



DEVELOPMENT OF THE CALIFORNIA
PEDIATRIC TRAUMA NETWORK (CAPTN)

Summit Summary & Recommendations

Co-Sponsored by
Children's Hospital Los Angeles
UC Davis Medical Center
California EMS Authority

Report Published: July 1, 2012





This summit and report was co-sponsored by the following organizations:

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Children's Hospital Los Angeles is the only freestanding Level I pediatric trauma center in Los Angeles County. It is the only hospital in the South/West region designated as a Level 1 pediatric trauma center by the American College of Surgeons. Directed by Jeffrey Upperman, MD, the Trauma Program encompasses acute injury, injury prevention and disaster preparedness programs, with encompassing research, education and advocacy in each of the areas. Trauma represents the most critical health risk for American children, and our goal is to not only provide the highest quality multidisciplinary care for injured children, but also to prevent these injuries through research and education.

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The Emergency Medical Services (EMS) Authority provides leadership in developing and implementing EMS systems in California through the 32 local and regional EMS agencies to ensure coordination of EMS services statewide. The EMS Authority, in cooperation with system participants, sets standards for training, scope of practice and licensure or certification for various levels of EMS personnel including first responders, emergency medical technicians and paramedics. In addition, the EMS Authority provides leadership in developing specialty care systems including Trauma, Stroke, ST segment elevation myocardial infarction (STEMI), Pediatrics, Prevention and Poison Control. The EMS Authority also has responsibility for disaster medical preparedness throughout the state, and, when required, manages the state's medical response to major disasters.

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Table of Contents

Executive Summary	9
Introduction	10
About This Report	11
Background	12
Pediatric Trauma in California	14
California Pediatric Trauma Network (CAPTN) Development	15
Definitions	16
Access to Pediatric Trauma Centers	18
Pediatric Trauma Triage	21
Pediatric Trauma Patient Transfer	24
Performance Improvement for Pediatric Trauma Care	27
Conclusion	30
Stakeholder Workgroups	31
Acknowledgements	32
References	33
Appendix	34

Executive Summary

Children within California receive varying levels of trauma care based on where they live. The different levels of care are due to the availability of pediatric specialists and hospital capacity in a given area. In California, the Emergency Medical Services Authority oversees programs for pre-hospital care and our trauma systems. Each local EMS Agency (LEMSA) is delegated the responsibility for overseeing trauma care within their given area.

This report is a summary of recommendations put forth by a broad set of stakeholders in the pediatric and adult trauma systems within California. The discussion, time and commitment of these individuals underscore the importance and passion for improving the quality and access to trauma care for children.

This summit and report is structured under the following four categories: Access, Triage, Transfer and Performance Improvement. These categories were selected because they cover main areas in which effort needs to be made to improve pediatric trauma care.

The individuals engaged in this summit call upon the continued advocacy and effort to improve access to quality trauma care for children through improved guidelines on triage and transfer, an improved process for data collection and analysis and resolution of identified issues. We recommend creating a statewide pediatric trauma system: the California Pediatric Trauma Network (CAPTN). Individuals within CAPTN should coordinate with existing state, regional, and local agencies to move recommendations forward and continue exploring and resolving these issues.

Introduction: The Need For A Pediatric Trauma Network

THE SLEDDING INJURY

The 13-year-old girl was happily sledding with her family near her home in a rural area of Northern California. But when her sled suddenly veered out of control and careened into a tree, the girl and her family came face-to-face with some of the shortcomings of the current California trauma system.

The girl was complaining of chest and abdominal pain. But a local hospital found no significant injuries and sent her home. Her parents were relieved. But four days later, their daughter woke up in the middle of the night with abdominal pain and vomiting.

This time, a local emergency department (ED) performed a CT scan, revealing a large laceration to the girl's liver. The injury had been sustained during the sledding accident, but was missed during the initial evaluation four days earlier. Meanwhile, the injury had worsened, her liver had continued to bleed, and she had developed a large hematoma.

The hospital transferred the girl to the nearest Level I pediatric trauma center, UC Davis Medical Center. Fortunately, it wasn't too late. An interventional radiologist (a specialist often not available at smaller hospitals) performed an emergency procedure to stop the bleeding. The girl required blood transfusions to replace the blood she'd lost, but she recovered and went home after a few days. A potential tragedy was averted.

GAPS IN THE SYSTEM

Many parents are probably unaware that California does not have a coordinated, statewide trauma system for children. When their child is injured they trust that their child will receive the most timely and most appropriate care. In fact, timely care is critical in trauma cases and can even make the difference between life and death.

Many times, appropriate trauma care is provided. Our first responders, community hospital emergency departments, and adult and pediatric trauma centers save children's lives every day. But the lack of a coordinated trauma system specifically for children can sometimes hinder their best efforts—and lead to dangerous gaps or delays in care.

In the case of the sledding accident, it took several days before a young girl's traumatic injuries were identified and treated. But this is just one example. In other cases throughout the state, children from the same car crash, with similar injuries, have been transported to vastly different levels of care, with varying outcomes. There have been instances where a child with a traumatic injury might be transferred to two different hospitals before finally being sent to a trauma center—wasting precious time.

Although rural areas in the state face the additional geographic challenge of long transport times, the lack of a coordinated system is a statewide problem that affects children from big cities and small towns and all economic walks of life.

As this report will demonstrate, the families and children of California need and deserve a coordinated, statewide California Pediatric Trauma Network to more clearly define appropriate access to trauma care, triage and transfers for pediatric trauma victims. Just as importantly, the processes and outcomes of all trauma care for children need to be carefully tracked to ensure ongoing performance improvement.

About This Report

This report provides background on the history of California's trauma system, as well as a summary of the issues and challenges involved in creating a new, coordinated California Pediatric Trauma Network.

The key findings, challenges, opportunities and recommendations presented in this report are the result of the Pediatric Trauma Access to Care Summit, a statewide stakeholder summit held at the UC Davis MIND Institute in Sacramento on April 28, 2011. A list of participants and advisors is included.

By working together with all stakeholders involved, we feel confident that we can create a more effective and efficient pediatric trauma system. This system can better support all stakeholders' efforts—and ensure the best possible care for California's children.

Background: Development of the California Trauma System

EARLY BEGINNINGS

Over the past 40 years, the California trauma system developed from patchwork legislation and funding. The first step was the formation of local Emergency Medical Services (EMS) in the 1970s. This initial program operated the emergency freeway call boxes in Los Angeles, Orange, San Diego and Santa Clara counties. These independent call systems went to separate lines for each county, with little interaction between counties.¹

In 1980, the California EMS Authority was developed to oversee emergency and disaster medical services. This was a result of the Emergency Medical Services System and Prehospital Emergency Care Personnel Act (SB 125) which added Division 2.5 to the Health and Safety Code. Following the creation of the EMS Authority, language was added to the Health and Safety Code to allow, but not require development of local trauma care systems. In 1986, the state established trauma care regulations to promote minimum standards for these local, optional trauma systems and locally designated trauma centers.²

More development followed, including paramedic training, regional EMS systems, universal 911 EMS access, Advanced Trauma Life Support (ATLS) and Trauma Care Standards and Verification. As a result of these developments, inquiry using the National Trauma Data Bank (NTDB) showed that trauma mortality rates in California declined between 8 and 25 percent.³ The system had proven effective. But trouble was brewing.

