment
4. Information System—timely collection of data from all providers in the form of consistent data sets meeting minimum established standards
 5. System Evaluation and Performance Improvement—use of data to monitor the performance of the system components
 6. Education and Training—education for all levels of trauma care personnel, both hospital and prehospital as well as public education
 7. Trauma System Research—trauma related research to include epidemiologic research in prehospital care, acute care, rehabilitation and prevention
 8. Injury Prevention and Control—comprehensive and integrated approach to injury prevention
 9. Emergency/Disaster Preparedness—fully integrated with EMS system, local government, private sector and acute care facilities

HRSA Model Trauma Guidelines Assessment of California

The “2006 Health Resources Services Administration Model Trauma System Planning and Evaluation” demonstrates the interrelationship of the core functions, essential services and trauma system benchmarks. It depicts core research that drives the system and essential governance structure that supports system management, and system benchmarks that circulate around the core constructs. This model supports assessment, policy development and assurance representing core functions of public health necessary for successful trauma system development.¹⁸ The document also provides an assessment tool to evaluate how California’s delivery of trauma care meets the national standards set forth in the document. The document was developed by a group of national experts with input from each state, including California. The intent of the tool is to allow an individual trauma system to identify its strengths and weaknesses, prioritize activities, and measure progress against itself over time. Guidelines are designed to provide trauma care professionals and health policy experts with direction in developing integrated statewide trauma systems focused on a public health model for injury prevention and disability mitigation after injury. The document includes core functions with benchmarks and indicators for planning a statewide trauma system. Each core function in the tool (Assessment, Policy Development, and Assurance) contains a variety of benchmarks. These benchmarks are based, to the extent possible, on current literature on trauma system development. The benchmarks focus primarily on process measures. It is assumed that meeting these process measures should result in improved outcomes.

¹⁸ **Model Trauma System Planning and Evaluation**, Health Resources and Services Administration, February 2006,

Using the HRSA document, the STAC assessed California's current system of trauma care and identified next steps to develop an inclusive and comprehensive State Trauma System. *Appendix A* provides California's current status of these benchmarks based on the 2006 Trauma System Assessment Indicators. Although all components of the HRSA assessment are important, because of the nature of California's system, these Statewide Trauma System Planning recommendations configure the national indicators into 15 components allowing for a more manageable and tailored approach to the implementation of trauma care/system improvements.

Surge Capacity Assessment

EMSA used the HRSA bioterrorism standards to determine California's readiness related to surge capacity for the care of critical trauma. The HRSA benchmark states that systems shall be established that, at a minimum, can provide triage, treatment, and initial stabilization above current daily staffed bed capacity for adult and pediatric patients requiring burn and/or trauma care hospitalization within three hours in the wake of a terrorism incident or other public health emergency. HRSA has established an ad hoc surge capacity target of 500 extra hospital patients per million population in urban areas.¹⁹ To date, this benchmark has not been evaluated, independent of general hospital surge capacity.

Surge Capacity—health care system's ability to expand quickly beyond normal services to meet the increased demand for medical care in the event of bioterrorism or other large-scale public health emergencies.

A trauma/burn bed is much more than an acute hospital bed as it implies that a multidisciplinary trauma team, with trauma care expertise and adequate ancillary support and facilities, is immediately available to perform emergency surgery. Multiple critical trauma and burn patients arriving at a Trauma Center create a unique surge challenge to such a system.

Incorporation of the recommendations made in the 2006 California Statewide Trauma Planning: Assessment and Future Direction

In addition to the findings from the HRSA assessment, there were three primary recommendations that were cited for the trauma system in the 2006 *California Statewide Trauma Planning: Assessment and Future Direction* document. Progress on these recommendations was evaluated, as work continues:

1. Strengthen State Trauma Leadership

The development of trauma systems is not required in statute or regulations; however all 33 LEMSAs have Trauma Plans approved by EMSA. The Annual Trauma System Status Report from each LEMSA must show that the LEMSA is in compliance with its approved Trauma Plan as well as statute and regulations. Since the publication of the *California Statewide Trauma Planning: Assessment and Future Direction* in 2006, 22 additional Trauma Centers have been designated.

¹⁹ Bioterrorism and Health System Preparedness. Rockville (MD): Agency for Healthcare Research and Quality; Optimizing surge capacity: regional efforts in bioterrorism readiness. Issue Brief No. 4. AHRQ Publication No. 04-P009. Also available from: URL: <http://www.ahrq.gov/news/ulp/btbriefs/btbrief4.htm>.

In 2008, EMSA established five RTCCs as a method to address gaps and inconsistencies and improve surge capacities. The RTCCs bring together system stakeholders and member LEMSAs to facilitate communication and coordination to minimize variations in practice, and provide regional performance improvement activities to advance the delivery of quality trauma care. Standardization occurs through state coordination, collaboration between RTCCs to support state standards, sharing of best practices, and promoting uniformity of data collection. EMSA participates in each RTCC by providing updates on statewide EMS issues and soliciting feedback on current projects under development. Each RTCC is a subcommittee of the STAC and provides representation where RTCC activities are shared and discussed. The STAC provides guidance to the RTCC as needed.

2. Develop Statewide Trauma Registry

The California EMS Information System (CEMSIS) was developed as a demonstration project funded by the Office of Traffic Safety. Data collection at the state level is dependent on the local EMS and trauma data systems managed by the local EMS agencies. The current regulations require the integration of prehospital and hospital trauma system data into the LEMSA and the EMSA data system (CCR, Title 22, Division 9, Chapter 7, §100253). Trauma Centers send trauma data into CEMSIS – either directly or through their LEMSA. From 2009 through 2012, CEMSIS collected over 250,000 patient care records. The standards for data collection are based on national standards established by the National Trauma Data Bank. In 2013, the State migrated CEMSIS into new data system software. As a result, LEMSAs have modified their systems for submission to the state. Participation has improved significantly over time. From 2013 through 2016, CEMSIS has collected over 250,000 patient care records.

3. Consider Trauma System Funding

Limited funds were made available to LEMSAs to modify their local data systems to be compliant with national standards and participate in CEMSIS. In addition, seed monies were provided to the RTCCs to assist in regional summits and conference calls. These monies are no longer available and there is no dedicated funding for state oversight of the Trauma System.

VII. Trauma System Strategies and Directions

Based on the HRSA benchmarks (Figure 4) and a current evaluation of California’s trauma system, utilizing the ACS’s trauma system guidance document, the following 15 components outline the future recommendations to continue the successful development and implementation of an effective Trauma System. Details on the proposed development for each component are found in *Appendix B* including the recommendations found in the ACS State Trauma System Assessment Report.

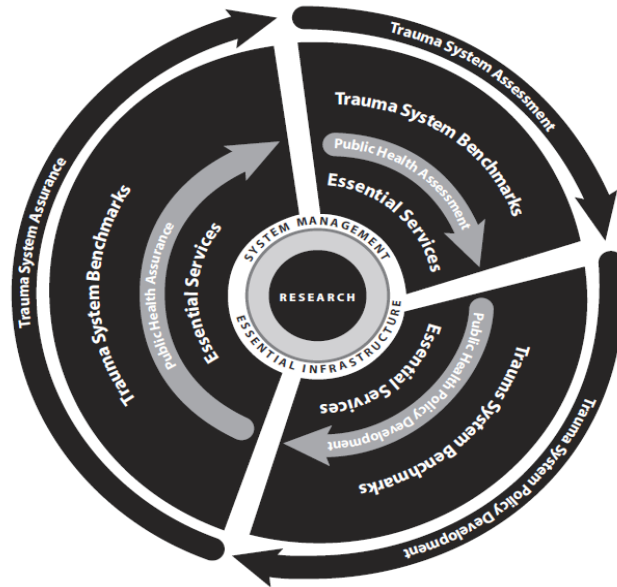


Figure 4

1. State Leadership—HRSA

Benchmark #202 (200 series: policy development). *Trauma system leaders use a process to establish, maintain, and constantly evaluate and improve a comprehensive trauma system in cooperation with medical, professional, governmental and citizen organizations. This requires strong state leadership.*

Barriers

Under the current statutory and regulatory framework, trauma is an optional local program. Since all 33 local EMS agencies have trauma plans in place, care is being provided locally; however, the trauma community perceives the need for improved coordination of patient movement between LEMSAs in addition to greater consistency in standards of care. EMSA has staff to review and approve statutorily mandated trauma plans but insufficient staff or central resources to fully coordinate a statewide trauma system. Limited resources at the state level mean that there is limited oversight of the locally based systems including lack of comprehensive regional and statewide performance analysis to assess such issues as field triage and timely access to care. While California’s decentralized approach to EMS permits flexibility and the tailoring of EMS practices to local needs, it has also allowed problematic variability in trauma care practices, as previously described under system challenges.

Opportunities

LEMSA and EMSA leadership remains essential to the overall success of the trauma system. The creation and development of RTCCs represent a principal change in the structure of the trauma system, including the composition of the STAC that now includes regional representatives from each RTCC.

The RTCCs do not replace LEMSAs or supplant the authority that EMS agencies currently maintain over EMS and trauma systems, but should have State support to build upon existing local EMS jurisdictions to address challenges of access, geographic isolation, coordination and optimal distribution of trauma care resources, and funding of out-of-county patients.

A regional structure, supported by the LEMSAs and RTCCs encourages optimal sharing of resources and information. Patient flow patterns, provisions for uncompensated care, and quality of care are improved through optimal sharing of resources throughout the region. The STAC and EMSA promote interregional standardization.

Goal: EMSA provides coordination, guidance, and assistance to the LEMSAs and RTCCs to enhance the consistency of trauma-related standards and guidelines throughout the state and improve the overall quality of trauma care

Objectives:

1. EMSA to encourage the collaborative efforts of the counties to support and share resources for a regionally-based trauma system.
2. EMSA to work with the LEMSAs, STAC and the RTCCs to develop a consensus compendium of trauma-related policies, procedures, and clinical guidelines that may be shared throughout the state.
3. LEMSAs to develop local trauma plans in the context of regional trauma care with input from Trauma Centers and RTCCs.
4. Establish basic quality and activity reporting standards and report templates for the LEMSAs to ensure that EMSA, STAC, and PIPS subcommittee receive sufficient data to assess state trauma system performance.

2. System Development—HRSA Benchmark #203 (200 series: policy development). *The state lead agency has a comprehensive written trauma system plan based on national guidelines. The plan integrates the trauma system with EMS, public health, emergency preparedness, and emergency management. The written trauma system plan is developed in collaboration with community partners and stakeholders.*

Barriers

Since trauma system development is optional, and the commitment to advanced trauma care by an existing facility with the population to support it is necessary, there is a wide range of trauma system models in California. The variance runs from LEMSAs with well-established trauma systems with designated Trauma Centers at various levels to LEMSAs that have limited implementation of the plan or no designated Trauma Centers. The ability to help coordinate trauma system activity and facilitate related interactions among all the LEMSAs by EMSA and STAC has historically been limited.

Opportunities

The LEMSA may assist EMSA in providing for a comprehensive analysis of trauma resources throughout the State including access-to-care assessment. The STAC may provide guidance and coordination for specific RTCC activities and projects with statewide implications.

Goal: Develop an inclusive statewide trauma system that provides an appropriate level of care for all individuals following major injury.

Objectives:

1. Conduct a systematic review of local trauma plans in the context of these Statewide Trauma System Planning recommendations and the structures and processes it outlines.
2. Develop processes and mechanisms for providing optimal care to special populations; for example, pediatric populations.
3. Update regulations to set specific standards and requirements for trauma system implementation, and to address changes to be consistent with the California Statewide Trauma System Planning recommendations, 2017.

3. Trauma System Financing—HRSA Benchmark #204 (200 series: policy development) and #309 (300 series: assurance). *The financial aspects of the trauma systems are integrated into the overall quality improvement system to assure ongoing “fine-tuning” and cost-effectiveness.*

Barriers

Beyond the Maddy EMS Fund, there is limited statewide funding to support local trauma systems, Trauma Centers or emergency/trauma care. Previously, legislation has been proposed to identify funding through levying taxes or fees on products associated with trauma, (i.e. alcohol, ammunition, firearms). However, these efforts have not been successful. The Tobacco Tax in 1990 was the last approved tax for uncompensated care; however, the majority of these funds have been redirected to other programs at the State, and the limited remaining funds do not go to the organization, coordination, and development of the State Trauma System. The lack of standardized data collection across the State leads to limited information about trauma care to inform policy based on cost effectiveness and efficiency. Beyond very limited federal grant funds, there is no stable funding source to manage the Trauma System.

There are three areas where funding is needed to develop an effective State Trauma System:

1. Support for uncompensated care
There are insufficient data to analyze the current fiscal status of our Trauma Centers. Historically, trauma system providers have indicated that additional Trauma Center funding is required. Health and Safety Code §1797.199 created the Trauma Care Fund for the purposes of compensating Trauma Centers for high percentages of uninsured patients, but this fund has not had appropriation since 2005. As more patients obtain coverage through the Affordable Care Act, and insurance coverage is expanded in both the public and private sector, the changes to trauma care reimbursement patterns should be studied under these changing payment mechanisms.
2. Support for EMSA and LEMSA administration of the program
Under current law, some LEMSAs receive only a small percentage of existing funds (Tobacco, Maddy, etc.) to support administrative, hospital, and physician costs. Some LEMSAs support local trauma system administrative and data costs through Trauma Center designation fees, which vary (from \$0 to \$100,000) across the State. There is

insufficient information about local funding to determine if there are enough resources to meet trauma system regulatory mandates and national guidelines. System requirements for performance improvement necessitate stable funding. In addition to funding, data are required for system evaluation, including fiscal information and post-discharge outcome data from rehabilitation facilities.

Current State Trauma System oversight is funded through the Federal Preventive Health and Health Services Block Grant.

3. Increase participation of community hospitals in the trauma system

Funding is necessary to initiate development of level III and IV Trauma Centers to provide regional trauma care in rural areas without nearby higher level trauma capacity. Existing local funding sources in rural areas are insufficient to fund both facilities and system administration.

Opportunities

The Affordable Care Act reauthorizes and improves the trauma care program by providing competitive grants, administered by the U.S. Health and Human Services Secretary, to states and Trauma Centers to strengthen the nation’s trauma system. The prerequisites for some of this funding may include the establishment of tracking communications systems and participation in the National Trauma Data Bank. Although the Affordable Care Act reauthorizes the trauma care program, funding has not been appropriated.

Goal: EMSA, in collaboration with the STAC, LEMSAs, and RTCCs, to explore the feasibility of a State Trauma System Business Plan to identify the system’s current financial status, perform a needs assessment to identify specific aspects of the system that need funding, and identify opportunities for future trauma system funding. It is important to recognize that dollars spent on infrastructure are returned through improved performance and quality of care that lead to better patient outcomes.

