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To ensure access to high-quality, patient-centered, cost-effective health care to Los Angeles County residents through direct services at DHS facilities and through collaboration with community and university partners.

November 24, 2015

TO: Mayor Michael D. Antonovich
Supervisor Hilda L. Solis
Supervisor Mark Ridley-Thomas
Supervisor Sheila Kuehl
Supervisor Don Knabe

FROM: Mitchell H. Katz, M.D.
Director

SUBJECT: **REPORT BACK ON IMPROVING TRAUMA CARE COUNTYWIDE AND IN "HOT SPOT" AREAS (ITEM NO. 16, AGENDA OF JUNE 23, 2015)**

On June 23, 2015, the Board instructed the Director of the Department of Health Services (DHS) to continue to develop and refine the proposed revised methodology for allocating Measure B, Maddy Emergency Medical Services Fund and Richie's Fund dollars to the non-County hospitals, and report back in 90 days on the recommendations to improve the accuracy, quality and timeliness of the data collected on the County's public and private trauma care system; proposed methodology for the Emergency Medical Services Agency to regularly assess the County trauma care system; and recommendations as well as options to re-establish a Level I trauma care system to serve the South Los Angeles community.

The attached report is in response to the Board motion.

If you have any questions or need additional information, please contact me or Cathy Chidester, Emergency Medical Services Director, at (562) 347-1604.

MHK:jp

Attachment

c: Chief Executive Office
County Counsel
Executive Office, Board of Supervisors

Los Angeles County
Department of Health Services

Report to the Board of Supervisors (Board):
Improving Trauma Care Countywide and in "Hot Spot" Areas

I. PURPOSE AND SCOPE

This report is in response to the June 23, 2015 Board motion by Supervisor Mark Ridley-Thomas, *Improving Trauma Care Countywide and in "Hot Spot" Areas* (Attachment I). This report is to address the following:

a. The revised methodology for allocating Measure B, Maddy Emergency Medical Services Fund and Richie's Fund dollars to the non-County hospitals and, once the methodology is completed and the impact of the new methodology on the trauma system is analyzed, return to the Board to seek authority to put in place a superseding agreement retroactive to July 1, 2015.
b. Recommendations to improve the accuracy, quality and timeliness of the data collected on the County's public and private system.
c. Proposed methodology for the Emergency Medical Services (EMS) agency to regularly assess the County trauma care system using clear and objective criteria and needs-based data and issue publicly available reports so that the allocation of resources will be spent and driven by accurate data on community needs.
d. Options to re-establish a Level I trauma care system to service the South Los Angeles community given the high incidence of trauma mortality in that area. A timeline for the establishment of a Level I trauma care system in South Los Angeles.

This report also includes a discussion of trauma prevention as a critical component of a comprehensive strategy to reduce trauma-related deaths across the County.

II. BACKGROUND

The regulatory framework for a County to establish trauma care systems is in the California Code of Regulations, Title 22. Social Security, Division 9. Pre-hospital Emergency Medical Services, Chapter 7. Trauma Care Systems. Prior to establishing a trauma care system, the local EMS agency completes a trauma plan, which includes a system assessment. The trauma system plan is submitted to the California EMS Authority for review and approval. Title 22 also establishes the criteria that a hospital must meet to be designated as a Level I or II trauma center (Attachment II).

Los Angeles County's first Trauma Care System plan was submitted in 1982 and included the system review and recommendations by the American College of Surgeons (ACS). The original eight trauma centers were designated in 1983. Designation is based on the hospital meeting the Title 22 requirements, ACS standards and any other contractual requirements. At the peak of the trauma system in Los Angeles County there were 22 trauma centers, nine of which met Level I criteria. Currently there are 14 trauma centers throughout the County, five Level I and nine Level II; Children's Hospital is a Level I pediatric center (Attachment III). The County is in the process of designating a fifteenth Level II trauma center (Pomona Valley Hospital Medical Center).

Level I trauma center designation can offer benefits to both the hospital and broader community through support for academic research, teaching and mentoring of new physicians. However, both Level I and Level II trauma centers are required to provide the same quality of patient care to injured patients, and therefore the County does not differentially transport patients to Level I vs. Level II centers based on the type and severity of injury. Similarly, the LA County Trauma Center Agreement has the following language in place that prevents trauma centers from referencing their level of designation in public signage: *"Contractor may, at its own expense, identify itself as a Trauma Center by placing signs to that effect on Contractor's grounds. Such signs shall exclude any reference to the level of its County designation and shall otherwise conform to local government regulations."* To ensure the ongoing provision of high-quality care regardless of trauma center level, quality assessments are completed by the EMS Agency in conjunction with the ACS reviews.