FUNDING CRISIS

In 1987, the Assembly Office of Research found that California's trauma care system was suffering from an enormous financial loss. This loss was mainly experienced by trauma centers. Many hospitals, in an effort to prevent more losses, dropped their trauma center designation. Throughout the 1980s and 1990s, several state legislative proposals to provide funding for trauma care were presented, but most of them failed.

One of the few measures that passed during this period was Chapter 1240, Statutes of 1987, which allowed counties to establish an Emergency Medical Services Fund (the Maddy fund). This fund compensated health care providers for emergency services, for both insured and uninsured patients. The purpose was to stabilize the system to ensure that the population had continued access to emergency care.²

In 2001, Assemblyman Cardenas established Chapter 171, which created the Trauma Care Fund. This included a method to distribute funds to local EMS agencies for designated trauma centers. This fund was created to support reimbursement for the resources and expertise required to maintain a 24/7 comprehensive trauma center that was not being reimbursed adequately. The same year, the *California Statewide Trauma Planning: Future Direction* report provided an analysis of the costs and benefits of the current trauma care system in California. In 2006, Governor Schwarzenegger signed the report, which validated that the existing trauma system was worthy of continued funding.²

TODAY'S SYSTEM

The current California trauma care system consists of 58 counties, divided into 32 local EMS agencies.⁴ The state EMS Authority is responsible for developing statewide standards for trauma care systems and trauma centers. Although local trauma systems are based on state regulations, the regulations, policies and practices differ within each LEMSA.

LEMAs designate trauma centers that meet state trauma regulation requirements. As of December 2011, there were 72 designated trauma centers throughout the state including 14 pediatric trauma centers. Trauma centers must be a licensed hospital that has the personnel, services and equipment necessary to care for trauma patients. Within California, all trauma centers must have:

- A trauma program medical director,
- A trauma nurse coordinator,
- A basic emergency department,
- A multidisciplinary trauma team,
- Specified service capabilities

TRAUMA CENTER DESIGNATION 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 also are research and teaching facilities.
- Level III trauma centers provide surgical services for patients with less critical injuries who do not need immediate surgery. They have resources for emergency resuscitation, surgery and intensive care for most trauma patients but may not have the full availability of specialist that a higher level of care offers.
- Level IV trauma centers generally provide initial stabilization of trauma patients, with secondary transfer to a higher level of trauma center care when appropriate.

Trauma centers can seek verification from the American College of Surgeons-Committee on Trauma (ACS-COT) which provides a level of designation indicating a trauma center has met additional requirements for trauma care.

Pediatric Trauma In California

THE NEED FOR A NETWORK

Pediatric trauma is the greatest cause of morbidity and mortality in child health.⁵ In fact, pediatric trauma accounts for more than 30 million Emergency Department visits per year.^{6,7} That's 15 to 25 percent of all ED visits statewide. Children have unique needs for expertise and resources. Because there are limited pediatric trauma centers, children are especially dependent on regionalized trauma care.

While there is a well-defined and functional trauma care system, there is no specific trauma system for pediatric patients in California. Many hospitals are not fully staffed with team members properly trained for pediatric trauma cases. The facilities that are properly prepared for these cases are few and far between.

CURRENT RESOURCES

As of December 2011, California has 14 facilities with pediatric trauma center capabilities, and five of these are designated the highest level, Level I. Pediatric trauma centers also tend to be centralized in certain geographic areas. The criteria for transferring a patient to a pediatric trauma center are fairly clear at this point:

- Multi-system injury,
- Unstable,
- Axial skeleton, neurovascular or acute cord injury,
- Complicated Traumatic Brain Injury (TBI) or a low trauma/Injury Severity Score (ISS) score.

However, many children will not be seen initially at a trauma center, and there is no systematic process for when to transport directly to, when to transfer and how to transfer to a trauma center.

RECOMMENDATION

We recommend creating a statewide pediatric trauma system. A statewide pediatric trauma system is needed to ensure that children's needs are continually assessed and met by the network of hospitals that comprise the trauma system for children. Without a designated pediatric focused system, children's needs are often overlooked. California can become a leader in ensuring children are cared for appropriately by establishing a system. Although pediatric trauma systems are not widespread, previous studies done in Washington and Oregon have shown a reduced risk of pediatric death with the implementation of a statewide pediatric trauma system.⁸

California Pediatric Trauma Network (CAPTN) Development

PURPOSE AND PLANNING

On April 28, 2011, 50 stakeholders convened at the Pediatric Trauma and Access to Care Summit in Sacramento to discuss key issues and recommendations for pediatric trauma care within California. The summit was organized and co-sponsored by the California Emergency Medical Services Authority, University of California Davis Medical Center Trauma Program and the Children's Hospital Los Angeles Trauma Program.

Summit planning was initiated in late 2010 by the co-sponsors to ensure that issues related to pediatric trauma care remained central to the conversation. A National Advisory Board and Statewide Steering Committee were formed to inform the discussion and provide relevant information from other trauma systems nationwide. Stakeholders also developed four draft briefs outlining the issues and draft recommendations that would be presented at the meeting. The areas of focus included: Access to Care, Triage, Transfer and Performance Improvement.

SUMMIT ACTIVITIES

When the summit convened, each of the stakeholders presented a briefing to the group. A panel of three stakeholders then contributed additional key issues and discussed the issue from their perspective. The remaining stakeholders within the audience were able to provide additional comments. This process was repeated for each of the four topic areas during the morning session.

Following lunch, stakeholders were divided into four breakout groups. Each group focused discussion on a particular topic area. At the conclusion of the session, a representative from each of these four breakout groups presented their findings and recommendations to the rest of the groups. All of the proceedings were audio-recorded and transcribed to ensure that everyone's ideas were captured.

RECOMMENDATIONS

At the conclusion of the summit, the stakeholders reported 18 recommendations in the following four topic areas:

- Access,
- Triage,
- Transfer,
- Performance Improvement

In the following pages, we discuss each of these areas in more depth and detail each group's discussions, findings and recommendations.

Definitions

Access: The opportunity and right for the injured child to receive the most appropriate level of trauma care in the timeliest fashion, regardless of payer status.

California Emergency Medical Services

Authority (EMSA): The California Emergency Medical Services Authority is the statewide authority that establishes and enforces standards for EMS personnel, coordinates with local EMS systems (LEMSAs) and prepares and responds to disasters.

California EMS Information System (CEMSIS):

The California EMS Authority has been working to develop CEMSIS since the late 1990s to gather standardized data elements from trauma registries throughout the state. The system is in the demonstration phase and compiles Emergency Medical Services (EMS) and trauma data from each LEMSA. Trauma data dates back to January 1, 2009.

Child: For the purposes of this report, we will use the Centers for Disease Control and Prevention (CDC) age category, younger than 15 years of age. This is consistent with the *2009 Guidelines for Field Triage of Injured Patients*.

Diversion: In a trauma system, when a receiving facility notifies the system not to bring emergency transport vehicles to the facility, that facility is on diversion.

JumpSTART: This is the START triage tool adapted for children. The full name is JumpSTART Pediatric MCI Triage Tool, from Lou Romig, MD, at Miami Children's Hospital (www.jumpstarttriage.com).

Local EMS Agency (LEMSA): Local EMS agencies oversee the Emergency Medical Services system in a given geographic area. In California, counties have the primary responsibility to ensure that EMS systems are implemented. The LEMSA is responsible for establishing policies; collecting, analyzing and disseminating associated data; developing guidelines and protocols for patient treatment and transfer; certifying pre-hospital medical care personnel and approving EMS personnel training programs.