Objectives:

1. Identify critical Trauma System components and the cost to develop and maintain them.
2. Work with researchers and hospitals to establish a basis for estimating the actual cost for trauma care in California
3. Identify sustainable funding sources to support regional infrastructure and planning.

4. EMS System: Prehospital Care—HRSA Benchmark #302 (300 series: assurance). *The trauma system is supported by an EMS system that includes communication, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated.*

Barriers

Trauma triage and destination policies often reflect the availability of trauma services within a specific community. With varying availability of resources, along with dense and sparse

populations there is variation in trauma triage criteria and destination determinations. The study of under and over triage has been limited due to differing triage policies and definitions.

Opportunities

The Centers for Disease Control and Prevention and the ACS Committee on Trauma have developed national trauma triage guidelines. These guidelines have been adopted by many of the LEMSAs both locally and regionally through RTCC collaboration.

Goal: Develop a minimal statewide standard for the triage of trauma patients to enable study of under and over triage.

Objectives:

1. Utilize the most current national standard for prehospital triage as the foundation for prehospital trauma triage guidelines. Based on specific environments (e.g. urban vs. rural) and presence or absence of Trauma Center resources, some local modifications may be required.
2. Develop definitions to study over and under triage with a mechanism to track on a regional basis.
3. Work with OSHPD in obtaining specified data from non-trauma facilities on major trauma patients transported to the facility and not transferred.
4. Adopt standards for transfer of documented information from field units to receiving hospitals with the goal that prehospital care reports be made available as part of the medical record for all trauma patients.
5. Explore the need for minimal special population field trauma triage criteria, e.g. pediatric and geriatric.
6. Develop EMS protocol guidance for field trauma care

5. EMS System: Ambulance and Non-Transporting Medical Units—HRSA Benchmark #302 (300 series: assurance). *The trauma system is supported by an EMS system that includes communication, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated.*

Barriers

Non-transporting prehospital medical units are configured in various ways throughout California. In urban regions, it's common for non-transporting units to be fire apparatus staffed by EMT or paramedic level personnel. Rural areas (including state and federal parks, forests, and beaches) may have staff cars or rescue units in various configurations and capabilities staffed with trained first responders, EMTs, or in some cases paramedics; many have volunteer personnel. Organized search and rescue teams also fit the category of non-transporting EMS units. Because of the diverse population and environmental challenges in California, response and transport times for EMS units vary significantly from area to area.

Opportunities

National recommendations have been developed for standards for equipment inventories of EMS resources. EMSA enforces EMS Aircraft regulations and publishes statewide Prehospital EMS Aircraft Guidelines.

Goal: Provide a minimum standard and align the use of ground vs. air resources for the transport of trauma patients to the closest appropriate level of Trauma Center that is equipped and staffed to best meet the needs of the injured patient.

Objectives:

1. Develop minimum prehospital equipment inventory for non-transport/transport EMS units specific to trauma needs.
2. Recommend air resource utilization guidelines applicable state-wide including access to air resources.

6. EMS System: Communications—HRSA Benchmark #302 (300 series: assurance). *The trauma system is supported by an EMS system that includes communication, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated.*

Barriers

The current 911 alert system has limited integration with cell phones or internet-based communication methods. Many small dispatch centers and rural regions are without priority dispatch or protocols.

Opportunities

PIPS Programs and processes are found in systems utilizing Emergency Medical Dispatching (EMD). Opportunities exist to expand the implementation of PIPS in dispatch centers regardless of implementation of an EMD program.

Goal: Standardized communications to be coordinated between all EMS systems on a given incident, utilizing current technology, to notify the trauma care team of essential information about the injured patient and ensure that appropriate destination decisions are made.

Objectives:

1. Develop guidance for priority dispatch protocols for trauma and investigate process changes that improve dispatch effectiveness while improving outcomes.
2. Study the hospital alert systems currently in place to identify hospital capability, capacity, and specialty care availability (e.g., burns, pediatrics,) and complete a gap analysis.

7. Definitive Care: Acute Care Facilities—HRSA Benchmark #303 (300 series: assurance). *Acute care facilities are integrated into a resource-efficient, inclusive network that meets required standards and that provides optimal care for all injured patients.*

Barriers

There are currently 343 acute care facilities with emergency departments in the state of California. Of these, 80 are designated Trauma Centers. Twenty California counties currently have no designated Trauma Centers within county lines. The process by which a non-trauma facility applies for and achieves formal LEMSA designation, as well as the process for re-designation varies throughout the state.

Opportunities

The Trauma System with respect to its acute care facilities should strive towards providing basic trauma care throughout the state, make every effort to provide definitive care regardless of the type and severity of injury, have designated centers maintain capabilities commensurate with their level of designation, and improve the consistency of processes related to initial and recurring designation.

Goal: Develop a network of acute care facilities intended to provide universal access to the appropriate level of trauma care.

Objectives

1. Develop guidelines outlining a process for the assessment of Trauma Center compliance with CCR Title 22, Chapter 7.
2. Outline the responsibilities and expected participation in the trauma system for non-designated acute care hospitals.
3. Establish EMSA guidelines to standardize the Trauma Center designation process across LEMSAs.

8. Definitive Care: Re-triage²⁰ Interfacility Transfer—HRSA Benchmark #303 (300 series: assurance). *When injured patients arrive at a medical facility that cannot provide the appropriate level of definitive care, there is an organized and regularly monitored system to ensure the patients are expeditiously transferred to the appropriate, system-defined trauma facility.*

Barriers

The frequency, location, and severity of related injuries involved with re-triage and interfacility transfer within the state are largely unknown. Obstacles to transfer and re-triage include lack of a proximally located Trauma Center, lack of knowledge regarding the capacity and capabilities of potential receiving centers, concern about potential EMTALA violations if patients are not fully evaluated and treated before transfer to a higher level of care, local geographical and climatic obstacles to transportation (e.g. remote location, mountains, fog, etc.), or transportation availability.

²⁰ For purposes of this document, re-triage means the immediate evaluation, resuscitation and transport of a seriously injured patient from a lower level trauma facility or NTC to a designated Trauma Center at a higher level of care. This process involves direct ED to ED transfer of patients that have not been admitted to the hospital. Interfacility transfer (IFT) refers to the transfer of an admitted patient, under the care of an admitting physician-of-record, from one facility to another.

Opportunities

Re-triage/Interfacility Transfer (IFT) protocols have been developed in several areas in the state, and their effectiveness has just begun to be monitored.

Goal: Develop mechanisms, processes, and guidelines that will optimize timely access to trauma care at a level commensurate with the severity of injury, regardless of geographic location.

Objectives:

1. Capture re-triage and IFT data in CEMISIS for statewide analysis and develop a map of re-triage and IFT traffic within the state.
2. Explore the development of centralized re-triage/transfer coordination within the state.
3. Assist in the development of regional cooperative arrangements between sending and receiving centers that will facilitate re-triage, reduce delays, and provide that patients are re-triaged to an appropriate level of care.

9. Definitive Care: Rehabilitation—HRSA Benchmark #308 (300 series: assurance). *The lead agency ensures that adequate rehabilitation facilities have been integrated into the trauma system and that these resources are made available to all populations requiring them.*

Barriers

California trauma regulations currently contain specific requirements for early rehabilitation involvement and the utilization of physical, occupational, and/or speech therapies for the trauma patient, some of which may be provided through a written transfer agreement. Most rehabilitation facilities are independent facilities and the degree of integration into the trauma system varies considerably. In addition, the degree of access to level-of-care post-injury rehabilitation throughout the state is unknown.

Opportunities

The rehabilitative needs of trauma patients in the context of a statewide system of care should be systematically addressed using acceptable standards.

Goal: Develop a plan to assess the availability and capabilities of rehabilitation facilities in the state and integrate them into the regional planning and performance improvement process.

Objectives:

1. Improve the data collection for evaluation of rehabilitative needs and degree of access to rehabilitation throughout the state
2. Adopt a standardized measure of functional recovery suitable for use throughout the trauma system

10. Information System—HRSA Benchmark #101(100 series: assessment). *There is a thorough description of the epidemiology of injury in the system jurisdiction using both population-based data and clinical databases.*

Integration of our trauma and EMS data with performance dashboards and more in-depth analysis is imperative to improving and continuously monitoring the Trauma System. Continued collection of trauma system data is necessary to assess performance, quality, utilization and prevention, benchmark against existing national standards, and to inform future policy decisions and directions.

Barriers

With the exception of the counties included in the multi-county EMS agencies, participation in CEMSSIS by LEMSAs is inconsistent. While data-related regulations exist for Trauma Centers and LEMSAs, compliance with these requirements from LEMSAs and non-trauma facilities is disparate. In addition, data elements and their definitions vary among LEMSAs, and thus interpretation of outcomes or processes is inconsistent. In the absence of statewide trauma system data, including financial data, a reliable assessment of system performance and determination of additional system resource needs is imprecise.

CCR Title 22 §100257 states:

- (a) The local EMS agency shall develop and implement a standardized data collection instrument and implement a data management system for trauma care.*
 - (1) The system shall include the collection of both prehospital and hospital patient care data, as determined by the local EMS agency;*
 - (2) trauma data shall be integrated into the local EMS agency and State EMS Authority data management system; and*
 - (3) all hospitals that receive trauma patients shall participate in the LEMSA data collection effort in accordance with LEMSAs policies and procedures.*
- (b) The prehospital data shall include at least those data elements required on the EMT-II or EMT-P patient care record, as specified in Section 100129 of the EMT-II regulations and Section 100176 of the EMT-P regulations.*

Opportunities

The State Trauma Registry should be linked with the EMS Data System (prehospital care data) to create a robust program in support of the EMS system core measures to achieve process and outcome measures to better measure trauma care across the state. In addition, the system should be expanded to include a minimal dataset from non-trauma facilities. There should be a process to evaluate the quality, timeliness, completeness, and confidentiality of data.

Effective January 2016, Health and Safety Code, Division 2.5, Chapter 3, Article 2, permits the release of patient-identifiable medical record information to an EMS provider, LEMSA and EMSA for quality assessment and improvement purposes.

1797.122. (Sharing of Patient-Identifiable Data)

- (a) Notwithstanding any other law, a health facility as defined in subdivision (a) or (b) of Section 1250 may release patient-identifiable medical information under the following circumstances:*

(1) To an EMS provider, information regarding a patient who was treated, or transported to the hospital by, that EMS provider, to the extent that specific data elements are requested for quality assessment and improvement purposes.

(2) To the authority or the local EMS agency, to the extent that specific data elements are requested for quality assessment and improvement purposes.

(b) An EMS provider, local EMS agency, and the authority shall request only those data elements that are minimally necessary in compliance with Section 164.502 (b) and Section 164.514 (d) of title 45 of the Code of Federal Regulations.

Goal: Establish linkages of databases to create a complete patient record.

Objectives:

1. Improve data sharing
2. Improve data quality and compliance
3. Evaluate data validity

11. System Evaluation and Performance Improvement—HRSA Benchmark #301(300 series: assurance). *The trauma management information system is used to facilitate ongoing assessment/analysis and assurance of system performance and outcomes and provides a basis for continuously improving the trauma system including a cost-benefit analysis.*

Barriers

The role of the RTCCs in overall system performance improvement is still being developed. Participation by non-trauma facilities in the local trauma system PIPS Program, including contributing data to the LEMSA's trauma registry, is inconsistent across LEMSAs. Without consistent metrics to measure performance across the LEMSA boundaries effectiveness of a statewide system cannot be demonstrated.

Opportunities

In order to evaluate the Trauma System, the continuum of care from dispatch to prehospital to hospital disposition must be connected through a data system. Only then can we begin to understand how care provided translates to improved outcomes and system effectiveness.

Goal: A PIPS Program to be developed by EMSA in collaboration with the LEMSAs and RTCCs to evaluate statewide trauma system performance.

Objectives:

1. In collaboration with the LEMSAs, and with the participation from the RTCCs, formulate a statewide comprehensive Trauma PIPS Plan consistent with the elements of these Statewide Trauma System Planning recommendations. Utilizing State Trauma Registry data:
 - a) Measure performance and quality through the development and analysis of system-wide performance improvement standards that are applicable statewide.

- b) Develop methodologies for outcomes analysis, using both registry data and OSHPD hospital and emergency department discharge data and medical examiner/coroner data.
 - c) Promote case-based performance improvement whereby sentinel events relative to trauma system deficiencies are identified.
 - d) Develop a methodology to assess over and under triage to support evaluation of field triage protocol.
2. Evaluate state data, identify regional opportunities for improvement, determine if similar opportunities are occurring in other regions, and explore mechanisms for shared resolution.
 3. Create a policy regarding the sharing of data for the PI process, recognizing hospital confidentiality and HIPPA regulations.
 4. Benchmark individual systems, hospitals, LEMSAs and RTCCs to the group as a whole and to an outside standard including a comparative analysis of risk-adjusted outcomes.

12. Education and Training—HRSA Benchmark #105 (100 series: assessment), #205 (200 series: policy development) and #310 (300 series: assurance). *Education for trauma system participants is developed based on a review and evaluation of trauma data. In cooperation with the prehospital certification and licensure authority, set guidelines for prehospital personnel for initial and ongoing trauma training including trauma-specific courses and those courses that are readily available throughout the State. An assessment of the needs of the general public concerning trauma system information should be conducted.*

Barriers

Private and public surveys indicate that the general public regards all hospitals as Trauma Centers and few can indicate where their closest Trauma Center is located; furthermore, many citizens are not aware that the EMS system is the best avenue to receive trauma care.

Education and training of trauma care professionals is compartmentalized into prehospital, nursing, and physician education with limited trauma systems education.

Opportunities

State, regional and local education needs should be identified, and resources readily available to meet those needs. Guidance for education competencies should exist, and each region's individual educational offerings should address local needs.

Goal: Identify statewide educational needs through the PIPS Program in consultation with the community, EMS providers, hospitals, LEMSAs, and RTCCs.

Objectives:

1. Develop a plan for providing information to the public regarding the structure and function of the Trauma System.
2. Perform a needs assessment prior to developing new or additional trauma-related professional educational programs.

3. Encourage the use of the ACS Rural Trauma Team Development Course, video conferencing, online education, and telemedicine connections between non-trauma facilities and lower level Trauma Centers with higher level Trauma Centers.

13. Research—HRSA Benchmark #301 and #306 (300 series: assurance). *A process is in place to facilitate the access to data for evaluation and research. The trauma system has developed mechanisms to engage the general medical community and other system participants in their research findings and performance improvement efforts.*

Barriers

Most research projects are being conducted by single institutions or agencies and are not utilizing the opportunities of collaborative, multidisciplinary research.