From 1984-1990, financial losses due to the costs of caring for uninsured patients and challenges with maintaining the required physician coverage led to trauma centers withdrawing from the system. As trauma hospitals withdrew, the geographic areas (catchment areas) that each trauma center covered changed to ensure that all severely injured patients would be transported to a trauma center within 30 minutes. In the setting of unreimbursed trauma-related costs adversely impacting the stability of the trauma system in LA County, and in the face of looming fiscal crisis projected for County-operated facilities due to a decline in Medicaid financial support, Measure B was proposed. In 2002, Measure B passed with the goal of shoring up DHS hospital (safety net) funding, maintaining and expanding the trauma network countywide, as well as achieving related emergency medical service and public health goals of ensuring timely response to medical emergencies and responding effectively to biological and chemical terrorism. Since 2002, the funding from Measure B has helped to support LA County's trauma centers and has been instrumental in stabilizing and expanding the County's overall health system.

III. FUNDING ALLOCATION: *The revised methodology for allocating Measure B, Maddy Emergency Medical Services Fund and Richie's Fund dollars to the non-County hospitals and, once the methodology is completed and the impact of the new methodology on the trauma system is analyzed, return to the Board to seek authority to put in place a superseding agreement retroactive to July 1, 2015.*

Since the implementation of the Patient Protection and Affordable Care Act (ACA) on January 1, 2014, the expansion of Medi-Cal and private insurance coverage available via Covered California has led to a reduction in the number of uninsured individuals, and uninsured trauma-related volume, in LA County. As a result, the methodology used since the passage of Measure B to allocate funds to non-County trauma centers must be re-evaluated in order to ensure an ongoing fair and equitable distribution of available funds in a way that supports and continues to strengthen the overall LA County trauma system. In preparation for this planned change, since early 2014, DHS finance staff have been meeting with executive and finance leadership from the non-County trauma hospitals discussing possible changes to the allocation methodology under which available Measure B funding is distributed.

Using the priorities and general approach shared with your Board on June 9, 2015, to determine a new proposed funding allocation, each non-County trauma center was asked to complete a survey of their actual costs related to fulfilling State- and County-mandated requirements of being a trauma center and providing care to uninsured trauma patients. The Department is currently analyzing the survey data received from each of the non-County trauma centers for the time period of July 2014 through March 2015 and is conducting individual face to face meetings with leadership of each trauma center to ensure data accuracy and consistency. Once the a final methodology is developed, we will return to the Board to seek authority to put in place a superseding funding agreement retroactive to July 1, 2015 for FY2015-16. This proposed methodology will also include specifications for distributing available Richie and Maddy funds.

Based on data received from trauma hospitals at the close of FY14-15, DHS also anticipates that due to the impact of the Affordable Care Act on uninsured trauma volumes, we will need to make minor refinements to the allocation methodology for payments to the non-County hospitals in FY14-15. As the full FY14-15 data is now available, once DHS is able to complete analysis and discuss and agree upon an approach with the private trauma hospitals, we will return to the Board with a specific recommendation for action to amend the contracts to implement a new agreed upon allocation, retroactive to July 1, 2014 for FY14-15.

IV. DATA COLLECTION: *Recommendations to improve the accuracy, quality and timeliness of the data collected on the County's public and private system.*

Data collection for the trauma system is conducted by the EMS Agency via the Trauma and Emergency Medicine Information System (TEMIS). Lancet Technologies, Inc. (Lancet) is the vendor that developed and maintains TEMIS. TEMIS was implemented to meet Federal, State and County data collection requirements, as well as to assist the EMS Agency in monitoring, evaluating and coordinating all components of the EMS system. TEMIS data includes both public and private acute care hospitals with emergency departments, including 21 hospitals contracted with DHS to provide medical direction and education to paramedics in the field (Base Hospitals), 14 trauma centers, and 42 EMS provider agencies (fire departments and ambulance companies).

TEMIS was fully implemented in 1987 and is primarily funded through annual data management fees paid by Paramedic Base Hospitals and Trauma Centers. Any additional funding required is covered by the EMS Agency budget. The TEMIS database is complex, with a current database of more than 14 million records; approximately 875,000 new records are added yearly. The TEMIS database captures EMS data from EMS provider agencies (600,000 records per year), paramedic base hospitals (250,000 records per year), and trauma centers (25,000 records per year).

A. Data Collection Challenges:

TEMIS is an application-based system; all paramedic base hospitals and trauma centers have dedicated TEMIS computers for data collection. Data is automatically uploaded from the hospitals every 24 hours to a File Transfer Protocol (FTP) site and subsequently downloaded by the EMS Agency's software vendor into TEMIS. A local copy of the data is maintained by each hospital. Trauma data audits are conducted by EMS Agency staff on a quarterly basis to ensure data accuracy and compliance with data collection requirements of the ACS National Trauma Data Bank. Any data discrepancies are sent back to the hospitals for correction and data resubmission. This process may take up to 30 days to complete (Attachment IV). As part of its contract monitoring activities, the EMS Agency also conducts chart audits to verify the accuracy of data collected in TEMIS.