National Trauma Data Bank (NTDB):

A national data bank that contains injury information from trauma patients presenting to hospitals (both trauma-designated and non-designated hospitals) from across the nation.

National Trauma Data Standard: A dataset of the National Trauma Data Bank (NTDB) that creates a standardized national registry database. Standard elements are used to collect data, and an accompanying data dictionary supports standardized collection. The American College of Surgeons oversees this data.

Over-triage: Over-triage occurs when a patient's injuries are initially overestimated. Patients who are triaged to a trauma center, but do not require specialized trauma intervention, have been over-triaged.

Pediatric Assessment Tool or Pediatric

Assessment Triangle (PAT): A simple triage tool to provide quick assessment of a child's degree of illness or injury. It evaluates:

1. airway and appearance,
2. work of breathing and
3. circulation

(www.health.state.ny.us/nysdoh/ems).

Pediatric-capable facility: A facility that has a pediatric intensive care unit (PICU) but is not California Children's Services (CCS)-certified. Presently, these facilities are obligated to transfer a traumatically injured child, regardless of the provider's willingness to care for the child. However, this regulation is being changed; CCS is moving to certify Level II PICUs to serve the subset of the population that does not have close access to a Level I PICU.

Performance improvement: A concept whereby organizations implement a program to measure current performance and then review outcomes from those measures to identify opportunities to improve.

Primary triage: Triage that occurs at the site or scene of the injury.

Regional Trauma Coordinating Committees (RTCC): In 2009, The Regional Trauma Coordinating Committees were established to support the development of a state trauma system. The committees represent all stakeholders in the Regional Trauma Services System and address trauma care priorities for the region. There are five committees in California— Region I: North, Region II: Bay Area, Region III: Central, Region IV: Southwest and Region V: Southeast. The committees integrate with the statewide trauma program.

Secondary triage: Any triage that occurs following the primary triage. This triage usually occurs at a receiving hospital. Henceforth, patients with severe injuries are sent to a trauma center.

START: Simple Triage And Rapid Treatment. START is an adult triage tool developed by the Newport Beach, Calif., Fire and Marine Department in the 1980s for multiple-casualty or mass-casualty situations (<http://www.start-triage.com>).

Triage: The sorting of patients according to the urgency of need of care. In the trauma setting, the goal of triage is to ensure that patients are sent to a facility that can provide optimum care for their injuries. Appropriate triage must occur not only in the routine day-to-day sorting of injured patients, but also in multiple- or mass-casualty situations. The approach used varies with the setting.

Under-triage: Under-triage occurs when a patient's injuries are underestimated during triage. Patients are considered under-triaged if they were initially thought not to have major injuries, but are later found to have an Injury Severity Score (ISS) over 16, require major emergency interventions or die from these undiagnosed or treated injuries.

Transfer: For the purposes of this report, transfer refers to the transfer of a patient from the Emergency Department (ED) of one hospital to the Operating Room (OR) or floor of a trauma center (a higher level of care).

Access to Pediatric Trauma Centers

Summary

Access to pediatric trauma care varies by region. It is dependent on the availability of trauma centers, hospitals and providers in a geographic area. In some areas, it is not feasible to have a pediatric-specific trauma center because the limited number of children does not provide a high enough volume of cases to maintain providers' skill sets. The level of trauma center required depends on the type of injury and the age of the child. To fully understand the impact of transport times, access to pediatric and adult trauma centers and patient outcomes, it is necessary to collect data at the regional level and create pediatric-specific guidelines based on each regional area.

Goals

1. To establish and delineate a network of hospitals that have made, and are motivated to make, a commitment of resources and training to provide quality care to pediatric trauma victims.
2. To ensure that resources are available to provide patient care, from initial trauma through the rehabilitation stages.
3. To provide pediatric trauma care in a manner that takes into account economic considerations, cost-effectiveness, EMS resource utilization and proximity and accessibility of the hospitalized patient to family and friends.

Key Findings

WIDE VARIABILITY AMONG FACILITIES

Numerous facilities throughout California participate in the care of injured children. Given the size and diversity of the state and its counties, many facilities apply methodologies and algorithms that fit the local infrastructure, but may not be applicable to other facilities or regions.

The group noted that there is wide variability among facilities that provide care—from Level I accredited pediatric trauma centers in children's hospitals, to adult trauma centers with pediatric critical care units, to general hospitals with pediatric facilities without formal trauma accreditation.

GEOGRAPHY CAN LEAD TO LONGER TRANSPORT TIMES

Certain geographic areas have a significant paucity of pediatric trauma centers, leading to increased EMS transport times. Transport times beyond 30 minutes can have detrimental effects on outcomes of trauma victims.

The group acknowledged that treating children at adult facilities may decrease transport time and allow for proximity to families. However, this may limit access to subspecialists trained in pediatric trauma.

Challenges

DATA COLLECTION

Limited data on pediatric outcomes by geographic area inhibit the ability to understand if and how outcomes vary across areas. The group agreed that it is crucial to collect and analyze available historical and prospective data to develop a functional, cost-efficient and safe pediatric trauma network. Data collection will also help delineate the challenges concerning children's access to trauma care. These data should include:

- Identifying which regions and counties have limited access to pediatric trauma care.
- Examining the size of the pediatric population and the number of pediatric trauma cases occurring in those regions.
- Analyzing regional trauma severity and complexity.
- Identifying potential gaps in trauma care.

Currently, data are collected at many different levels (EMS, hospitals, administrations and government); however, a standardized communication platform and data bank are yet to be established.

LEVEL OF CARE AND VOLUME

Verified trauma centers are required to maintain a certain trauma volume. This volume is also critical for allowing trauma surgeons and intensivists to maintain their required skill sets, especially for cases that may be rarely seen. Some data suggest that patient outcomes at Level I trauma centers are superior; however, these data need to be evaluated against the time and distance required to reach a Level I adult facility. Certain patients are better served by treatment closer to home, while others will experience better outcomes and may have less morbidity at a facility with a large number of subspecialists available.

CONFLICTING GUIDELINES

The group noted that several guidelines for pediatric access to trauma care already exist. These are established from a number of sources, but occasionally, they are contradictory and actually limit access to an appropriate care facility.

CARE OF ADOLESCENTS

Patients between the ages of 13 and 18 years often are considered in the “age gray zone” in terms of access to trauma care. Many triage and access algorithms are available, but have varying age limits. These range from strict age cutoffs at the 15th birthday to triaging according to secondary signs of sexual development.

The group discussed that the type of care required for the “age gray zone” depends on the mechanism of injury and physiologic development of the patient. A 13-year-old patient with a gunshot wound might be better taken care of at a trauma center that is experienced with gunshot wounds and provides access to vascular surgical care. However, treatment at the pediatric trauma center would enable the pediatric trauma surgeons to maintain vascular surgical skills. On the other hand, a 16-year-old motor vehicle crash victim with a solid organ injury might be better served at a pediatric trauma center, where solid organ injury algorithms are well established and routinely used. This gray zone is dependent on the patient’s

developmental age and physiology, as well as the availability and experience of the pediatric trauma care personnel.

Opportunities

Providing pediatric trauma victims access to the most appropriate level of care is an ongoing challenge for care providers at all levels. The group recommended harnessing the power of communication devices and networks to maximize the detailed understanding of the patient population in need and to document the already available infrastructure.