Opportunities

Trauma system research involving both local and state agencies should be part of local/regional trauma system.

Goal: The CEMISIS, LEMSAs, and Trauma Centers should become the basis for collaborative systems research.

Objectives:

1. Develop a research agenda (possibly through a local research committee) and collaborate with established investigators to conduct research projects.
2. Periodically review trauma system data derived from CEMISIS, OSHPD, and other sources, and make a recommendation to various system stakeholders regarding potential areas of research.

14. Injury Prevention—HRSA Benchmark #203 (200 series: policy development). *A written injury prevention and control plan is developed and coordinated with other agencies and community health programs. The injury program is data driven, and targeted programs are developed based on high injury risk areas. Specific goals with measurable objectives are incorporated into the injury plan.*

Barriers

Statewide injury control in California has been established primarily under the direction of the Department of Public Health; however EMSA recognizes the need to interface these efforts and with Trauma System objectives.

Opportunities

Recommend the application of the public health model in reducing trauma and subsequent injuries by applying basic public health principles and guidelines to identify risk factors and help develop and choose prevention strategies that are comprehensive. It is important to know which injury prevention strategies are proven effective, and those that are less effective, in order to have the greatest impact.

Goal: Improve coordination and utilization of public health and trauma systems injury prevention resources at the state, regional and local levels.

Objectives:

1. Develop a compendium of regional injury prevention programs.
2. Collaborate with the Department of Public Health to evaluate, implement, and determine the effectiveness of initiatives to reduce intentional and unintentional injuries.

15. Emergency/Disaster Preparedness—HRSA Benchmark #203 (200 series: policy development). *The trauma system plan has established clearly defined methods of integrating with emergency preparedness plans (all hazards).*

Barriers

Funding from HRSA and FEMA is limited to assist Trauma Centers in preparing for the next inevitable event when they are already under economic duress. There is inconsistent coordination of Trauma Centers with disaster response planning to fully utilize the specialty resources of the trauma system.

Opportunities

EMSA can advocate utilizing federal hospital preparedness funds, emphasizing the integration of the trauma system into the statement of work. Funds may be used to assess the trauma system's emergency preparedness including coordination with the public health agency, EMS system, and the emergency management agency. Funding through the Affordable Care Act for States, when appropriated, can serve to improve pre-hospital and trauma care at a regional level on a day-to-day basis and could have implications for surge management and regional disaster response.

Goal: Have the Statewide Trauma Planning Recommendations integrated with, and complementary to, the comprehensive mass casualty plan for natural and manmade incidents, including an all-hazards approach to planning and operations.

Objectives:

1. Incorporate the role of the trauma system in the California Department of Public Health and Medical Emergency Operations Manual.
2. Develop a recommended inventory for a trauma cache to be utilized at Trauma Centers in the event of a disaster.
3. Plan for trauma system surge capacity in collaboration with local Public Health and Emergency Health Management, depending on disaster risk assessment.

VIII. Priorities for Trauma System Objectives

The following priorities are based on these Statewide Trauma System Planning recommendations for strategies and policy direction:

1. Strengthen State Trauma Organizational Structure and Leadership

(Goal 1: State Leadership; Goal 2: System Development)

EMSA should explore mechanisms within state rules and existing funding sources to better leverage resources to support trauma care in California. EMSA's infrastructure should have appropriately trained personnel in Trauma System development to provide management and evaluation of the system in collaboration with the STAC, LEMSAs, and RTCCs.

The RTCCs are well-established through consensus practice and volunteer effort. They provide for regional needs assessments and set priorities based on the results that encourage optimal sharing of resources to improve access to quality trauma care throughout their regions. To move forward, the RTCCs, LEMSAs and EMSA should work towards standardization within the region as well as inter-regionally where appropriate.

2. Examine Trauma System Funding Options

(Goal 3: Trauma System Finance)

There are three areas where funding options should be further evaluated in order to improve the existing trauma care system in California:

- A. To provide support for state, regional, and local administration of the trauma program
Neither EMSA nor LEMSAs currently receive state general funds to support administrative development and oversight of the Trauma System. EMSA funding is dependent in part on the Preventive Health and Health Services Block Grant. There are other time-limited grants to support data and performance improvement activities. Permanent funding sources may be necessary to maintain and advance the Trauma System.

Local systems receive only a small percentage of existing funds (Tobacco Tax, Maddy EMS Fund, Richie's Fund) to support administrative costs. The majority of these funds are applied to trauma care reimbursement. Many LEMSAs receive designation fees from the Trauma Centers which may be applied to trauma system costs. Two LEMSAs receive monies from property taxes to support the trauma system. Stable funding sources are desirable at the local level to maintain essential trauma systems.

- B. To help increase system participation by community hospitals
An inclusive Trauma System requires the participation of all acute care facilities to increase trauma care capacity and to collect and analyze essential data. Some hospitals have limited resources to provide a level of trauma care needed for the critically injured who arrive at their facility. Financial support for these facilities would facilitate an

inclusive system and a regional approach to trauma care. Specifically it would provide a coordinated process to stabilize and transfer trauma patients to the level of care commensurate with their injuries. The exchange of data and participation in local and regional performance improvement by all facilities that receive trauma patients advances the system and provides the tools to improve care.

C. Support for Uncompensated Care

At this time, there are insufficient data to determine if additional funding for indigent patient care is needed and at what level to cover uncompensated trauma care. EMSA should work with researchers and hospitals to establish the basis for estimating the actual cost of trauma care in California. In addition, the effect of the Affordable Care Act and insurance coverage expansions (both public and private) on trauma care reimbursement should be studied to determine the future impact of uncompensated care with payment shifts driving new care models and changing payment mechanisms. Decreasing reimbursement may cause some Trauma Centers to downgrade or de-designate. Alternatively, the formation of Medicare Accountable Care Organizations may stimulate interest in Trauma Center designation to keep patients within the service network.

3. Establish a Statewide Performance Improvement and Patient Safety (PIPS) Program

(Goal 11: System Evaluation and Performance Improvement)

A PIPS Program is a structured effort to demonstrate a continuous process for improving care for injured patients. EMSA should provide the leadership necessary to coordinate the PIPS program supported by a reliable method of data collection that consistently obtains valid and objective information necessary to identify opportunities for improvement. The PIPS method involves guideline development, process assessment, process correction, and monitoring for improvement. The California PIPS program would be characterized by

- authority and accountability for the program;
- a well-defined organizational structure;
- appropriate, objectively defined standards to determine the quality of care; and
- explicit definitions of outcomes derived from relevant standards where available.

Patient safety is inseparable from the PIPS process and underscores an important program goal. The patient safety process will direct its efforts at the environment in which care is given, and the PIPS process will be directed at the care itself.

4. Design the State Trauma Registry to support the PIPS Program

(Goal 10: Information System)

Development of a statewide trauma data system is imperative to improving and continuously monitoring trauma systems. Data is necessary to assess performance, quality, utilization and prevention, benchmark against existing national standards, and inform future policy decisions and directions. The State Trauma Registry should be linked with the EMS Data System (prehospital care data) and hospital emergency medical record to create a robust program in

support of the EMS system core measures. In addition, the system should be expanded to include a minimal data set from non-trauma facilities.

The National Trauma Data Standard (NTDS) has served as a key mechanism to assess Trauma Centers. The State Trauma Registry should utilize NTDS as well as additional data elements which will serve to assess trauma system function in the state.

LIST OF APPENDICES

Appendix A: HRSA/EMS Authority Benchmark Status

Spreadsheet showing HRSA Benchmarks from the 2006 Model Trauma System Planning and Evaluation document and how California is currently meeting each benchmark

Appendix B: Statewide Trauma System Planning Components and Assessment

The functional components of the Statewide Trauma System Planning recommendations are divided into 15 components. Each component contains two parts: 1) Background and Current Status; a brief description of the existing component and 2) Planned Development; a listing of objectives outlining how the component is expected to develop over the next 3-5 years.

Appendix C: State Trauma Advisory Committee Membership

Listing of STAC membership with associated affiliation

Appendix D: Designated Trauma Centers

Listing of current designated Trauma Centers with Level of designation noted

Appendix E: Trauma System Research

A selection of trauma system articles reflecting national and California research on trauma system development

Appendix F: Scudder Oration

The Scudder Oration on Trauma was presented by Brent Eastman, MD, FACS at the American College of Surgeons 95th Annual Clinical Congress in Chicago, Illinois, October 2009. Much of the oration surrounds the development of trauma systems with specific reference to California

Appendix A

HRSA/EMS Authority Benchmark Status

APPENDIX A: HRSA/EMS Authority Benchmark Status

Each indicator from the 2006 HRSA *Model Trauma System Planning and Evaluation* document was evaluated and a 2013 status is provided. Prioritization is as follows: Short Term (within 1 year); Intermediate (within 3 years); and Long Term (3-5 years).

Priority	#	Benchmark	Solution	Status
Short Term	102	There is an established trauma management information system for ongoing injury surveillance and system performance assessment.	Trauma Registry	Met <input checked="" type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> The California EMS Information System (CEMSIS) was created as a demonstration project funded by the Office of Traffic Safety. As of August 2014, 16 of the 26 LEMSAs with designated Trauma Centers were submitting data totaling 52 of the 76 designated Trauma Centers.
Short Term	201	Comprehensive state statutory authority and administrative rules support trauma system leadership and maintain trauma system infrastructure, planning, oversight, and future development.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input checked="" type="checkbox"/> Not Met <input type="checkbox"/> The EMS Authority has legislative authority to manage the State Trauma System. In 2008 a regional infrastructure composed of five (5) Regional Trauma Coordinating Committees was established building upon the local EMS agency structure. The development of standardized policies for regions is in process in varying degrees in the regions.

Priority	#	Benchmark	Solution	Status
Short Term	202	Trauma system leadership (lead agency, Trauma Center personnel, and other stakeholders) is used to establish, maintain, and constantly evaluate and improve a comprehensive trauma system in cooperation with medical, professional, governmental, and citizen organizations.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input checked="" type="checkbox"/> Not Met <input type="checkbox"/> The State Trauma Advisory Committee is advisory to the Director of the EMS Authority. Membership is multidisciplinary and provides overall guidance to trauma system planning. These Statewide Trauma System Planning recommendations provide a decision-making process for system issues with measurable goals and objectives.
Short Term	203	The state lead agency has a comprehensive written trauma system plan based on national guidelines. The plan integrates the trauma system with EMS, public health, emergency preparedness, and emergency management. The written trauma system plan is developed in collaboration with community partners and stakeholders.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input checked="" type="checkbox"/> Not Met <input type="checkbox"/> These Statewide Trauma System Planning recommendations integrate EMS, public health, emergency preparedness and emergency management and were developed in collaboration with trauma system partners.

Priority	#	Benchmark	Solution	Status
Short Term	204	Sufficient resources exist, including those both financial and infrastructure related support, system planning, implementation, and maintenance.	Trauma System Funding	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input checked="" type="checkbox"/> <p>Due to ongoing budget constraints, improving the financial support of the State Trauma System was not feasible. Federal Block Grant funding continues to support state trauma program staff. Benchmark will be moved to Long Term priority.</p>
Short Term/ Ongoing	103	A resource assessment for the trauma system has been completed and is regularly updated.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> <p>Many of the Regional Trauma Coordinating Committees have either completed or are working on a resource assessment for their region followed by a gap analysis. Reports on status are given routinely to the State Trauma Advisory Committee. As the CEMSIS program becomes more mature and complete, morbidity and mortality assessment will be done. Each Local EMS agency provides for outside consultation to assist with Trauma Center designation and re-designation.</p>

Priority	#	Benchmark	Solution	Status
Short Term/ Ongoing	302	The trauma system is supported by an EMS system that includes communication, medical oversight, prehospital triage, and transportation; the trauma system, EMS system, and public health agency are well integrated.	Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input checked="" type="checkbox"/> Not Met <input type="checkbox"/> The regionalization of the trauma system has provided 5 avenues for support of a State Trauma System. Most regions have worked toward triage standardization utilizing the national CDC standards. Each region encourages communication with the region's trauma partners. The state trauma registry, while still under development, provides data on the system which is shared with its regions and State Trauma Advisory Committee upon request.
Short Term/ Ongoing	303	Acute care facilities are integrated into a resource-efficient, inclusive network that meets required standards and that provides optimal care for all injured patients.	Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> While regions have improved communication with all acute care facilities in the region, standards do not exist specific to trauma. Re-triage standards are under development in some of the regions that improve the coordination of care when a patient requires urgent transport to a Trauma Center with the higher level of care needed. The state registry is under revision and will include specific data to describe the transfer.

Priority	#	Benchmark	Solution	Status
Short Term/ Ongoing	310	The lead trauma authority assures a competent workforce.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> Regulations only partially require a specific level of training for physicians and/or nurses. The Rural Trauma Team Development Course is being offered throughout the State sponsored by the Trauma Mangers Association, California. Other trauma-specific education is provided by the LEMSA as needed and may be part of the accreditation process for paramedics. Compliance assessment for Trauma Centers is the responsibility of the LEMSA.

Priority	#	Benchmark	Solution	Status
Short Term/ Ongoing	311	The lead trauma authority acts to protect the public welfare by enforcing various laws, rules, and regulations as they pertain to trauma system components and the system overall.	State Leadership & Coordination	Met <input checked="" type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> The Trauma Center (through Title 22) and the LEMSA (through statute and Title 22) are required to provide for performance improvement of the local system. Regions have included system case reviews as part of their mission. Local Trauma Plans are required to describe their PI program and how they ensure Title 22 compliance. The majority of LEMSAs require ACS verification and/or consultation for continued designation. The State has developed guidance documents to assist LEMSAs in the compliance reviews. The State is responsible for approving local Trauma Plans prior to system implementation to ensure statute and regulatory compliance. Annual reports are due from each LEMSA to ensure continued compliance.

Priority	#	Benchmark	Solution	Status
Intermediate	104	An assessment of the trauma system's disaster/ emergency preparedness has been completed including coordination with the public health and EMS systems and the emergency management agency.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> The EMS Authority coordinates its trauma system with the California Office of Emergency Services. An assessment needs to be completed.
Intermediate	105	The system assesses and monitors its value to its constituents in terms of cost/benefit analysis and societal investment.	Trauma Registry	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input checked="" type="checkbox"/> The State Registry has been developed and in part collects information to assess the fiscal impact of the trauma system. As the registry becomes more complete, the state will publish trauma system information to educate the public and professional population on the trauma system. LEMSAs have a mechanism in place to partially support the system through designation fees. An organized approach to public information about the trauma system is limited to local/regional activities.