Once these communication pathways are established, they could be used in an ad hoc fashion for triage and care of the patient—and to provide access to the most appropriate level of care for each individual. Care for trauma patients in the “age gray zone” could then be directed based on individual need and available resources at the potential receiving trauma center.

As a state, California is at the forefront of high-end technological communications and is the home of software industry and development. The group noted that this makes it the ideal place to establish and optimize a pediatric trauma communications and data network—and to reach the goals of cost-efficient, timely and individualized care for pediatric trauma patients.

Recommendations

The group offered the following recommendations regarding access to pediatric trauma facilities:

1. CREATE A LEAD ADVOCACY NETWORK.

The “California Pediatric Trauma Network” (CAPTN) can become the lead advocacy organization with the responsibility and resources to continue the ongoing development, operations and evaluation of the pediatric trauma system in California. This could be developed through government and non-government agencies.

Access to Pediatric Trauma Centers (continued)

2. DEVELOP AN ENHANCED DATA COLLECTION PROCESS.

Under this process, each region would collect data on available resources and trauma volume. This process is beginning for the adult trauma system in the RTCCs. All care facilities would be assessed based on an accurate description of each facility's capabilities (ICU/non-ICU beds, pediatric surgeons, trauma surgeons, intensivists, subspecialists, neurosurgeons, orthopedic surgeons and rehabilitation facilities).

Each region should provide a description of its current practice for access within each county or LEMSA. This may include written policies and actual practices, and may include practices for triage algorithms. It also should include an accurate description of pediatric volumes within each age bracket, as well as transport times and frequency of transfers. Finally, each region should be given an opportunity to provide subjective information about its strengths, problems and needs.

3. ESTABLISH INITIAL GUIDELINES REGARDING MINIMUM STANDARDS FOR PEDIATRIC TRAUMA CENTERS.

These guidelines should be trauma-specific and not limited by standards only appropriate for a pediatric hospital. It may become necessary to compare established standards and recommend alignment of these, so as not to exclude hospitals that may be able to provide care (e.g., comparing ACS guidelines to Title 22, etc.). State standards for critical care should support access to trauma care. ACS recommendations within the most recent "Optimal Care of the Injured Patient" should serve as a reference.

4. STANDARDIZE THE DEFINITION OF PEDIATRICS, BUT ALLOW FOR A GRAY ZONE.

The CDC definition for pediatrics should be used as a standard; younger than 15 years of age. Currently per the Department of Health Services (DHS), patients 14 years and older are allowed to occupy adult beds. Below this age, appropriately designated and approved pediatric beds are required.

However, it seems logical and useful to accept a "gray zone" to cover the group of patients between the ages of 13 and 18 years. In these cases, the appropriate location of treatment can be determined after triage, depending on the needs of the patient.

5. CREATE PRE-DETERMINED TRANSFER AGREEMENTS.

Every trauma center of any level caring for children should have pre-determined agreements for arranging transfers to a pediatric hospital. These transfers should occur when patients need tertiary care for services that the trauma center does not provide regardless of insurance status.

6. PROVIDE APPROPRIATE CCS PAYMENT FOR ALL PEDIATRIC TRAUMA CARE.

California Children's Services (CCS) leadership should be consulted in formulating this plan for access. CCS definitions should be incorporated to align with DHS terminology. Appropriate CCS payment should be provided for all pediatric trauma care. Payer status should not limit access to trauma care.

Pediatric Trauma Triage

Summary

Triage tools exist for primary and secondary medical assessments, but none are specific to children. The limited number of children seen by pre-hospital providers and non-pediatric trauma centers contributes to the knowledge gap regarding the care of children. To close this gap, pediatric providers should be required to provide education to these individuals. For a pediatric trauma system to work, a real-time status of all hospitals' capacities is needed to ensure that a patient is transferred to an appropriate hospital provider.

Goals

The goal of a pre-hospital trauma system has been clearly stated by the American College of Surgeons Committee on Trauma (ACS-COT) since the publication of its first *Optimal Care of the Trauma Patient* document in 1976: to get the right patient to the right place at the right time.⁹ This goal applies to children as well.

Key Findings

PRIMARY TRIAGE (FIELD TRIAGE)

The group discussed the best triage tool to use for pediatric patients in the field, at the scene of the injury. Existing trauma tools are designed for mass casualty and disaster triage, not for routine pre-hospital use.

The national standard is the *ACS/CDC Guidelines for Field Triage of Injured Patients* (MMWR RR1, 58:1-35, 1/23/09, www.cdc.gov/mmwr). The CDC also provides educational materials that could be helpful in disseminating this triage scheme statewide. These guidelines are not designed specifically for children. However, the guidelines argue that there is no evidence-based reason to alter the triage scheme for children.

The group concluded that the CDC triage tool is the optimum choice, but the PAT ("Pediatric Assessment Tool" or "Pediatric Assessment Triangle") also could be incorporated into the triage scheme. The assessment taught in Pediatric Advanced Life Support (PALS) blends both of these tools and is a national model.

The group agreed that, regardless of the triage criteria chosen initially, triage criteria should be regularly assessed and modified, based on outcomes data. For this purpose, pre-hospital documentation should capture the reasons a patient was sent to a trauma center or pediatric trauma center.

Under-triage may result in worse outcomes for injured children than for adults. Also, there are additional barriers to improving initial assessment in children, such as low volume of pediatric patients causing limited personnel experience; a lack of pediatric-specific provider education; as well as children's inability or limited ability to communicate. Thus, the group consensus was that a higher rate of pre-hospital over-triage for children is acceptable. According to the *Resources for Optimal Care of the Injured Patient 2006*, a range of 25-50% over-triage would be acceptable.⁹

SECONDARY TRIAGE

The group also reviewed secondary triage of children. Secondary triage determines if and when children should be transferred from hospitals without pediatric trauma capabilities to pediatric trauma centers. A pediatric trauma system should streamline this process and create designated guidelines for when patients should be transferred.

Due to a limited number of pediatric centers, many pediatric trauma patients must receive their initial resuscitation and evaluation at other facilities. To encourage these facilities to provide initial care, there must be a simplified and agreed upon system to transfer children when appropriate. This will require defined transfer agreements and criteria—as well as outreach and education—from the pediatric trauma centers.

The group recognized that all hospitals receiving injured children must have training and equipment for pediatric resuscitation as is required in EMSA document *Administration, personnel and policy for the care of pediatric patients in the ED # 182*. A pediatric trauma system should set minimal standards for this training and equipment.

Pediatric Trauma Triage (continued)

Another issue involves field triage versus secondary triage of injured children. In other words, which patients should go to the closest hospital to be stabilized, and which should be sent directly to a designated pediatric trauma center. For example, in the Los Angeles area, if the patient is within 30 minutes of a pediatric trauma center, the patient is transported there. Otherwise, the child is initially taken to an adult trauma center.

The group agreed that pediatric trauma facilities must be involved in this decision, as it may depend on local or regional pediatric trauma resources. It may be appropriate to have different protocols in different areas, especially with respect to urban versus rural transports.

DIVERSION

At times, a hospital may notify the trauma system to not bring emergency transport vehicles to the facility. This process is called “diversion,” and it means an ambulance or other emergency transport vehicle needs to take patients to a different facility.

Within the group, one member argued that pediatric trauma facilities should not be allowed to divert appropriate patients. However, several representatives from pediatric facilities noted that a “no diversion” policy may not be possible, depending on resources. They also noted that some systems in California work efficiently, without transport delays, within defined diversion protocols.

The group concluded that diversion may be appropriate, but only within a working diversion system, such as is currently available in Los Angeles and San Diego counties. The group also agreed that paramedics should never be “driving around looking for a hospital.”

Currently, it is impossible to know statewide which pediatric trauma facilities are able to accept patients at any given time. There are some regional information systems that work well, but only within those systems. Children’s Hospital & Research Center Oakland and Southern California use “Reddinet.” San

Francisco General Hospital uses EMSTrack, and the Sacramento area uses EMSsystem. Other counties have different internal practices.

A statewide system for real-time receiving status is needed—not only for secondary triage, but also for mass-casualty events.

MASS-CASUALTY TRIAGE

The group did not specifically address optimum criteria for pediatric triage in cases of disasters or mass casualties. However, it agreed that a pediatric trauma system must include a process and triage scheme for disasters, both for multi-casualty and mass-casualty events. Again, a statewide system for pediatric and adult trauma resources that provides real-time receiving status and capabilities is necessary.

WHEN IS A CHILD A CHILD?

Another important issue is age: What is the optimum age for triaging a trauma patient as pediatric? Most physicians and nurses feel comfortable providing care to older pre-teens and teens. Thus, there is an argument to use a lower age (10 or 12) cut off to avoid overburdening limited pediatric trauma resources.

On the other hand, size alone is not a satisfactory criterion. Some children are bigger in size, but still need pediatric services. Pediatric centers can offer special resources for adolescents and even for those 18 and older. After much discussion, the group consensus was to have a standard fixed age for “pediatric trauma” throughout the state. The national ACS/CDC guidelines (“under 15”) were accepted.

EDUCATION

Comprehensive pediatric trauma education is an essential element of developing a pediatric trauma system. Public knowledge of pediatric injury prevention can also be facilitated by a statewide system. Required and standardized education for first responders would make them less fearful and more competent.

All hospitals that are 911 receiving hospitals may admit injured children, and their personnel

must know basic pediatric resuscitation techniques. The education process could begin with some simple equipment and education tools, such as pre-hospital availability and use of length-based tapes and routine Pediatric Advanced Life Support (PALS) training of ED personnel.

Challenges

CHILDREN ARE DIFFERENT

Injured children provide challenges to appropriate triage. Initial assessment is difficult, and rapid deterioration can occur, so these patients require constant monitoring and reevaluation. Because children require different equipment and have age-based vital signs, this variation and limited experience of providers with children often leads to discomfort among providers. A child's stage of development also creates communication challenges.

LACK OF TRIAGE STANDARDIZATION

There currently are no widely adopted processes, tools or criteria for initial assessment and triage of pediatric injuries. One roadblock to standardization is a belief in the superiority of individual or local processes. A lack of education in pediatric injury assessment—throughout the state, but especially for pre-hospital providers and non-trauma adult hospitals—also represents a major challenge.

DELAYS IN SECONDARY TRANSFERS

The lack of a statewide system that reports facilities' receiving status often delays appropriate secondary triage to the closest and most appropriate facility. Currently each LEMSA operates its own process for transfers.

DIVERSE CALIFORNIA GEOGRAPHY

The state has large rural areas and dense urban areas. This diversity creates wide variations in access to pediatric trauma care.

Opportunities

The current number of high-quality pediatric trauma centers in California can be integrated into a statewide system as primary and secondary receiving facilities. These centers also can serve as leaders for outreach, education and injury prevention.

Recommendations

The group offered the following recommendations regarding pediatric trauma triage:

1. Implement a standardized assessment and triage tool.
 - Use the standard CDC guidelines for assessment and triage of injured children.
 - Incorporate PAT (Pediatric Assessment Triangle) into the initial assessment.
2. Use the standard age criteria of "15 and under" as the definition of children for triage purposes.
3. Encourage pediatric trauma centers to avoid diversion in a regional area unless there is a system in place to support that diversion.
4. Educate pre-hospital and receiving hospital personnel in the initial assessment and treatment of injured children to support the development of a pediatric trauma system.
5. Include multi-casualty and mass-casualty event planning specifically focusing on children and ensure it is coordinated with adults.
6. Evaluate and adopt minimal standards for an adult center that may be receiving injured children.

Pediatric Trauma Patient Transfer

Summary

Transferring patients is an integral component of any pediatric trauma system. But there are several challenges. To create a more efficient and effective system, we need to create: 1) a definition of terms; 2) a better understanding of the different roles of the community hospital, trauma hospital, LEMSA and RTCC in pediatric trauma transfer; 3) increased coordination and communication between facilities; and 4) systematically collect data to understand and inform the quality improvement (QI) process.

Goals

1. To create a patient flow that considers all aspects of access, including field transport time, EMS resource utilization, cost-effectiveness and accessibility of the patient to family and friends.
2. To establish general principles for the transfer of pediatric trauma patients that account for age, unique physiology and resources for safe movement of pediatric trauma patients.

Key Findings

DIFFERENT REGIONS HAVE DIFFERENT NEEDS

Throughout the summit, it was very apparent that different regions have different needs. For example, remote counties do not have the option of calling 911 for unstable trauma patients who need a higher level of care, and these hospitals may need to perform diagnostics that are not necessary in an urban region. Remote areas also may have decreased access to critical care transfer teams and may have long waiting times to transfer patients.

The Regional Trauma Coordinating Committees (RTCCs) may be able to meet the needs of their regions, but they have no administrative power. However, if they had the support/recommendation from California EMSA, this would help RTCCs enforce policy. The group agreed that guidelines for each region should be made, taking into account the geographic setup and the scope of practice of the medics and transporting team.

NO CONSISTENT UNDERSTANDING OF THE TRANSFER PROCESS

The lack of guidelines and consistent understanding of receiving hospital EDs regarding the transfer process leads to precious delays in transferring pediatric patients to appropriate facilities.

TRANSFERRING HOSPITALS

911 receiving hospitals that are not trauma centers have inconsistent transfer processes. Sometimes patient transfers are delayed because of extensive testing and imaging prior to transfer. Trauma center staff feel that once a patient is identified as needing transfer, he/she should be transferred to a higher level of care immediately.

If a hospital receives an emergent patient that it does not have the capability to care for, the group agreed that the hospital should be able to call 911 or initiate air transport immediately.

TRAUMA CENTERS

- Sometimes trauma centers are open to trauma victims, but closed to transfers from non-trauma centers. If a trauma center takes trauma patients from outside its catchment area, then it will not be available for patients within its catchment area, including transfers.
- The group agreed that a trauma center should have a priority to take patients from its catchment area. The trauma center should provide feedback to transferring hospitals regarding clinical care of the patient.
- Trauma centers could play a role in the education process for transferring hospitals (e.g., what tests to order), as well as in quality improvement and assurance.

Unclear and Cumbersome Transfer Process

TRANSFER AGREEMENTS

There is much confusion about who is responsible for initiating a transfer agreement: a 911 receiving hospital or the trauma center. The group discussed the limitations of a trauma center initiating agreements with the transferring hospitals—for example the amount of paperwork in an urban area such as LA. If LEMSAs or the

RTCCs could make the agreements, this might decrease the workload of the hospitals.

TRANSFER PROCESS

The group concluded that a streamlined process with one phone number to call would be ideal for transferring a trauma patient. A checklist (perhaps specific for each region) could allow a systematic process. The checklist could include a standardized list of tests to be performed prior to the arrival of a transfer team. These tests should not delay the transfer.