Priority	#	Benchmark	Solution	Status
Intermediate	205	Collected data are used to evaluate system performance and to develop public policy.	Trauma Registry	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> The State Trauma Registry has been developed based on national standards. 56/76 Trauma Centers participate with 100% participation anticipated by the end of the fiscal year. Linkage has yet to be done. A new system for EMS and trauma data is now in place which should improve the linkage capabilities.
Intermediate	206	Trauma system leadership, including its multi-performance reports, in disciplinary advisory committees, regularly reviews system.	Trauma Registry	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> While data exists for much of the system, performance reports have yet to be developed. A quality and consistency review of the data needs to be completed before the system can rely on the data reports to guide policy.

Priority	#	Benchmark	Solution	Status
Intermediate	207	The lead agency informs and educates state, regional and local constituencies and policy makers to foster collaboration and cooperation for system enhancement and injury control.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> The 5 regions are collaborative groups that foster system enhancement. Most projects are focused on post-injury system issues. Some of the regions are beginning to work on prevention activities such as pediatric and elderly falls. The Department of Public Health focuses on prevention. Injury prevention activities are shared through the Strategic Highway Safety Program.
Intermediate	304	The jurisdictional lead agency, in cooperation with other agencies and organizations, uses analytical tools to monitor the performance of population- based prevention and trauma care services.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> Data from the state registry is provided to the regions upon request for the monitoring of trauma care in the region. Common mechanisms of injury are also identified which has resulted in prevention activities related to pediatric and elderly falls. The development of these Statewide Trauma System Planning recommendations is a significant step towards the development of a State Trauma System. Many of the Plan's objectives are already being addressed.

Priority	#	Benchmark	Solution	Status
Intermediate / Ongoing	208	The trauma, public health, and emergency preparedness systems are closely linked.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> The State Trauma System and the Disaster Preparedness Operations are loosely linked with need for more formal integration.
Intermediate / Ongoing	305	The lead agency assures its trauma system plan is integrated with, and complementary to, the comprehensive mass casualty plan for natural disasters and manmade disasters, including an all-hazards approach to disaster planning and operations.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input checked="" type="checkbox"/> Integration of the State Trauma System with all disaster preparedness activities is state as a goal in these Statewide Trauma Planning System recommendations.
Intermediate / Ongoing	306	The lead agency ensures that the trauma system demonstrates prevention and medical outreach activities within its defined service area.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> Regional activities may incorporate prevention and medical outreach. Pediatric and elderly falls have become a focus throughout the state. The Strategic Highway Safety Plan links Department of Public Health with EMS.

Priority	#	Benchmark	Solution	Status
Intermediate / Ongoing	307	To maintain its state or regional or local designation, each hospital must continually work to improve the trauma care as measured by patient outcomes.	Registry/Local Trauma System	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> Each Trauma Center and its LEMSA are responsible for measuring patient outcomes. The State will be formalizing its Performance Improvement Program once the State Trauma Registry is complete with quality and consistent data. Outcomes for trauma patients seen at non-Trauma Centers needs to be addressed with utilization of OSHPD data.
Intermediate / Ongoing	308	The lead agency ensures that adequate rehabilitation facilities have been integrated into the trauma system and that these resources are made available to all populations requiring them.	State Leadership & Coordination	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input checked="" type="checkbox"/> There are no standards to integrate rehabilitation services into the trauma system except for minor requirements for acute rehabilitation services in Title 22. The State Trauma Registry has minimal information regarding functional outcome and rehabilitation costs.

Priority	#	Benchmark	Solution	Status
Long Term	101	There is a thorough description of epidemiology of injury in the system jurisdiction using both population-based data and clinical databases.	Coordinate with agencies that collect data/make available to participants.	Met <input type="checkbox"/> Partially Met <input checked="" type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input type="checkbox"/> While the State Trauma Registry contains detailed information on the epidemiology of injury, there has been no true analysis. However, coroner and non-trauma facility data is limited and not linked to the trauma registry. Regional reports are provided upon request describing the injury patterns of the region.
Long Term/ Ongoing	301	The trauma management information system (MIS) is used to facilitate ongoing assessment and assurance of system performance and outcomes and provides a basis for continuously improving the trauma system including a cost-benefit analysis.	Trauma Registry	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input checked="" type="checkbox"/> Not Met <input type="checkbox"/> 52/76 Trauma Centers provide data to the State Trauma Registry. Regional reports are provided upon request to assist in regional performance improvement. LEMSAs are responsible for local system performance review including costs (many require Trauma Centers to pay annual fee). Limited state reports are generated due to incomplete participation.

Priority	#	Benchmark	Solution	Status
Long Term/ Ongoing	309	The financial aspects of the trauma systems are integrated into the overall quality improvement system to assure ongoing “fine-tuning” and cost-effectiveness.	Trauma System Funding	Met <input type="checkbox"/> Partially Met <input type="checkbox"/> Majority Met <input type="checkbox"/> Not Met <input checked="" type="checkbox"/> <p>No cost data is available in the State Trauma Registry. Payer mix and charges can be analyzed. While specific financial data is not available, length of stay, ICU length of stay etc. can be evaluated based on cost estimates.</p>

Appendix B

Statewide Trauma System Planning Components and Assessment

Appendix B: Statewide Trauma System Planning Components and Assessment

Organized approaches within single trauma care facilities to treat victims of severe injury have repeatedly demonstrated improved patient outcomes, an observation that has led to the development of the Trauma Center designation process. But individual facilities are insufficient, since patient distribution and health system capabilities are not optimized or consistent. Since high level Trauma Centers are not available in all areas of the state, regional coordination is required to provide care across all geographic areas so all patients get the level of care they need in a timely manner.

Regionalized trauma systems should have a process for triaging patients, which would provide that a patient gets to the level of trauma care that matches his/her injury severity and results in improved outcomes. Moreover, using a rigorous disease management approach to injury across the entire spectrum, from prevention to rehabilitation, has shown improved outcomes.²¹

A broad approach to policy development through laws and regulations should include building a system infrastructure that can provide system oversight and future development, routine monitoring of system performance, updating laws, regulation, policies and procedures, and the establishment of standard operating methods across all phases of intervention.²²

These Statewide Trauma System Planning recommendations depend on the exercise of regulatory authority by the local EMS agencies (LEMSAs), and are not designed to interfere with or compromise this authority. The recommendations also rely on the activities of the Regional Trauma Coordinating Committees (RTCCs) and the State Trauma Advisory Committee (STAC) to provide expertise, support, and technical assistance to both the LEMSAs and the State EMS Authority (EMSA) in matters pertaining to state and regional trauma care and trauma system development.

As described by the American College of Surgeons' (ACS) *Regional Trauma Systems: Optimal Elements, Integration, and Assessment* the functional components of a State Trauma System are divided into 15 parts:

1. Trauma System Leadership
2. System Development Operations
3. Trauma System Finance
4. EMS System: Prehospital Care
5. EMS System: Ambulance and Non-Transporting Medical Units
6. EMS System: Communications
7. Definitive Care: Acute Care Facilities
8. Definitive Care: Inter-Facility Transfer and Re-Triage

²¹ *Resources for Optimal Care of the Injured Patient 2014*, Committee on Trauma American College of Surgeons

²² *Regional Trauma Systems: Optimal Elements, Integration, and Assessment*, American College of Surgeons Committee on Trauma, 2007

9. Definitive Care: Rehabilitation
10. Information Systems
11. System Evaluation and Performance Improvement
12. Education and Training
13. Trauma System Research
14. Injury Prevention
15. Emergency/Disaster Preparedness

Each component contains two parts: 1) Background and Current Status with a brief description of the existing component; and 2) Planned Development with a list of objectives with assigned responsibility outlining how the component is expected to develop over the next 3-5 years.

The recommendations provided by ACS as part of the Consultative State Trauma System Review for California in March 2016 are consistent with these Statewide Trauma System Planning recommendations. The ACS recommendations are incorporated and indicated either by footnotes or *italicized* (if verbatim) throughout this appendix. Objectives in **bold** are considered priority by ACS.

It is understood that many objectives require resources that may not be available. These objectives have been designated as long-term goals with suggested prioritization and should be met through collaborative efforts between EMSA, LEMSAs, the STAC, the RTCCs, Trauma Centers, and other interested groups and organizations. Through voluntary collaboration and coordination, improvements in patient care quality can be achieved.

Component 1—Trauma System Leadership

Trauma System Partners

State EMS Authority

EMSA was established in 1980 through the Emergency Medical Services System and Prehospital Emergency Care Personnel Act (SB 125). EMSA is one of 13 departments within the State of California Health & Human Services Agency and has statutory responsibility (Health and Safety Code §1797.103) for:

- Manpower and training
- Communications
- Transportation
- Assessment of hospitals and critical care centers
- System organization and management
- Data collection and evaluation
- Public information and education
- Disaster response

EMSA's role specific to trauma programs

- 1798.161 Required to Establish Regulations
- 1797.199 Trauma Care Fund Distribution
- 1798.166 Approval of local Trauma Plans in Accordance with Regulations

Local EMS Agencies

There are currently 33 LEMSAs within the State of California; 26 are single-county and seven have a multi-county jurisdiction. The LEMSA has statutory responsibility to plan, implement, and evaluate an emergency medical services system in accordance (in part) with the following sections within the California Health and Safety Code:

- 1797.204 Plan, implement, and evaluate EMS system
- 1797.206/1797.218 Implementation and Approval of ALS & LALS Systems
- 1797.208 Compliance of EMT Training Programs
- 1797.214 Additional Training Requirements
- 1797.220 Local Medical Control Policies & Procedures
- 1797.252 EMS System Coordination
- 1798.100 Designation of Base Hospitals
- 1798.163 Trauma Care System Policies & Procedures
- 1797.151 Coordination of Disaster Preparedness

The LEMSA is charged with implementing statutes (1798.162, 1798.163), regulations and local policy for trauma services in their area of jurisdiction including designation of Trauma Centers. Using State trauma guidelines, LEMSAs design trauma systems that meet minimum State standards and regulations, which provide a level of consistency between counties. The LEMSA ensures the system components operate in an effective and compliant manner throughout the continuum of care.

State Trauma Advisory Committee

The STAC's 18 member committee is comprised of physicians, nurses, administrators and other EMS providers and personnel for the purpose of advising the EMSA Director on matters pertaining to the planning, development, and implementation of the State Trauma System.

Regional Trauma Coordinating Committees

As the result of recommendations made by the STAC and the 2006 *California Statewide Trauma Planning, Assessment and Future Direction* document, five (5) trauma regions were defined by EMSA; corresponding RTCCs were created in 2008. These committees are composed of trauma system providers, LEMSAs staff, and trauma system stakeholders from within each region for the purpose of promoting regional cooperation, enhancing and developing best practices, assisting in the interpretation of regional data, and working collaboratively with the State and LEMSAs in support of a state trauma system.

Trauma Centers

Trauma Centers are a key element in a trauma system and the focal point for trauma care. Lead Trauma Centers (Level I and II) contribute administrative and medical leadership and academic expertise to the system. These lead Trauma Centers, in collaboration with the LEMSAs, engage all other Trauma Centers (Level III and IV) and other non-trauma acute care facilities in the performance improvement process. Many Trauma Centers participate in state and regional trauma system planning and development.

Planned Development

LEMSA and EMSA leadership remain critical to the overall success of the Trauma System. The creation and development of RTCCs represent a principal change in the inclusion of expertise and participants of the trauma system, including the composition of the STAC, which now includes regional representatives from each RTCC.

State EMS Authority

As part of the responsibility to coordinate the planning, development and implementation of the State Trauma System, EMSA, with recommendations from the STAC, should work to provide coordination, guidance, and assistance to the LEMSAs and RTCCs with the goal of enhancing the consistency of trauma-related standards and guidelines throughout the state and improving the overall quality of trauma care.

The EMS Authority's objectives should include:

1. ***Establish basic quality and activity reporting standards and report templates for the LEMSAs that are individualized based upon size, activity, available resources, and degree of system development.***
2. Use system reports to educate the public regarding trauma system accomplishments and post on the EMSA's website.
3. Develop policy to facilitate communication among the LEMSAs, RTCCs, and STAC for purposes of system development.
4. Facilitate the utilization of CEMSIS data by LEMSAs and RTCCs.

5. Coordinate the development and activities of ad hoc working groups for system development projects such as data utilization, performance improvement, and regional transfer network.
6. Develop a compendium of trauma-related policies, procedures, and clinical guidelines that may be shared throughout the state.
7. Receive information and advice from the STAC pertaining to the further development, monitoring, and operation of the Trauma System.
8. Convene a statewide forum to brief stakeholders and receive feedback on system-wide developments and review the overall operation and performance of the Trauma System.

State Trauma Advisory Committee

Membership on the State Trauma Advisory Committee (STAC) is determined by the EMSA Director and includes broad representation from trauma system stakeholders, including representatives from each of the RTCCs.

The STAC Chair should be a nationally recognized trauma surgeon with experience and demonstrated expertise in Trauma Center evaluation and trauma system planning. The Vice-Chair of the STAC should ideally be a LEMSA medical director or LEMSA administrator.

The STAC advises EMSA in matters pertaining to the development, monitoring, and operation of the State Trauma System to include the following:

1. *Expand representation on the State Trauma Advisory Committee (STAC) to include Level III and Level IV Trauma Centers, non-designated acute care facilities and public member(s).*
2. *Develop subcommittees to the STAC around targeted issues to increase the number of engaged trauma stakeholders.*
3. Assist EMSA in facilitating the activities of the RTCCs.
4. Set priorities for specific guideline, protocol, and policy development/review for the state-wide work groups.
5. Receive periodic reports on LEMSA trauma plans and make related recommendations to the EMSA Director.
6. *Make recommendations to the EMSA Director in regards to modification to existing regulations pertaining to trauma systems and consistent with these Statewide Trauma Planning recommendations.*
7. Respond to requests from EMSA Director to assess trauma-related policies, procedures, regulations, or guidelines proposed by other groups or committees.
8. Receive and analyze reports from the RTCCs, making specific recommendations to the EMSA Director as needed.
9. Work with EMSA in conducting periodic (every 3-5 years) assessment and modifications to these California Statewide Trauma System Planning recommendations.

Local EMS Agencies

The authority and responsibility of the LEMSAs in implementing and monitoring local/regional trauma systems remain unchanged. The specific responsibilities of each LEMSA, with respect to the future direction of the State Trauma System, should include the following:

1. Participate in the RTCC with LEMSA Medical Director, Administrator, or Trauma System Coordinator.
2. Utilize the expertise, resources, and technical assistance of the RTCCs to assist with regional trauma care issues. This may include:
 - 2.1. Encourage all hospital to participate in improving regional trauma care.
 - 2.2. Identify and promote clinical guideline development.
 - 2.3. Implement a system-based Performance Improvement and Patient Safety (PIPS) program.
 - 2.4. Review and modify trauma-related policies within the region.
 - 2.5. Review local trauma plans in the context of regional trauma care, with input from Trauma Centers.
3. Implement data collection by non-trauma receiving facilities.
4. Share pre-hospital and trauma registry data via submission to CEMESIS.
5. Assess Trauma Center compliance with CCR, Title 22, Division 9, Chapter 7 regulations.

Regional Trauma Coordinating Committees

RTCCs are a key component of the California State Trauma System and were created for the purpose of utilizing a broad range of expertise within the five regions to enhance collaboration, share and support best practices, provide requested technical assistance to the LEMSAs and to EMSA regarding the ongoing development and operation of a system of trauma care for the State of California. The RTCCs function as a conduit between the regions and the EMSA/STAC to aid in the overall Trauma System development and standardization. Regional roles include the establishment of regular communication and collaboration within and between regions. Examples of regional activities include regular meetings, sharing best practices, exploring common issues and themes and working toward resolutions to minimize variations in practice within the region and ultimately the state. State level activity includes representation on the STAC, (acting as a subcommittee for the STAC) reporting regional activities and issues, sharing regional work products, relaying STAC information and decisions back to the region. The RTCCs:

1. *Cultivate relationships with public health, injury prevention, rehabilitation, emergency management organizations, EMS providers, transport agencies, public safety, and academic institutions to support the trauma system coalition.*
 - 1.1. *Identify an individual in California with past leadership success to guide the RTCC.*
2. *Devise mechanisms to disseminate best practices in integrated trauma care, mental health services, social services, child protective services, public safety, and law enforcement to all regional trauma stakeholders.*
3. *Formalize the structure and charge of the RTCCs and continue to develop their function, especially in domains of clinical practice guidelines and quality assurance programs.*
 - 3.1. *Seek resources to provide administrative and liaison support to the RTCCs.*

Trauma Center

Each designated Trauma Center should have its own trauma program leadership to:

1. Participate on their respective LEMSA and RTCC committees, including Performance Improvement

2. Provide expertise to the LEMSA in the development and ongoing updates of the local Trauma Plan
3. Minimum compliance with CEMISIS data standards and inclusion criteria

Component 2–System Development Operations

Background and Current Status

California is unique from the other States insofar as its systems of trauma care are administered at the local EMS level. Currently, 33 LEMSAs administrate trauma care in California's 58 counties. Of these LEMSAs jurisdictions, 27 have at least one designated Trauma Center and six (6) do not. There is no statutory or regulatory requirement for a regional or county trauma system; the statute is permissive, making all local systems optional. However, all LEMSAs have developed a trauma system and have an approved trauma system plan.

LEMSAs plan, implement and manage local trauma systems based upon state regulations. Local Trauma Plans are submitted to the EMSA for review and approval. The plans outline local trauma systems but do not necessarily address inter-county needs. The LEMSAs are responsible for designating Trauma Centers within their jurisdictions that meet state trauma regulation requirements as stipulated in CCR, Title 22, Division 9, Chapter 7.

Since trauma system development is optional and locally based, there are a wide range of trauma system models in California. The variance runs from LEMSAs with well- established trauma systems, with designated Trauma Centers at various levels, to LEMSAs that have limited implementation of the plan or no designated Trauma Centers.

Planned Development

The vision for California is to develop an inclusive state trauma system that assures timely access to an appropriate level of care for all individuals following major injury.

The system should focus on prevention, quality care improvements and rehabilitation and be informed by a robust system for data collection and analysis.

State EMS Authority

EMSA, advised by its State Trauma Advisory Committee, in order to strengthen state trauma resources, should:

1. Utilize available resources for trauma system functions to fulfill EMSA's statutory function.²³
2. *Develop a staff succession plan to ensure trauma system stability in the event of future personnel changes.*
3. Provide medical advice for trauma system activities by a clinically active trauma surgeon experienced in trauma systems to act as the Chair of the STAC.
4. *Ensure adequate personnel for data management, data analysis, and reporting for the statewide EMS and trauma information systems.*
5. Facilitate participation in and utilization of the state trauma registry.

²³ Consistent with ACS recommendation

6. Collaborate with the California Department of Public Health in an analysis of injury throughout the State of California utilizing existing databases (EPICenter, Statewide Integrated Traffic Records System (SWITRS), California EMS Information System (CEMSIS) and Office of Statewide Health Planning and Development (OSHPD).
7. *Identify and collaborate with other state agencies and external resources to enhance trauma system development.*
8. Work with the LEMSAs to conduct an analysis of trauma resources throughout the state including access-to-care at:
 - 8.1. Non-trauma facilities with emergency departments
 - 8.2. Trauma Centers and their specific (sub-specialty) capabilities, e.g. Neurosurgical Interventional Radiology, re-implantation, etc.)
 - 8.3. Rehabilitation facilities and their specific capabilities (e.g. neurological-cognitive rehabilitation).
9. Facilitate communication and information transfer among the RTCCs, LEMSAs, and EMSA through:
 - 9.1. Existing website resources
 - 9.2. Phone conferencing
 - 9.3. Video-conferencing.
10. *Provide liaison support to the RTCCs as resources allow.*
11. Work through the STAC to provide guidance and coordination for specific RTCC activities and projects with statewide implications.
12. Support statewide working groups for high priority projects that might include:
 - 12.1. Performance Improvement & Patient Safety programs
 - 12.2. System-wide trauma data procurement and analysis
 - 12.3. Regional Network for re-triage and interfacility transfers.

State Trauma Advisory Committee

The STAC to provide expertise, advice and guidance to the State EMS Authority, LEMSAs and RTCCs should:

1. Prioritize the needs of the state system, identifying related issues or problems, and assist the EMS Authority in coordinating efforts to address these specific issues and problems.
2. Review and make recommendations to the EMSA Director for revisions to these Statewide Trauma Planning recommendations.
3. Review reports from the RTCCs and make recommendations for statewide policy.
4. Advise the Authority on applications for trauma-related prehospital clinical studies.
5. Develop guidance for consistent and periodic assessment of Title 22 compliance for designated Trauma Centers throughout the state.
6. Make recommendations regarding revisions to Title 22 regulations:
 - 6.1. ***Establish in regulation scalable minimum operational standards based on the size and resource capabilities of the urban, suburban, and rural LEMSAs.***
7. Make recommendations, as requested by a LEMSA, regarding the number, level, location, and capacity of Trauma Centers in regions throughout the state.
8. Prioritize the development of statewide protocols and guidelines that may be adapted to local needs by LEMSAs throughout the state.

9. Develop processes and mechanisms for providing optimal access and care to special populations specifically including pediatric populations.
10. Develop guidance for transfer, re-triage and interfacility transfer of trauma patients regionally.
11. Identify high priority areas for system-wide research projects.

Local EMS Agency

The LEMSAs will maintain the authority and responsibilities as outlined in statute and regulations. In addition, LEMSA activities should include:

1. Conduct a review of local trauma plan in the context of these Statewide Trauma Planning recommendations and the structures and processes it outlines
2. Utilize the expertise of the RTCC to provide technical assistance for the review of local trauma plans as needed

Regional Trauma Coordinating Committees

The RTCCs, by providing a broad range of expertise and experience, are instrumental in assisting the LEMSAs and EMS Authority in ongoing system development and assisting with the implementation of these Statewide Trauma System Planning recommendations. The role of the RTCCs should include the following:

1. Assist with a gap analysis of regional resources including acute care facilities, rehabilitation facilities, prevention programs, prehospital components, etc.
2. Assist the LEMSA with Trauma Plans upon request as it relates to regional trauma care.
3. Participate in the development and implementation of a regional process for ongoing Performance Improvement (as outlined in the “Evaluation” section) that includes data and case-based analyses.
4. Assist in the development of regional standards for performance improvement.
5. Work collaboratively with the LEMSA to perform regional analyses of trauma-related data.
6. Make recommendations to the STAC regarding revisions to state-wide policies and regulations.
7. With guidance from the LEMSA, contribute to the development of state and regional protocols and guidelines.
8. Assist in the development of regional trauma-related educational programs or offerings.
9. Evaluate or collaborate with regional partners on trauma-related research projects.
10. Provide technical assistance to the LEMSAs as needed for:
 - 10.1. Assessment and modification of existing trauma-related policies/guidelines/protocols, and the development of new trauma-related policies/guidelines/protocols as they relate to regional trauma care
 - 10.2. Identification of system performance improvement issues and solutions as they relate to regional trauma care
 - 10.3. Identification of regional resource issues and solutions
 - 10.4. Assist with the creation of Trauma Center survey teams to work with the LEMSA upon request
 - 10.5. Respond to ad hoc requests from LEMSAs for other types of technical assistance.
11. Submit or present reports to STAC that include:
 - 11.1. Assessment of RTCC meetings and attendance

- 11.2. Regional trauma system development and configuration
- 11.3. Regional Performance Improvement activity.

Component 3—Trauma System Finance

Background and Current Status

Funding for Trauma Systems are typically considered in two general categories: reimbursement for direct patient care, and administrative support for system oversight. Most of the efforts in improving trauma funding have focused on the direct reimbursement for uncompensated and undercompensated patient care. Fewer financial resources have been available to support development, oversight, and quality of the Trauma System (including governance, planning, a statewide trauma registry, and performance improvement efforts).

Funding of Trauma Care

An ongoing and stable source of funding is important to the success of trauma care systems.

Financial support for trauma care has been available through Senate Bill (SB) 12/612 that created the Maddy EMS Fund in 1987, Proposition 99 (California Tobacco Tax and Health Protection Act of 1988) revenue in 1990, and Assembly Bill (AB) 430 in 2001 which established a Trauma Care Fund for the State. The Maddy EMS Fund continues to be funded through penalty assessments on various traffic violations. The Trauma Care Fund was funded for 3 years until 2005. Funding specific for state coordination of the Trauma System is not available through these funds, but is available in a limited manner under the Federal Preventive Health and Health Services Block Grant.

Maddy EMS Fund

Optionally, many counties (86%) utilize the Maddy EMS Fund to reimburse physicians for uncompensated emergency services, hospitals that provide disproportionate trauma and emergency medical care services, including trauma services for adults and children, and for discretionary EMS purposes. In 2007, SB 1773 amended the statute to allow counties to increase the amount of the penalty from \$2 per \$10 to \$4 per \$10 penalty. Information from 2015 indicates that 53% of the counties have established this fund. A subsection of SB 1773, known as Richie's Fund, sets 15 percent of the funds collected in the supplemental penalty assessment to be utilized for all Pediatric Trauma Centers throughout the county. It further defines the expenditure of money with the intent for augmenting pediatric trauma care. Approximately \$80 million annually is available for local distribution from the Maddy EMS Fund.

Tobacco Tax (Proposition 99)

Revenues from tobacco taxes (Enabled by AB75, Chapter 1331, Statutes of 1989) were earmarked, in part, for programs to provide health care services for hospitals and physicians for indigent patients. The money from the Tobacco Tax is deposited by using the following formula: 20 percent is deposited in the Health Education Account (HEA); 35 percent in the Hospital Services Account; 10 percent in the Physician Services Account; 5 percent in the Research Account; 5 percent in the Public Resources Account; and 25 percent in the Unallocated Account (Revenue and Taxation Code 30124). Although Proposition 99 dollars have dwindled because of a decrease in the number of smokers, there is approximately \$85 million annually available for hospital services and \$24 million available for physician services.

Trauma Care Fund

The Trauma Care Fund was established to provide designated Trauma Centers funding for trauma care to uninsured patients. The funds were passed through the LEMSAs for distribution through a competitive grant-based system. The Trauma Care Fund allocated \$55 million for three years including \$2.5 million provided to LEMSAs for the planning and implementation of new local trauma systems. Trauma Care funds have not been allocated since FY 2005-06.

Local Funding

Two counties, Los Angeles and Alameda, have developed local funding for trauma care through earmarked assessments on property value. Another source for funding local trauma systems is paid by the Trauma Centers to the designating agency for costs associated with audits and in some cases, review by the American College of Surgeons. The fees are also used for data collection and system management.

Planned Development

The Patient Protection and Affordable Care Act (ACA) includes funding language for regional trauma systems. While not appropriated since its inception, there is a need to align the elements of the California's Trauma System with any anticipated trauma system funding requirements in the future.

Establishing health insurance programs for all citizens is expected to have a positive effect on Trauma Center financing. It is unclear how healthcare reform policies will affect the payment for trauma care, specifically the relationship between the percentages covered by the private and public payers.

State EMS Authority/State Trauma Advisory Committee

1. Explore the feasibility of a Trauma System Plan that could:
 - 1.1. Research existing funding statutes, regulations, and processes and identify the system's current financial status including distribution of any trauma system funds and sustainability.²⁴
 - 1.2. Perform a needs assessment to include the identification of specific aspects of the system that need funding, i.e. trauma care, infrastructure, data systems, performance improvement programs, rehabilitation, etc.
 - 1.3. *Identify funding options for the implementation of the Trauma Plan, trauma system planning, oversight, and evaluation at the state level.***
2. *Collaborate with the California Hospital Association to identify a strategy and potential funding mechanisms for technical assistance and outreach to non-designated acute care facilities in rural communities to assist them to become a trauma-participating hospital.*
3. Establish relationships with University Business, Financial, and Public Policy schools to collaborate on projects using open data and information to:

²⁴ 2016 ACS Recommendation from State Trauma System Consultation report

- 3.1. Identify critical Trauma System components (including local and State data systems, local EMS agency system oversight, and RTCC activities) and the cost to develop and maintain.
- 3.2. Research appropriate funding opportunities for identified critical trauma system components.
- 3.3. *Seek other sources of funding to support development of trauma care capabilities in rural California acute care facilities, such as the Rural Flex grant program.*
- 3.4. Work with researchers and hospitals to establish a basis for estimating the actual cost for trauma care in California.
- 3.5. ***Produce a report of the costs, the benefit of the trauma system and trauma care, and the importance of maintaining Trauma Center readiness to treat persons with severe injuries.***
- 3.6. ***Use information within the Cost and Benefit Trauma Report to inform the public about the importance of the trauma system and the challenges in sustaining the existing Trauma Center resources.***
4. Collaborate with the local EMS agencies and California Hospital Association to determine the cost-benefit of a Trauma System to advocate for trauma system enhancements.