LACK OF DATA ON OUTCOMES

Presently, there is no systematic way to track the transfer process at any level. The trauma system only has information about patients who ultimately are cared for in a trauma center. But there is no information about children with trauma who should have been transferred, but were not.

Thus, there is no way to understand the outcomes of these children and no ability to assess quality improvement at a regional level. The group pointed out that there are currently no funds to do this.

Challenges

The group cited the lack of a statewide trauma system as a challenge, although it acknowledged that different regions have very different needs. Another key challenge is that RTCCs have no administrative authority, and there are minimal funds available.

Opportunities

Overall, group members were optimistic. The players involved are all active and committed to improving the trauma system. In addition, California EMSA has initiated the CEMIS database. All LEMSAs and trauma centers are participating, even though they are not required to do so. Also, EMSA is presently updating the 1994 inter-facility pediatric trauma and critical care consultation and transfer guidelines. RTCCs are established and include five regions.

Recommendations

First and foremost, the group recommended taking a regional approach for pediatric trauma care. A regionalized pediatric trauma transfer system should be developed. It should be recognized that different regions have different geography, resources and needs, but these five regions can probably represent the state. There should be regional ownership/cooperation in caring for pediatric trauma patients.

Thus, a pediatric transfer system should consider a region as a whole; connecting and coordinating individual hospitals and sometimes even LEMSAs. In light of the fact that rural trauma care has disparate outcomes and resources, a special awareness of rural/remote areas should be maintained.

Under this rubric, the group offered the following recommendations regarding pediatric trauma victim transfer:

1. DEVELOP A FORMALIZED, WORKING RELATIONSHIP BETWEEN RTCCS AND LEMSAS.

A critical component of a well-functioning trauma system is a formalized relationship between RTCCs and LEMSAs. Presently, administrative power lies with the LEMSAs, and the RTCCs have no formal administrative power. The California EMSA should strongly support and recommend a regional work group structure.

Direction and clarification should be issued regarding transfer agreements. This should include identifying who needs to initiate these agreements and perhaps developing regional-level transfer agreements, or at least a LEMSA/EMSA template. At present, it is unclear if the sending hospital initiates an MOU with the trauma center, or vice versa.

2. ASSESS RESOURCES—INCLUDING EXISTING PROTOCOLS, POLICIES AND PROCEDURES—BY REGION AND BY FACILITY.

LEMSAs should work with the RTCC and all facilities in their jurisdiction that care for pediatric trauma patients (pre-hospital/non-trauma centers/trauma centers) to catalog

Pediatric Trauma Patient Transfer (continued)

and assess resources and then build on this foundation. Current resources include: capabilities of regional facilities, critical care transport capabilities, existing protocols (including field protocols) and transfer agreements. Once these are assessed, they should be catalogued in a way that makes it easy to assess capabilities of different levels of transport and availability.

Telemedicine resources also should be explored, especially in areas where there are existing systems used for other purposes, such as stroke.

3. DEVELOP POLICIES AND PROCEDURES FOR THE ENTIRE REGION.

These should include:

- Regional transfer criteria and a method to inform sending and receiving hospitals about these criteria. The criteria would identify who, where and when to transfer patients, and would vary by region. For example, criteria for rural areas might require anatomic and physiologic criteria, in addition to a mechanism to activate a transfer.
- A streamlined process and protocol for transferring patients to a higher level of care. Policies for each region will naturally differ, depending on local EMS scope of practice and geography. These policies could include a one-call transfer process. For example, the sending facility could call one number, and this facility or “transfer center” could coordinate patient destination and transport method.

Included within this purview is to establish criteria for patients who need to be transferred emergently (perhaps a visual scheme). One option that has been used successfully is activation of 911 to a trauma center. A transfer checklist appropriate to the region and type of hospital could be developed to expedite patient transfer and decrease redundant or time-wasting testing.

- A regional system of trauma centers accepting trauma patients. All trauma centers should play an equitable role in caring for pediatric trauma transfers. Specifically, if a trauma center is open for trauma, then it must also be

open for trauma transfers from a non trauma hospital. If all trauma centers are closed, then “all are open” and they should accept patients in a rotating fashion. For rural and remote areas, a method to obtain critical care transport and technical support for patients in need should be developed.

4. CLEARLY DELINEATE THE RESPONSIBILITIES OF SENDING HOSPITALS, RECEIVING TRAUMA CENTERS AND LEMSAS.

Sending hospitals’ responsibilities would include the advance identification of appropriate transfer destinations. Utilizing the regional recommendations, they would implement a hospital-specific transfer process.

Trauma centers’ responsibilities would include developing a streamlined process for accepting pediatric trauma patients, with the specific model of “one phone number to call.” They must set up lines of communication with their sending EDs, including perhaps a simple method for a trauma surgeon consult (not necessarily a transfer). Trauma centers also should assume responsibility for continuing medical education and quality assurance feedback with their catchment non-trauma centers. This feedback should include which patients were appropriate to transfer and their outcomes.

5. DEVELOP A QI SYSTEM THAT CAPTURES REGIONAL DATA OF ALL CHILDREN WITH TRAUMA.

Although resources are scarce, it is imperative to develop a process to capture and report transfer outcomes. At a system level, quality indicators for pediatric trauma transfer should be developed. Trauma centers also should develop a program for education and QI for their catchment hospitals.

Performance Improvement for Pediatric Trauma Care

Summary

Several factors contribute to a strong, system-wide performance improvement program. These include: consistent data collection, established performance metrics, a process for reviewing data and a process for taking action to improve the system if the data indicate a need for change. Within the current structure for pediatric trauma care, many of these essential elements are missing.

Goals

1. Establish a statewide data system that captures injury epidemiology and unique developmental aspects of pediatric trauma.
2. Launch a statewide pediatric-focused trauma quality improvement program.

Key Findings

The group found that the key issues documented below contribute to a limited ability to assess process and outcome performance measures for pediatric trauma within California:

LIMITED AND INCONSISTENT DATA COLLECTION

Pediatric trauma is a public health problem. More children are injured and killed by trauma than any other cause. However, there is no sufficiently funded national strategy to decrease pediatric trauma. The group noted that one critical step is an accurate assessment of pediatric injury. However, to accurately assess pediatric injury, consistent data elements need to be collected from all hospitals that treat children for traumatic injury. Subsequently, benchmark data can be developed. Currently, limited and inconsistent data collection hinders the understanding of pediatric trauma.

LIMITED DATA ON THE ENTIRE PICTURE OF PEDIATRIC TRAUMA

Pediatric population and patient trauma data are not adequately collected across California. Based on analysis of statewide data from 1998-2004, Wang et al. identified that 23 percent of children with severe injuries were cared for in non-trauma facilities.¹⁰ These facilities

have varying capabilities and can either treat or transfer patients. But non-trauma centers are not required to collect and report data on the care they provide for traumatically injured children.

The group agreed that this lack of data on children treated at non-trauma facilities has created a gap in the system's ability to understand the volume and quality of trauma care for children. The only statewide and national data that are available are from cases that were cared for at trauma centers.

NO PEDIATRIC-SPECIFIC PARAMETERS FOR DEFINING QUALITY CARE

The National Trauma Data Bank (NTDB) annually collects trauma registry data from trauma centers across the country. Data are summarized and formatted to produce yearly reports, hospital benchmark reports and data quality summaries. Unfortunately NTDB definitions do not adequately characterize the developmental milestones that contribute to injury patterns and outcomes. Therefore, conclusions drawn from analyses based on these data are limited.