Regional Trauma Coordinating Committee

- 1 Identify opportunities for funding to support regional coordination activities.
- 2 Make recommendations to the STAC and the EMSA Director regarding potential sources of revenue for consideration in supporting trauma system coordination and infrastructure at both the state and local levels.

Component 4—EMS System: Prehospital Care

Background and Current Status

In California, the EMSA has overall statutory authority for the development of prehospital care program regulations. The LEMSAs have local responsibility and oversight of these programs at county and regional government levels. The medical direction and management of EMS is under the control of the Medical Director of the LEMSA. This medical control is in accordance with standards established by EMSA. The LEMSA is responsible for trauma system management including the development of local EMS trauma triage criteria, destination policy, and accreditation of local paramedics and EMTs to include knowledge of the local trauma system.

Trauma education for prehospital providers is incorporated into prehospital training programs as a standard part of the U.S. Department of Transportation, National Highway Transportation Safety Administration National Educational Standards for EMT, Advanced EMT, and Paramedic. Multidisciplinary continuing education programs for trauma are available to prehospital personnel through local Trauma Centers, LEMSAs, and continuing education providers. At present, there is no specific trauma continuing education hours considered to be a minimum for prehospital personnel.

Triage, Destination Policies for Trauma

Trauma triage and destination policies often reflect the availability of trauma services within a specific community. The Centers for Disease Control Guidelines for Field Triage of Injured Patients (2011) have been adopted by many of the LEMSAs both locally and regionally through RTCC collaboration. While there is still needed local variation due to geography and resource availability, these guidelines have become accepted as the minimum trauma triage standards for all of California.

Medical Direction

The LEMSA, using state minimum standards, establishes policies and procedures including dispatch, patient destination, patient care guidelines, and quality improvement requirements. For trauma systems, medical direction is commonly accomplished by two complementary methods:

- Trauma system policies and procedures in written form and accepted as valid by and for the trauma community to which they apply,
- Policies such as equipment required for field stabilization of trauma victims.

Planned Development

While the prehospital component of the Trauma System is well defined and has been functioning as a key partner, there are opportunities for improvement as the system matures.

State EMS Authority

1. Support the current national standards for prehospital Trauma Triage Guidelines as the minimum statewide standard.

2. Through its State Trauma Advisory Committee, develop benchmarks for the state and regional over- and under-triage rates, analyze data, and develop process improvement strategies to address gaps.²⁵
 - 2.1. Work with OSHPD in obtaining specified data from non-trauma facilities on trauma patients transported to the facility and not transferred.
3. *Obtain CDPH and LEMSA epidemiological support to use administrative data (hospital discharge dataset) to obtain death rates and the frequency of emergency department treatment and hospital admission for any patients with trauma diagnoses in non-designated facilities.*

Local EMS Agency

As part of the local Trauma Plan, LEMSAs should:

1. Establish a Trauma System Manager/Coordinator position with appropriate qualifications.
2. Have prehospital care reports part of the electronic health record for all trauma victims.
3. Develop policy to ensure prehospital resources are available for transfer and re-triage including roles and responsibilities of prehospital personnel.
4. Adopt the current Guidelines for Field Triage of Injured Patients for prehospital trauma triage as guidelines tailored to local needs and resources, incorporating the needs of pediatric and geriatric populations.

Regional Trauma Coordinating Committee (upon request by the LEMSA)

1. Assist LEMSAs in developing California -specific continuing education programs for the training of first responders, EMTs, paramedics and Mobile Intensive Care Nurses (MICN) in the region.
2. Assist LEMSAs in developing pediatric and geriatric-specific field trauma triage criteria for regional standardization.
3. Assist LEMSAs in analyzing regional over and under triage.

²⁵ 2016 ACS Recommendation from State Trauma System Consultation report

Component 5—Ambulance and Non-Transporting Medical Units

Background and Current status

Non-transporting prehospital medical units are configured in various ways throughout California. In urban regions, it's common for non-transporting units to be fire apparatus staffed by either EMT or paramedic level personnel. Rural areas (including state and federal parks, forests, and beaches) may have staff cars or rescue units in various configurations and capabilities staffed with trained first responders, EMTs, or in some cases paramedics. Organized search and rescue teams also fit the category of non-transporting EMS units.

Transport units, ground and air, are regulated and meet policies of the jurisdictional LEMSA and applicable state and federal laws and regulations. EMS transport agencies are operated by public and private agencies. The EMS Authority enforces EMS Aircraft regulations (CCR, Title 22, Chapter 8) to ensure medical quality, and publishes statewide Prehospital EMS Aircraft Guidelines (EMSA #144).

Minimum ground ambulance equipment standards are established by the California Highway Patrol for basic life support supplies and equipment. Equipment standards to support the scope of practice are established by the LEMSA and vary between non-transporting and transporting units. Recommendations for national standards for equipment inventories for EMS resources have been developed by Commission on Accreditation of Ambulance Services, Commission on Accreditation of Medical Transport Services and California EMS for Children Program.

Planned Development

California has a complex EMS transport system utilized to expeditiously transport the critically injured patient to the most appropriate facility. As the system expands to provide universal access to trauma care, transport decisions become more multifaceted, coordinating both ground and air resources in a safe manner.

EMS Authority/State Trauma Advisory Committee

1. Recommend triage guidance for EMS Dispatch Agencies receiving automated vehicular telemetry data and Advanced Automatic Collision Notification (AACN).
2. Develop minimum prehospital equipment inventory guidelines for non-transport/transport EMS units specific to trauma needs.
3. Develop guidance for EMS Provider Agencies in providing for or allowing scene photography to aid in the assessment of the mechanism of injury and its effect on injury.

Regional Trauma Coordinating Committee

1. Assist, upon request by the LEMSA, in the development of inter-regional agreements for management and transport of mass casualty victims.
2. Assist the LEMSA, upon request, in the development of re-triage guidelines and transfer processes including necessary prehospital resources for the rapid transport of patients from non-trauma facilities to Trauma Centers that cross LEMSA jurisdictional lines within the region.
3. Recommend air transport utilization guidelines applicable to regional trauma care issues.

Component 6–Communications Systems

Background and Current status

The nation’s 911 system has been an unqualified success for more than 40 years. Computer aided E911 access system is standard in California. Unfortunately, the 911 system has been challenged by changing technology such as expanding cell phone and voice-over- internet protocol (VOIP) usage. Cellular telephone and VOIP communication systems do not easily fit current computer aided 911 dispatch systems that allow for immediate identification of the precise location of a caller.

The current state and local 911 alert system is poised to advance with communication technology and to integrate cell phones or Internet-based communication methods as part of Next Generation 911 (NG9-1-1); however, this will be done incrementally with an estimated date of completion of 2020. The lack of precise locations and transfer of callers sometimes results in a delayed response of first responders to the scene of a trauma event.

In large urban California systems, it is common for Emergency Medical Dispatch programs (EMD) to be employed. Pre-arrival instructions and protocols are often used. While some non-urban systems utilize EMD, many small dispatch centers and rural regions are without priority dispatch or protocols.

A standard public safety radio frequency has been identified for use in California for communication between all air and ground units.

Some LEMSAs maintain computer logging systems that provide diversion data to hospitals in the region. Some LEMSAs have developed on-line computer communication systems for inter-hospital communication.

Planned Development

Standardized communications should be coordinated between all EMS systems on a given incident, utilizing current technology, to notify the trauma care team of essential information on the injured patient and provide appropriate destination decisions are made.

State EMS Authority/State Trauma Advisory Committee

- 1 Explore, in coordination with CalOES, an integrated prehospital-base hospital-receiving hospital communication system to aid in mass casualty and disaster events, such as FirstNet.
- 2 Promote statewide usage of common communication frequencies between ground and air transport units (700mHz Broadband Public Safety).

Local EMS Agency

- 1 Continue to advance efforts to develop priority medical dispatch for trauma and investigate process changes that improve dispatch effectiveness while improving outcomes.
- 2 Participate in statewide gap analysis to determine ambulance to ambulance communication capability and formats with identification of shortfalls.

Regional Trauma Coordinating Committee

Study the statewide and regional hospital alert systems currently in place to identify hospital capability, capacity, and specialty care availability (e.g. burns, pediatrics, etc.) and assist the LEMSA, upon request, in a gap analysis.

Component 7–Definitive Care Facilities: Acute Care Facilities

Background and Current Status

The mainstay of a trauma system is its network of specially designated acute care hospitals that have the resources and personnel capable of providing timely care to victims of serious injury. The current characteristics of local trauma systems, with respect to its acute care facilities, include the following:

- An existing network of designated Trauma Centers that have demonstrated compliance with established standards and regulations for Trauma Center resources, personnel, and processes of care
- The number of Trauma Centers within a system is restricted to allow volume performance by the highest level centers
- An inclusive system of higher and lower level centers providing care to patients with higher and lower injury severity respectively. In the more mature systems, the LEMSA defines a role for all acute care facilities as participants in the delivery of trauma care. Markers for participation include a structured institutional and system performance improvement program, data submission to regional registries, educational outreach, injury prevention, and operational agreements between sending and receiving hospitals within the system

Given the diversity of population density, geography, economics and other factors, California presents unique challenges to the creation of optimally located, appropriately resourced networks of acute care facilities. There are currently 343 acute care facilities with emergency departments (Comprehensive, Basic, and Standby) in the state of California. Of these, 80 are designated Trauma Centers. (*Appendix D*) Twenty California counties currently have no designated Trauma Centers within their county borders.

Recognizing that under-triage will occur in the prehospital setting, and that patients with significant injuries will present themselves to hospitals not specifically equipped or designated; non-trauma facilities play a critical role in the care of trauma patients. With some of the mature local trauma systems, these facilities are integrated into the regional trauma system with their roles specifically defined and codified in the local Trauma Plan. The “inclusivity” of counties and regions within the state with respect to the spectrum of Trauma Center levels (I-IV and non-trauma facilities) varies from those counties served by a sole Level I Trauma Center (San Francisco), to those areas served by a greater number and wider variety of designated centers (Los Angeles).

Planned Development

The primary goals for the statewide system of trauma care with respect to its acute care facilities is to help provide timely access to basic trauma care throughout the state, timely access to definitive care regardless of the type and severity of injury, have designated centers maintain capabilities commensurate with their level of designation, and to improve the consistency of

processes related to initial and recurring designation. The further development of the network of acute care facilities should involve the following aims.

EMS Authority

1. Periodically assess the number and level of Trauma Centers within the state by region to evaluate access to trauma care and work with LEMSA to identify areas of insufficient coverage.
2. ***Provide EMS Authority guidelines for needs-assessment methodology supporting the authority of the LEMSAs to designate Trauma Centers based upon the needs of the population served.***
 - 2.1. ***Provide EMS Authority guidelines to refine metrics of Trauma Center need in addition to the current regulation measure of one level I-II Trauma Center per 350,000 population.***
3. ***Establish guidelines to further uniformity of the Trauma Center designation process across LEMSAs.***
 - 3.1. ***Explore use of the ACS verification process for all Level I and Level II Trauma Centers.***
 - 3.2. ***Explore use of the ACS verification process for Level III Trauma Centers operating in proximity to higher-level Trauma Centers within a LEMSA.***
 - 3.3. ***Explore modifying the designation process for Level III and Level IV Trauma Centers operating in a LEMSA without a higher level Trauma Center, or in areas of a LEMSA not served by other Trauma Centers, to focus on resource enhancement and to encourage participation in the trauma system.***
4. Identify members of the trauma community (surgeons, emergency medicine physicians, trauma program managers) within the state with the expertise, experience & willingness to serve as site surveyors under Title 22 to be provided to LEMSAs upon request.

State Trauma Advisory Committee

1. Develop a template for 'operational' agreements between sending (non-trauma facility/lower level TC) and receiving (LII, LI) centers.
2. Develop guidance documents comparing Title 22 requirements with current ACS verification requirements.

Local EMS Agency

1. Outline the responsibilities and expected participation in the trauma system for non-designated acute care hospitals.
 - 1.1. ***Exercise the regulatory authority to collect data from all acute care facilities in the region.***
2. ***Develop a long-range plan of collaboration for specialized regional centers treating trauma and other time-sensitive conditions, such as stroke and ST elevation myocardial infarction (STEMI), capitalizing on shared resources.***

Component 8—Inter-Facility Transfer and Re-Triage

Background and Current Status

Although accurate field triage and direct transport to an appropriate level of care is a goal for all trauma systems, under-triage to non-trauma facilities or lower level Trauma Centers lacking the capabilities of caring for the most seriously injured will likely occur. For purposes of this document, re-triage means the immediate evaluation, resuscitation and transport of a seriously injured patient from a lower level trauma facility or non-trauma facility to a designated Trauma Center for a higher level of care. This process involves direct ED to ED transfer of patients that have not been admitted to the hospital. Interfacility transfer (IFT) refers to the transfer of an admitted patient, under the care of an admitting physician-of-record, from one facility to another.

There is currently no mechanism for the ongoing monitoring of under-triage or the number of re-triaged or transferred patients within the state. The frequency, location, and severity of related injuries involved with re-triage and inter-facility transfer within the state are largely unknown. In situations where re-triage or inter-facility transfer does occur, it may be delayed, and patients may not be managed according to evidence-based practice guidelines (e.g. traumatic brain injury). Re-triage/IFT protocols have been developed in several areas of the state, but are not in widespread use, and their effectiveness has just begun to be monitored.

Obstacles to transfer and re-triage include lack of a proximally located Trauma Center, lack of knowledge regarding the capacity (e.g. diversion status) and capabilities of potential receiving centers, concerns regarding EMTALA violations if procedures are not followed, local geographical and climatic obstacles to transportation (e.g. remote location, mountains, fog, etc.), transportation availability, insurance or financial status of the patient, and bed availability at receiving facilities.

Planned Development

The overall goal for the state with respect to re-triage/Interfacility transfer is to develop mechanisms, processes, and guidelines that will optimize timely access to trauma care at a level commensurate with the severity of injury, regardless of geographic location. The specific elements needed to achieve this goal include the following:

State EMS Authority

1. Develop a process that will allow ongoing analysis of all re-triage and IFT activity within the state based on CEMSSIS data
 - 1.1. *Utilize LEMSA level data to develop benchmarks for system and regional level secondary transfer rates, analyze data, and develop process improvement strategies to address gaps.*
2. *Regularly analyze the interaction between definitive care facilities, within and across the LEMSAs, including the following metrics:*
 - *Primary (field to initial hospital) transport and secondary (inter-facility transfer) over-triage and under-triage,*

- *Delays in transfer,*
 - *Multi-step transfers,*
 - *Mortalities occurring outside of Level I and Level II Trauma Centers.*
3. Evaluate current paramedic scope of practice to enable and facilitate rapid re-triage and transport of severely injured trauma patients (i.e. Traumatic Brain Injury).
 4. Identify receiving centers for special injuries (i.e. spinal cord, reimplantation).
 5. Develop web-based compendium of Trauma Centers, Burn Centers, Pediatric Trauma Centers, their specialized capabilities and contact information for rapid communication when needed.
 6. Investigate integration of real-time information on California Trauma Center status: open/on-diversion/partial diversion, etc. to all receiving facilities in California.
 7. Explore development of centralized re-triage/transfer coordination within the state.
 8. Develop specific EMTALA-based guidelines for the transfer and acceptance of trauma patients within the state. These should address:
 - 8.1. The EMTALA ‘non-discrimination’ provision in regards to the obligation (or not) to accept non-level-of-care patients,
 - 8.2. EMTALA allowance for the transfer of ‘unstable’ trauma patients for documented medical need to a higher level of care.

Local EMS Agency/Regional Trauma Coordinating Committee

1. Identify areas in the state where timely access to Trauma Centers may be improved (needs assessment).
2. Develop specific physiological and anatomical indicators for re-triage on a level-of-care basis (e.g. Level III center to LI/LII, etc.).
3. Develop models for education and outreach that will promote timely re-triage/IFT where appropriate.
4. Promote the development of regional cooperative arrangements between sending and receiving centers that will facilitate re-triage, reduce delays, and ensure that patients are re-triaged to an appropriate level of care.
5. Develop clinical management guidelines for the early (re-triage phase) treatment of high-risk injuries such as TBI, pelvic fractures, mangled or crushed extremity injuries, peripheral vascular injuries, etc.
6. Explore the development of clinical management guidelines that would allow lower level facilities in remote areas to manage selected types of injuries (e.g. ‘minimal’ Traumatic Brain Injury).
7. Develop structured relationships (regional cooperative agreements), including educational outreach between sending and receiving hospitals in order to facilitate the inter-facility transfer and re-triage and clinical management guidance to allow lower level facilities to keep selected patients.
8. Explore and promote the use of telemedicine for trauma patients where appropriate.
9. Identify and promote educational resources suitable for improving re-triage and inter-facility transfers (i.e. the ACS Rural Trauma Team Development Course).

Component 9—Rehabilitation and Trauma Recovery

Background and Current Status

Rehabilitation services are optimally provided along a continuum beginning with admission to a Trauma Center and continuing through community reintegration. While California regulation Title 22 for Level I/II contains requirements for Physical Therapy/Occupational Therapy/Speech Therapy, standardized early treatment guidance does not exist. Most rehabilitation facilities are independent facilities and the degree of integration into the trauma system varies considerably. In addition, the degree of access to level-of-care post-injury rehabilitation throughout the state is unknown. In many cases, the access to post-injury rehabilitation is a function of the needs of the patient but also of their insurance status and rehabilitation resources within the region.

Planned Development

In an effort to more effectively address the rehabilitative needs of trauma patients in the context of a statewide system of care, the following objectives should to be applied:

State EMS Authority

1. Develop a compendium of rehabilitation facilities throughout the state to include:
 - 1.1. A plan to assess the availability and capabilities of rehabilitation facilities in the state (and neighboring states) and integrate them into the regional planning and performance improvement process²⁶ and perform a gap analysis to identify shortfalls in services including:
 - 1.1.1. Specialized centers for Traumatic Brain Injury & spinal cord injuries
 - 1.1.2. Pediatric centers
 - 1.1.3. Burn & other specialty recovery facilities
2. Improve the data collection for evaluation of rehabilitative needs and degree of access to rehabilitation throughout the state.
 - 2.1. *Utilize trauma rehabilitation data, such as functional outcomes and costs, to inform injury prevention programs across the state.*
3. Explore possible amendments to CCR, Title 22, Division 9, Chapter 7 to incorporate the rehabilitation needs of the trauma patient including rehabilitation as part of the continuum of care.
4. *Integrate rehabilitation specialists at the state, regional, and local level trauma system planning and evaluation.*

State Trauma Advisory Committee

Recommend a standardized measure of functional recovery suitable for use throughout the trauma system.

Local EMS Agency/Regional Trauma Coordinating Committee

1. *Encourage Trauma Centers to partner with rehabilitation services internal and external to their centers.*

²⁶ 2016 ACS Recommendation from State Trauma System Consultation report

2. Develop guidelines for the current incorporation of rehabilitation into the continuum of trauma care. These guidelines might include:
 - 2.1. A mechanism to initiate rehabilitation services or consultation upon patient admission.
 - 2.2. Policies regarding coordination of transfers between acute care and rehabilitation facilities.
 - 2.3. A template for operational Memorandum of Understanding's between definitive care facilities and rehabilitation centers to include:
 - 2.3.1. Complications and outcome follow-up,
 - 2.3.2. Data sharing for performance improvement activities,
 - 2.3.3. Educational outreach.

Component 10—Information Systems

Background and Current Status

Data collection at the state level is dependent on the local EMS and trauma data systems managed by the LEMSAs. The majority of the data is transmitted to CEMSIS from the LEMSA data systems and not directly from the EMS provider or Trauma Center. CEMSIS is divided into two components: CEMSIS-EMS, which contains prehospital data and CEMSIS-Trauma which contains Trauma Center data.

Participation in CEMSIS is voluntary by local EMS agencies and is currently managed for EMSA through a subcontract with Inland Counties EMS Agency with Image Trend as the vendor. CEMSIS is presently funded from the California Office of Traffic Safety by annual competitive grants.

CEMSIS-EMS

Select prehospital data elements are included in the state trauma data standards. Data is integrated into the data management systems of both the LEMSA and EMSA. The CEMSIS-EMS data standards are in compliance with the National EMS Information System (NEMSIS) standards.

CEMSIS-Trauma

Each designated Trauma Center is responsible for the collection of data on defined patients as outlined in CCR, Title 22, Division 9, Chapter 7. This minimum data set is expanded locally to meet the needs of the Trauma Center and trauma system. This data is integrated into both LEMSA and EMSA State's data management systems. CEMSIS-Trauma is inclusive of Trauma Center data with data standards in compliance with the National Trauma Data Standards (NTDS).

While regulations require all hospitals that receive trauma patients to participate in the local EMS agency data collection efforts, compliance with this requirement is variable as non-trauma facilities have no contractual obligation to comply. All hospitals are required to provide emergency department, and hospital discharge data to the State Office of Health Planning and Development (OSHPD) with specific data standards outlined in regulations.

Other data systems that support CEMSIS-Trauma

- Crash/law enforcement data is collected through the California Statewide Information Traffic Records System (SWITRS) by law enforcement personnel.
- California Highway Patrol at the scene of a crash on state highways; other law enforcement agencies have the option of participating in SWITRS.
- Coroner data: California has a mixed system of county coroners and medical examiners with no central data repository of data apart from the reporting of data for death certificates to the state Department of Public Health. Coroners and medical examiners report data for death certificates via an electronic (web-based) system. The California Department of Public Health edits and verifies the information and creates several files.

The most commonly used is the Deaths Statistical Master file which contains all the information found in comparable files for other states and territories.

Planned Development

State EMS Authority/State Trauma Advisory Committee/CEMSIS Data Committee

1. Explore feasibility of linking databases to create a complete longitudinal patient record.²⁷
This would include:
 - 1.1. Develop a mechanism for deterministic/probabilistic matching of data.
 - 1.2. CEMSIS-Trauma and CEMSIS-EMS linkage.
 - 1.3. CEMSIS-EMS and Hospital Data (OSHPD) linkage.
 - 1.4. CEMSIS and SWITRS linkage.
2. Evaluate data validity by developing a plan to monitor data completeness and accuracy including utilization of the state-defined inclusion criteria.
3. Improve data compliance by:
 - 3.1. Development of standard reports provided to local EMS agencies itemizing Trauma Center data compliance.
 - 3.2. Development of a subset of CEMSIS-Trauma to include data on pre-defined injured patients seen at non-trauma facilities.
 - 3.2.1. *Develop a special recognition program for non-designated acute care facilities that submit trauma data as trauma participating hospitals.*
 - 3.3. Promotion of CEMSIS participation by all local EMS agencies through submission of a minimal data set from non-trauma facilities (e.g. OSHPD data).
4. Improve data sharing through:
 - 4.1. Development of standard aggregate reports and dashboards to be publically shared on the EMSA website and the California Health and Human Services Open Data Portal, as applicable.
 - 4.2. Development of a procedure for all requests for data including a data request form.
 - 4.3. Development of a policy for data sharing in compliance, with applicable patient confidentiality laws and California Health and Human Services De-Identification Policy Standards.
 - 4.4. *Development of a comprehensive report of injuries for the state with comparisons of injury in rural, suburban, and urban counties.*
 - 4.4.1. *Obtain a template for a comprehensive state injury report from a state with a CDC Core Injury Grant.*
 - 4.4.2. *Prepare an executive summary of the injury report including key information and graphics for use in educating the public.*
5. ***Create an injury report template for the LEMSAs, and provide a list of EpiCenter queries to use to complete the injury report.***
 - 5.1. *Include a list of queries from the EMS and trauma registries.*
 - 5.2. *Consider using an injury epidemiology graduate student from a School of Public Health to support development of additional injury data reports and report templates.*

²⁷ 2016 ACS Recommendation from State Trauma System Consultation report

Local EMS Agency

1. Develop a plan to monitor data completeness and accuracy including utilization of the state-defined inclusion criteria prior to submission to CEMESIS.
2. *Assure all EMS patient data are included in hospital electronic health records (Trauma Centers and non-trauma centers), as well as trauma registries.*
3. *Develop a process to track the movement of patients through the continuum of trauma care.*²⁸

²⁸ EMS and Hospitals Join Together to Track Trauma Patients, 2011
<http://www.healthy.arkansas.gov/programs/services/hslicensing/regulation/emsandtraumasystems/documents/training/trainingmaterials/traumaband.pdf>

Component 11—System Evaluation and Performance Improvement

Background and Current Status

The purpose of a state Performance Improvement and Patient Safety (PIPS) Program ensures that injured patients receive quality care throughout the continuum. This requires monitoring care processes, structures and outcomes, identifying areas for improvement, developing and carrying out corrective action plans, and verifying that these corrective action plans result in desired improvements. The ideal PIPS Program requires accurate local, regional, and state prehospital and hospital clinical databases. Other components include identification of risk factors and best practices, accurate, standardized measurement of complications, risk-adjusted outcomes measurement, benchmarking, and appropriate feedback of benchmarking results.

EMSA may develop and implement a state-wide EMS Quality Improvement (QI) Plan with the LEMSA Trauma System Coordinators in collaboration with EMS Medical Directors. For the purposes of this plan, the terms QI and PIPS are synonymous. RTCCs may assist in case review if it crosses jurisdictional lines within the region. Trauma Centers are required to have a PIPS Program for improving care. In most cases, the PIPS program is linked to the hospital PI department and overall hospital PI Plan. Performance Improvement standards are developed to assist with monitoring care relative to standards of care.

California Code of Regulations, Title 22, Division 9, Chapter 12: EMS System Quality Improvement, requires that EMS provider agencies and Base Hospitals develop a PIPS Program with an associated Plan to be approved by the LEMSA. The LEMSA PIPS Plan is approved by EMSA. The regulations do not itemize trauma-specific components of the LEMSA PIPS Plan.

Planned Development

In order to evaluate the State Trauma System, the continuum of care from dispatch to pre-hospital to hospital disposition must be connected through a data system. Only in this way, can we begin to understand how care provided translates to improved outcomes and system effectiveness.

State EMS Authority

A program should be developed by the EMS Authority in collaboration with the LEMSAs and RTCCs to evaluate statewide trauma system performance. This should include:

1. Develop a statewide comprehensive Trauma PIPS Plan consistent with the elements of these Statewide Trauma Planning recommendations²⁹.
 - 1.1. *Identify additional staffing resources to assume responsibility for the overall implementation of the state PIPS program to ensure integration with regional and LEMSA trauma system plans and other relevant state plans.*
 - 1.2. *Utilize existing educational forums to provide information on the state PIPS plan, with an emphasis on the PIPS structure, process and metrics.*

²⁹ Recommendation from ACS State Trauma System Consultation report, 2016

2. Create a *multidisciplinary* State Trauma PIPS committee as a subcommittee of the STAC *taking into consideration the urban, suburban and rural clusters of Trauma Centers, regions, hospital network affiliations, and Committee on Trauma representation.*
 - 2.1. *Solidify the state core trauma performance improvement measures within the State PIPS plan to include structure, process, outcome and patient safety metrics.***
 - 2.2 *Assure that the performance improvement process is protected from discovery, when conducted at all levels of the trauma system, including the Regional Trauma Coordinating Committees.*
 - 2.3 *Query the databases to help answer specific performance improvement questions of interest, such as rates of over- and under-triage, and timeliness of re-triage and address trends in deviation of care through the PIPS plan process.***
 - 2.4 *Consider incorporating the best practices, processes and metrics identified from LEMSAs with well-established PIPS plans.***
3. Perform a statewide assessment of the Trauma System based on national standards and California-specific resources.
4. Evaluate state data and identify regional opportunities for improvement, determining if similar opportunities are occurring in other regions and explore mechanisms for shared resolution:
 - 4.1. Develop specific database queries.
 - 4.2. Create definition for system sentinel event and monitor such events.
 - 4.3. Facilitate issue resolution by assisting other system performance improvement committees.
 - 4.4. Develop and implement standards for system-wide performance improvement.
5. Create a recommended minimal data set of information to be submitted to LEMSA system trauma registries from non-trauma facilities to track and trend outcomes of traumatically injured patients retained in non-trauma receiving facilities.
6. Direct cross-regional issues to specific PIPS Work Groups for study and recommended resolution.
7. Develop and institute a mechanism for providing data and feedback to LEMSAs to assist in optimizing local PIPS processes.
8. Explore participation in the American College of Surgeons National Trauma Performance Improvement Project (TQIP) as a state, including a cost-benefit analysis.
 - 8.1. *Seek funding partners to support a California State Collaborative to provide risk-adjusted benchmarking outcomes.***
9. Create a policy regarding the sharing of data for the PI process, recognizing hospital confidentiality and HIPPA regulations.
10. Explore the development of a HIPPA compliant universal identifier (e.g. PCR# from prehospital patient care report) that allows individual patient data to be tracked throughout the entire spectrum of care including post care outcomes.
11. Ensure recommended minimum data that set allows for risk adjustment of individual patients so that benchmarking can be carried out.
12. Develop a process to periodically collect data elements designed to focus on specific patient populations and processes that are deemed to be the most important at any given time; these focused projects may be directed from the State, Region or LEMSA.