The group concluded that it is critical to have pediatric parameters included in data sets, as the mechanism of injury differs between children and adults. Additionally, by accounting for pediatric differences, leaders will be able to assess injury patterns and create specific injury prevention efforts targeted at specific ages.

NO NATIONAL PEDIATRIC BENCHMARKING DATA SET

For adult trauma systems, quality standards exist. These do not necessarily apply to pediatric trauma centers because children continue to develop physiological and psychological parameters from infancy to adolescence. Therefore, criteria and cutoffs for interventions will certainly vary by developmental groupings. Nevertheless, trauma leaders should work to establish pediatric benchmarks that address these changes from infancy to adolescence.

Efforts to create consistency in data collection via data dictionaries and standardized reporting are underway, but this remains an opportunity.

Performance Improvement for Pediatric Trauma Care (continued)

In 2004, Guice and Cassidy were funded by Emergency Medical Services for Children (EMSC) to design a national trauma registry for children.¹¹ As a result of that work, a data dictionary with standardized elements for children was submitted to the NTDB as a sample.

In California, a statewide policy assessment recognized that a crucial step in developing a statewide trauma system was the establishment of a statewide trauma registry: the California EMS Information System (CEMSIS).

In 2001, the National EMS Information System (NEMSIS), funded by the National Highway Traffic Safety Administration (NHTSA), was established to gather EMS and trauma data from states. A national data dictionary set was created to establish consistency for inclusion.

Hence, although leaders in the trauma field generally recognize the need for pediatric definitions, a concerted effort has not been undertaken. The group discussed at length the need to develop pediatric-specific data sets.

NO STRONG PERFORMANCE IMPROVEMENT PROCESS

A fundamental concept of trauma care is the assessment of injury in a defined geographic space and population. Trauma centers are required to describe and analyze the injury morbidity and mortality that present to their respective centers. These data are submitted to regional and national trauma databases for analysis.

Many jurisdictions across California conduct regional quality improvement programs, but there is limited experience with cross-jurisdictional programs to examine quality issues.

With the fairly recent launch of CEMSIS, the data collection process is still too new to perform a gap analysis on injuries and outcomes.

Trauma registries and data are the cornerstones of an effective trauma system. Trauma centers are required to assess their data and then conduct procedures for addressing deficits and performance issues. The data are regularly

reviewed by a multidisciplinary team at the trauma center. At the regional level, each trauma center's medical director and manager are key participants in regional quality peer reviews. Trauma centers in geographic regions meet periodically to address quality issues and review mortalities.

In California, there is limited activity across jurisdictions for performance improvement review.

NO PEDIATRIC TRAUMA CENTERS IN NATIONAL QI PROGRAM

At the national level, the ACS-COT leadership established the Trauma Quality Improvement Program (TQIP). The program provides a risk-adjusted benchmarking system for tracking designated trauma centers.

Nearly 70 adult trauma centers participate in this program. However, no pediatric trauma centers currently participate. Recently, a pediatric subset of facilities joined a trauma quality improvement program across the U.S.

Challenges

The group concluded that a widespread lack of data and inconsistent and non-standardized data collection currently present the biggest challenges to developing a strong performance improvement process for pediatric trauma care.

Opportunities

The group agreed that performance improvement is an essential component of creating a pediatric trauma system. There is opportunity to create a strong data infrastructure that will allow for:

- Participation by all pediatric trauma providers in data collection and review.
- Consistent data collection.
- Pediatric-appropriate measurements.
- Development of a system-wide approach for reviewing, analyzing and improving pediatric trauma care.

Recommendations

The group offered the following recommendations regarding performance improvement for pediatric trauma care:

1. ANALYZE EXISTING CALIFORNIA PEDIATRIC TRAUMA DATA FOR TRENDS.

A subgroup should be convened to assess the available CEMESIS data to identify and recommend five to eight items for further review. In addition, the group recommended that a survey be created, distributed, collected and analyzed.

2. CONVENE A FORUM FOR DISCUSSING AND DETERMINING PEDIATRIC TRAUMA DATA ELEMENTS, BASED ON AN ESTABLISHED PERFORMANCE IMPROVEMENT METHODOLOGY.

The forum should meet to address the following goals:

- Create a structure and process for convening and reporting pediatric performance improvement issues.
- Determine who should be included, how the reporting structure should work, meeting frequency and the scope of authority and discussion.
- Identify which performance improvement methodology should be used.
- Determine pediatric trauma data elements that should be consistently collected.
- Develop and recommend pediatric data elements that should be benchmarked.
- Develop recommendations for the implications of not meeting pediatric performance standards.

3. ESTABLISH A PEDIATRIC TRAUMA QUALITY IMPROVEMENT PROGRAM.

As data elements are being defined for pediatric trauma, a pediatric-specific trauma quality improvement program should be established. Michigan state has begun this process and could be used as a reference. The Pediatric TQIP would require staff infrastructure and would use and enhance pediatric definitions within CEMESIS. The program would be established to meet the following goals:

- Establish risk-adjusted benchmarks of pediatric trauma process and outcome indicators.
- Monitor benchmarks across the state.
- Provide feedback to participating hospitals to improve the quality of pediatric trauma care.
- Collaborate with ACS-COT TQIP.

Conclusion

The Pediatric Trauma and Access to Care Summit brought together stakeholders from pre-hospital, adult and pediatric trauma center and community hospitals to discuss and provide recommendations on the development of a pediatric trauma system. It is evident that providers throughout the state are concerned and interested in improving the quality of trauma care that our children receive.

The stakeholders who attended this summit in April 2011 have continued their dialogue about pediatric issues via a membership-based online network (groupsite.captn.org). The California Pediatric Trauma Network (CAPTN) should be formally developed to move forward the recommendations put forth during this summit.

It is generally recognized that outcomes for severely injured patients are better at trauma facilities, and that many hospitals may not be appropriately equipped to care for injured children. But, the only way to accurately assess care for traumatically injured children is to consistently collect standardized data elements across all facilities. The current structure does not require all hospitals that provide trauma care to children to report their data. To ensure that children are receiving the appropriate trauma care (the right care, at the right place at the right time) it is critical that an effort is made to move the recommendations in this report forward. Individuals and organizations that provide care for children throughout the state have expressed interest in making this happen and creating a better trauma system for our children.

This report of findings and recommendations is intended to highlight these issues to other stakeholders, policymakers and government and non-government agencies, with the intent of garnering momentum and resources to create a pediatric trauma system in California.

Stakeholder Workgroups

The following individuals participated in the breakout groups during the summit:

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Acknowledgements

Special thanks go out to the following individuals who contributed immensely preceding, during, and following the summit:

Wolfgang Stehr, MD
Children's Hospital and Research
Center Oakland

John Sherck, MD
Santa Clara Valley Medical Center

N. Ewen Wang, MD
Stanford University

Michael Lekawa, MD
UC Irvine

Sue Cox, RN, MS, CPEN, PHN
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Thank you also to our facilitators and additional writers:

Tina Barry
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Appendix

CALIFORNIA REGIONAL TRAUMA COORDINATING COMMITTEES (RTCCS)



California Trauma Centers by RTCC

Source: www.emsa.ca.gov December 2011

REGION I—NORTH		PEDIATRIC DESIGNATION ONLY		ADULT AND PEDIATRIC DESIGNATION			ADULT DESIGNATION ONLY			
Local EMS Agency (LEMSA)	Hospital	Level 1 Peds	Level 2 Peds	Level 1 adult and Level 1 Peds	Level 1 adult and Level 2 Peds	Level 2 Adult and Level 2 Peds	Level 1 Adult	Level 2 Adult	Level 3 Adult	Level 4 Adult
Coastal Valley EMS	Queen of the Valley Hospital—Napa								●	
Coastal Valley EMS	Santa Rosa Memorial Hospital							●		
El Dorado County EMS	Marshall Medical Center								●	
North Coast EMS	Sutter Coast Hospital									●
North Coast EMS	Sutter Lakeside Hospital									●
Northern California EMS	Glenn Medical Center									●
Northern California EMS	Seneca Healthcare District									●
Sacramento County EMS	Kaiser—South Sacramento							●		
Sacramento County EMS	Mercy San Juan Medical Center							●		
Sacramento County EMS	UC Davis Medical Center			●						
Sierra-Sacramento Valley EMS	Biggs Gridley Memorial Hospital									●
Sierra-Sacramento Valley EMS	Enloe Medical Center							●		
Sierra-Sacramento Valley EMS	Oroville Hospital								●	
Sierra-Sacramento Valley EMS	Colusa Regional Medical Center									●
Sierra-Sacramento Valley EMS	Sutter Roseville Medical Center							●		
Sierra-Sacramento Valley EMS	Mayers Memorial Hospital District									●
Sierra-Sacramento Valley EMS	Mercy Medical Center Redding							●		
Sierra-Sacramento Valley EMS	Shasta Regional Medical Center								●	
Sierra-Sacramento Valley EMS	Fairchild Medical Center								●	
Sierra-Sacramento Valley EMS	Mercy Medical Center Mt. Shasta								●	
Sierra-Sacramento Valley EMS	St. Elizabeth Community Hospital								●	
Sierra-Sacramento Valley EMS	Rideout Memorial Hospital								●	

California Trauma Centers by RTCC (continued)

Source: www.emsa.ca.gov December 2011

REGION II – BAY AREA		PEDIATRIC DESIGNATION ONLY		ADULT AND PEDIATRIC DESIGNATION			ADULT DESIGNATION ONLY			
Local EMS Agency (LEMSA)	Hospital	Level 1 Peds	Level 2 Peds	Level 1 adult and Level 1 Peds	Level 1 adult and Level 2 Peds	Level 2 Adult and Level 2 Peds	Level 1 Adult	Level 2 Adult	Level 3 Adult	Level 4 Adult
Alameda County EMS	Children’s Hospital—Oakland	●								
Alameda County EMS	Eden Hospital Medical Center							●		
Alameda County EMS	Highland Alameda County Medical Center Campus							●		
Contra Costa EMS	John Muir Medical Center							●		
Marin County EMS	Marin General Hospital								●	
Solano County EMS	Kaiser Foundation Hospital								●	
Solano County EMS	NorthBay Medical Center								●	
San Francisco County	San Francisco General Hospital & Medical Center						●			
Santa Clara County	Regional Medical Center of San Jose							●		
Santa Clara County	Santa Clara Valley Medical Center				●					
Santa Clara County	Stanford University Medical Center				●					

REGION III – CENTRAL		PEDIATRIC DESIGNATION ONLY		ADULT AND PEDIATRIC DESIGNATION			ADULT DESIGNATION ONLY			
Local EMS Agency (LEMSA)	Hospital	Level 1 Peds	Level 2 Peds	Level 1 adult and Level 1 Peds	Level 1 adult and Level 2 Peds	Level 2 Adult and Level 2 Peds	Level 1 Adult	Level 2 Adult	Level 3 Adult	Level 4 Adult
Central California EMS	Community Regional Medical Center—Fresno						●			
Central California EMS	Kaweah Delta Medical Center								●	
Kern County EMS	Kern Medical Center							●		
Mountain Valley EMS	Doctor’s Medical Center—Modesto							●		
Mountain Valley EMS	Memorial Medical Center—Modesto							●		

REGION IV – SOUTH/WEST		PEDIATRIC DESIGNATION ONLY		ADULT AND PEDIATRIC DESIGNATION			ADULT DESIGNATION ONLY			
Local EMS Agency (LEMSA)	Hospital	Level 1 Peds	Level 2 Peds	Level 1 adult and Level 1 Peds	Level 1 adult and Level 2 Peds	Level 2 Adult and Level 2 Peds	Level 1 Adult	Level 2 Adult	Level 3 Adult	Level 4 Adult
LA County EMS	Antelope Valley Hospital							●		
LA County EMS	California Hospital Medical Center							●		
LA County EMS	Cedars-Sinai Medical Center				●					
LA County EMS	Children’s Hospital Los Angeles	●								
LA County EMS	Harbor UCLA Medical Center				●					
LA County EMS	Henry Mayo Newhall Memorial Hospital							●		
LA County EMS	Huntington Memorial Hospital							●		
LA County EMS	IAC + USC Medical Center				●					
LA County EMS	Long Beach Memorial + Miller Children’s Medical Center					●				
LA County EMS	Northridge Hospital Medical Center					●				
LA County EMS	Providence Holy Cross Medical Center							●		
LA County EMS	Ronald Regan UCLA Medical Center			●						
LA County EMS	St. Francis Medical Center							●		
LA County EMS	St. Mary Medical Center							●		
Orange County EMS	Mission Hospital Regional Medical Center							●		
Orange County EMS	UC Irvine Medical Center						●			
Orange County EMS	Western Medical Center-Santa Ana							●		
Santa Barbara County EMS	Santa Barbara Cottage Hospital							●		
Ventura County EMS	Los Robles Hospital & Medical Center							●		
Ventura County EMS	Ventura County Medical Center							●		

California Trauma Centers by RTCC (continued)

Source: www.emsa.ca.gov December 2011

REGION IV—SOUTH/EAST		PEDIATRIC DESIGNATION ONLY		ADULT AND PEDIATRIC DESIGNATION			ADULT DESIGNATION ONLY			
Local EMS Agency (LEMSA)	Hospital	Level 1 Peds	Level 2 Peds	Level 1 adult and Level 1 Peds	Level 1 adult and Level 2 Peds	Level 2 Adult and Level 2 Peds	Level 1 Adult	Level 2 Adult	Level 3 Adult	Level 4 Adult
Imperial County EMS	El Centro Regional Medical Center									●
Imperial County EMS	Pioneers Memorial Healthcare District									●
Inland Counties EMS	Arrowhead Regional Medical Center							●		
Inland Counties EMS	Loma Linda University Medical Center			●						
Riverside County EMS	Desert Regional Medical Center							●		
Riverside County EMS	Inland Valley Medical Center								●	
Riverside County EMS	Riverside Community Hospital							●		
Riverside County EMS	Riverside County Regional Medical Center					●				
San Diego County EMS	Palomar Medical Center							●		
San Diego County EMS	Rady Children's Hospital San Diego		●							
San Diego County EMS	Scripps Memorial Hospital							●		
San Diego County EMS	Scripps Mercy Hospital and Health Center						●			
San Diego County EMS	Sharp Memorial Hospital							●		
San Diego County EMS	UC San Diego Medical Center						●			





TRAUMA PROGRAM

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