13. Periodically benchmark individual systems, hospitals, LEMSAs and RTCCs to the group as a whole and to an outside standard such as the HRSA “Benchmarks, Indicators, Scoring” (BIS) tool³⁰.
 - 13.1. *Encourage utilization of the BIS by the LEMSAs.*
 - 13.2. *Train facilitators to conduct the BIS for LEMSAs.*

Local EMS Agency

1. Develop risk-adjusted standardized reports and based on nationally recognized formula.
2. Show overall progress in achieving goals for significant injury and patient categories.
3. *Ensure that all LEMSA medical directors report their clinical performance improvement initiatives to the EMS Authority.*
4. Create a local/regional Performance Improvement Program (may be integrated into EMS PI Program for small systems) to:
 - 4.1. Develop specific database queries.
 - 4.2. Create definition and monitor system sentinel events.
 - 4.3. Work with local Medical Examiner on guidelines for trauma post-mortem exams.
 - 4.4. Facilitate issue resolution by individual performance improvement committees.
 - 4.5. *Incorporate the state PIPS trauma performance measures as a minimum into their trauma plans.*
5. Represent LEMSA at regional and state Performance Improvement Committees

Regional Trauma Coordinating Committee

1. Identify regional system issues and work with member LEMSAs on resolution of these issues.
2. *Support regional collaboration to enhance system integration and performance improvement.*
3. Recommend audit filters based on the region’s population traits, available resources and geography.
4. Explore tools to identify variations in care and outcomes across respective regions and determine possible ways to reduce detrimental variations in regional structures and care processes that may result in negative outcomes.
5. Prioritize system issues identified for resolution.
6. Work collaboratively with each member LEMSA to ensure standardized and accurate data collection and CEMSIS participation³¹.

³⁰ 2016 ACS Recommendation from State Trauma System Consultation report

³¹ 2016 ACS Recommendation from State Trauma System Consultation report

Component 12—Education & Training

Background and Current Status

Education consists of two categories: education of the public regarding trauma systems and education and training of trauma care professionals across the continuum of care.

Education of the Public

No formal public education process exists for trauma systems. Private and public surveys indicate that the general public regards all hospitals as Trauma Centers and few can indicate where their closest Trauma Center is located; furthermore, many citizens are not aware that the EMS system is the best avenue to receive trauma care. Direct first aid is another aspect of public education. Interventions utilizing new equipment and medications formerly available only to medical professionals are now being taught to the public, including use of tourniquets for severe limb hemorrhage.

Education and Training for Trauma Care Professionals

Education and training of trauma care professionals is compartmentalized into prehospital, nursing, and physician education with very limited trauma systems education. The EMS Authority in conjunction with statewide partners has sponsored seven State Trauma Summits providing updates on national trauma system development and clinical care along with an opportunity for local systems to present on best practices.

RTCCs also offer regional Trauma Summits with a mix of systems and clinical topics. RTCCs, partnering with the Trauma Managers Association of California (TMAC), sponsor the ACS Rural Trauma Team Development Course. Standard certification courses such as International Trauma Life Support (ITLS), Prehospital Trauma Life Support (PHTLS) and Transport Nurse Advanced Trauma Course (TNATC) are available and encouraged but not required in most of areas of the State.

While there are national continuing education standards in place for Trauma Centers, they are silent in California regulations. Some education requirements are addressed through the Trauma Center designation process and monitored by the LEMSA. Various national certification programs such as Advanced Trauma Life Support (ATLS), Trauma Nurse Coordinator Course (TNCC), Advanced Trauma Care for Nurses (ATCN), Advanced Cardiac Life Support (ACLS), and Pediatric Advanced Life Support (PALS) are available; however, there is no consistent standard for training throughout the State.

Regulations specify Trauma Center physician qualifications related to specialty board certification and Advanced Trauma Life Support certification. It is also a requirement that the Trauma Center participate in continuing education in trauma care. Education standards also exist within the Trauma Center, which are met if the Trauma Center either chooses or is required to be verified by the ACS.

Planned Development

State, regional and local education needs should be identified, and resources identified to meet those needs. Standard education competencies should apply statewide, and each region's individual educational offerings should address local needs.

EMS Authority

1. Identify statewide educational needs through the Performance Improvement and Patient Safety Program in consultation with hospitals, LEMSAs and RTCCs.
2. Develop, through its State Trauma Advisory Committee, a plan for providing information to the public regarding the structure and function of the State Trauma System.
3. *Expand the state EMS annual recognition program to include a category specific to the trauma system.*
4. ***Collaborate with the Trauma Managers Association of California in their efforts to roll out a statewide media campaign to educate the public about the trauma system.***
 - 4.1. *Consider engaging graduate student(s) from a communications or marketing program to support this effort.*
 - 4.2. *Develop a one page fact sheet to summarize the updated goals in these Statewide Trauma System Planning recommendations and publish it on the EMS Authority website.*
 - 4.3. *Integrate the executive summary from the comprehensive trauma injury report.*

Local EMS Agency

1. Provide public education regarding trauma systems and injury prevention.
2. Perform a needs assessment prior to developing new or additional trauma-related educational programs.

Regional Trauma Advisory Committee

1. Promote regional efforts to educate the public on trauma systems and the role and effectiveness of Trauma Centers.
2. Develop trauma clinical care education for regional trauma professionals.

Trauma Centers

1. Work with non-trauma facilities and level IV Trauma Centers in providing for the Rural Trauma Team Development Course.
 - 1.1. *Seek funding for continued provision of the course for rural acute care facilities to assist them in becoming participating trauma facilities.*
2. Provide educational opportunities based on PIPS Program findings.

Component 13—Trauma Systems Research

Background and Current Status

Academic research centers perform the majority of trauma research done in California (Level I Trauma Center) and is required by regulation for Level I designation. Important contributions are also being made in the areas of public health, pediatrics, and prehospital. Most of these projects are being conducted by single institutions or agencies and are not utilizing the opportunities of collaborative, multidisciplinary research. Currently, funding is sought by investigators and facilitated by the research institution. To date, statewide systems research has been limited and has included isolated reports from single institutions on issues such as access to care and pediatrics.

The state trauma registry (CEMSIS-Trauma) is an important source of information and data for research. Institutional and regional databases may be used for comparative and outcomes research, and large statewide databases should be used to demonstrate the effectiveness of the system. The CEMISIS-Trauma Registry was started in 2009 and currently does not have a mechanism to request data for the purposes of research. The EMS Authority is responsible for maintaining data integrity and reliability of the state trauma registry, which is compatible with the National Trauma Data Standards (NTDS).

Research using trauma registries may provide information about resource utilization, outcomes, and system performance. Comparative benchmarking using local, regional or statewide trauma registries can be performed by comparing local data with the National Trauma Data Bank (NTDB).

Planned Development

Local EMS agencies and Trauma Centers should be the basis for collaborative systems research utilizing the statewide CEMISIS database. Trauma system research involving both local and state agencies should be part of local/regional trauma systems.

EMS Authority

1. *Develop a research agenda with priority topics identified.*
2. *Encourage continued investigation of issues that may help inform trauma system evaluation and planning in California and the nation.*
3. Facilitate access to data for individual or groups of investigators through the use of the CHHS Open Data Portal and CEMISIS³²
4. Establish internal policies for the request for data from CEMISIS for research purposes.
5. Identify the research expertise in the system and work collaboratively with experts in the field (e.g. Schools of Public Health, Finance and Economics).

State Trauma Advisory Committee

1. Facilitate multidisciplinary collaboration for research.

³² 2016 ACS Recommendation from State Trauma System Consultation Report

2. Develop research agenda (possibly through a research committee) and collaborate with established investigators to conduct research projects.
3. Periodically review trauma system data derived from CEMISIS, OSHPD and other sources, and make recommendation to various system stakeholders regarding potential areas of research.

Component 14—Injury Prevention

Background and Current Status

A number of collaborative efforts between Trauma Centers, LEMSAs and public health departments have successfully been developed at the regional level and can be used as models for injury prevention. In keeping with the public health model, statewide injury control in California has been established primarily under the direction of the Department of Public Health; however, an assessment of the state trauma system in 2006 by EMSA recognized a lack of interface between these efforts and state trauma leadership.

EMSA participates in the Strategic Highway Safety Plan (SHSP) that has 17 Challenge Areas focused on many injury prevention topics. EMSA is the lead agency for Challenge Area 15 that has the goal of “Improving Post Crash Survivability”. EMSA is actively forging relationships between EMS partners (LEMSAs, Trauma Centers, and providers) and SHSP committees to increase statewide injury prevention participation.

The Trauma Managers Association of California (TMAC) utilizes the expertise of many trauma program leaders to develop statewide coalitions for prevention. Some of the Regional Trauma Coordinating Committees (RTCC) are developing organized approaches for injury prevention.

Planned Development

The incorporation of an integrated injury prevention system into the Trauma System is a critical step in reducing the burden of injury morbidity and mortality in California. In recent years, trauma care has shifted from the medical model of treating injuries to a public health approach that defines trauma as a preventable disease. Rather than focusing on the acute care of traumatic injuries, the public health framework allows for the prevention and mitigation of injury by addressing the causes of trauma and subsequent injury.

State EMS Authority/State Trauma Advisory Committee

1. *Create a needs-based, integrated, statewide injury prevention plan, in collaboration with the California Department of Public Health that identifies priorities for intervention.*
 - 1.1. *Share the injury prevention plan and its priorities with LEMSAs and Trauma Centers.*
 - 1.2. *Encourage LEMSAs and Trauma Centers to develop strategies to address state priority injury prevention issues.*
2. Partner with existing agencies focusing on statewide injury prevention (e.g. EpiCenter at the California Department of Public Health) for the purpose of:
 - 2.1. Establishing best practice recommendations for prevention programs and evaluation based on scientifically evaluated injury prevention strategies.
 - 2.2. Improving coordination and utilization of public health and trauma systems injury prevention resources at the state, regional and local levels.
 - 2.3. Coordinating a statewide strategy to promote injury awareness with the public, media, and elected officials.

Local EMS Agency/Regional Trauma Coordinating Committee

1. Develop a compendium of regional injury prevention programs with links provided to EMSA for posting on the website.
2. Implement new and support existing scientifically proven prevention programs in response to regionally specific injury data.
3. Ensure ongoing program evaluation to determine the effectiveness in reducing intentional and unintentional injuries.
4. Collaborate with injury prevention programs to collect the necessary data for program evaluation and needs assessment.
5. Create a public information and education program with consistent messaging on the preventability of injury.

Component 15—Emergency/Disaster Preparedness

Background and Current Status

The role of trauma systems is a key component of the overall response system for disasters/multiple casualty events. Each LEMSA and Operational Area (county) has a defined means of communication and coordination of patient movement. A local jurisdiction engaged in a multi-casualty incident (MCI) commands and organizes a given incident using their local MCI Plan. Triage, using LEMSA protocols and procedures, is conducted under a Triage Unit and patient treatment and staging prior to transport are conducted under a Treatment Unit. Using local procedures, Radio communication from the Transportation Leader relays the number and acuity of victims to the healthcare system, including Trauma Centers, which in turn communicate their capacity for receiving patients. Designated trauma and burn patients, using LEMSA criteria, are directed to trauma/burn centers. If the magnitude of the MCI begins to exceed the capacity of the local or Operational Area trauma system, patient movement may be directed to contiguous trauma systems.

The State Operations Center (SOC), operated by CalOES, coordinates State resources to a disaster. The Public Health and Medical Emergency Function (EF8) support the Medical Mutual Aid system and supports affected trauma systems or to coordinate state-wide patient movement through the EMS Authority and California Department of Public Health. The SOC, with approval of the Governor, can also make requests for federal medical and health resources through the FEMA Region IX and Department of Health and Human Services Region IX.

All-hazards multi-casualty events typically include situations involving natural (earthquake), unintentional (school bus crash), and intentional (terrorist explosion) trauma-producing events that test the expanded response capabilities and surge capacity of the trauma system. Funding from HRSA and FEMA is inadequate for the task of preparing Trauma Centers for the next inevitable event when they are already under economic duress.

Planned Development

EMS Authority/State Trauma Advisory Committee

1. Perform an assessment gap analysis of the state trauma system's emergency preparedness including Trauma Center surge capacity
2. *Explore the use of Hospital Preparedness Program funding to assist the trauma system with disaster planning and exercises.*
3. Integrate Statewide Trauma System Planning with the California Department of Public Health and Medical Emergency Operations Manual Plan for natural and manmade incidents.
 - 3.1. *Integrate the Trauma Centers and EMS in the development of regional emergency, disaster, surge capacity, and mass casualty planning based upon risk, population, and bed census assessments.*
4. *Provide updated information to the State Trauma Advisory Committee and the Regional Trauma Coordinating Committees annually on the state disaster activities and the status of medical assets available to the trauma system.*

5. Explore the use of existing resource monitoring systems to provide real-time trauma capacity and resources assessment.
 - 5.1. *Utilize disaster management systems to assess hospital capacity and capability for specialized care.*
6. Incorporate the role of the trauma system in the Public Health and Medical Emergency Operations Manual³³.
7. Develop a standardized inventory for trauma caches that could be located at strategic locations in the event of a disaster.
8. Develop the capacity via the EMSA website for the dissemination of guidelines, protocols, programs, etc. relevant to the State Trauma System.
9. Encourage collaboration, communication, and involvement between LEMSAs, RTCCs, MHOAC/RDMHS, and local Trauma Center staff.
10. Coordinate and plan with LEMSAs, RTCCs, MHOAC/RDMHS, and local Trauma Center staff for rapid decompression of healthcare facilities during regional mass casualty events.

Local EMS Agency/Regional Trauma Coordinating Committee

1. Explore trauma system surge capacity, and best practices to improve disaster response.
2. Provide leadership and active participation in the state and regional trauma care system with lead functions for system and disaster planning.
3. Promote training to Trauma Centers and non-trauma facilities on the medical health disaster system in the region.
4. Develop template language for MOU's between Trauma Centers to ensure a quick process for sharing resources (personnel, equipment and medical supplies) to enhance surge capacity during disasters.
5. *Incorporate applicable LEMSA disaster planning with the LEMSA trauma plans along with annual disaster updates.*
 - 5.1. *Include guidelines that direct less severely injured patients to non-designated acute care facilities when possible, allowing Trauma Centers to receive the most severely injured patients.*
6. *Consider using a patient tracking system that could be implemented on a regular basis as well as in the event of a disaster.*

³³ 2016 ACS Recommendation from State Trauma System Consultation report

Appendix C

State Trauma Advisory Committee Membership

Appendix D

Designated Trauma Centers

Appendix E

Trauma System Research

Appendix F

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