Although these trauma data audits show high compliance with timeliness, completeness, and accuracy of data submission;[1] data collection and verification remain manual processes

[1]A Trauma System Data Audit Report (Attachment IV) for the time period January 1, 2012 through December 31, 2014 shows the following:

- 96% compliance with timeliness
- 96% compliance with completeness
- 99% compliance with accuracy

requiring full-time data abstractors and registry personnel. A Trauma Patient Summary Form is utilized by data abstractors to collect required information from the hospital medical records; subsequent data entry into TEMIS is conducted by data registrars. Similarly, a handwritten Base Hospital Report Form is completed by mobile intensive care nurses or base hospital physicians whenever a paramedic calls the trauma center for medical direction on a trauma patient. Data from the Base Hospital Report Form is then manually entered into TEMIS.

Additionally, questions have been raised about the consistency and accuracy of coding of injuries across LA County's trauma centers. Although this has not been found in EMS agency audits, we plan to conduct focused data reviews to validate the accuracy of coding and make any corrections or improvements that may be necessary.

Trauma centers are also required to collect EMS related data from the EMS patient care records (PCRs). This process is not ideal, as data accuracy is highly dependent on the completeness and legibility of the EMS PCR.[2]

Ten of the 30 EMS provider agencies continue to use paper EMS PCRs; this represents approximately 50% of patients treated in the system. Of the paper-based EMS PCRs generated, approximately 30% are sent to the EMS Agency where data is abstracted and entered into TEMIS by County-employed data entry personnel. The other 70% of the paper-based EMS PCRs are scanned, converted into data, and manually validated by the EMS provider agency. These data are then uploaded into TEMIS.

Data collection and submission requirements by public fire department EMS provider agencies to the EMS Agency are guided by County policies. Current regulation allow the EMS Agency to utilize computer or other electronic means of collecting or storing EMS patient information by promulgating policies, in consultation with EMS providers, for the collection, utilization and storage of such data. The EMS Agency has required, through policy, that all EMS provider agencies submit data electronically to the EMS Agency by the end of 2016. This requirement has been generally accepted by the EMS providers in part due to electronic billing requirements imposed by the Centers for Medicare and Medicaid Services.

The Board recently approved appropriations from Measure B funds to assist EMS providers' transition from paper-based PCRs to electronic patient care records (EPCR) or augment current EMS data collection systems (i.e. scanning solutions). The Measure B funds will aid in

[2]An EMS System Data Audit Report (Attachment V) for the time period January 1, 2013 through December 31, 2013 shows the following:

- 14% compliance with timeliness
- 81% compliance with completeness
- 75% accuracy on time fields

increasing the number of provider agencies converting to EPCR. We anticipate that all providers will use EPCRs by the end of 2016. Even with the conversion to EPCR, data abstraction by the trauma centers will remain a manual process as hospital and EMS provider medical record systems have not evolved to have the ability to exchange data. This data exchange will be addressed over time using the Los Angeles Network for Enhanced Services (LANES) as the conduit for the service.

B. Recommendations to improve trauma data collection:

1. **Upgrade TEMIS from an application-based system to a web-based system.** This will resolve the issue of TEMIS access being limited to dedicated TEMIS computers and the current agreement only allows for a single-user software license. Maintenance, updates and upgrades are time consuming and must be done manually for each licensed computer. This limits the flexibility and timeliness for TEMIS changes and upgrades.

   Current Status: *TEMIS was upgraded in 2001 and a 10-year maintenance agreement was established with LANCET Technology, Inc. (Lancet). In 2011, the agreement with Lancet was extended to allow for a system upgrade that created linkages between the three existing databases. This allowed the EMS Agency to create a single patient care record for each patient transported by EMS which incorporates EMS, Base Hospital and Trauma Center information, as applicable. In 2013, DHS began researching a possible replacement system but the project was put on hold until the complete deployment of ORCHID, DHS' Electronic Health Record. In August 2015, DHS restarted its efforts to research comparable systems in order to establish system requirements for the TEMIS replacement. DHS will need to develop a solicitation process, which is anticipated to take 12-18 months.*

2. **Explore the feasibility of having TEMIS fully hosted by the software vendor.** TEMIS is currently hosted and maintained by the EMS Agency. System performance is greatly impacted by the number of users at any given time. As most EMS providers move towards EPCR, it is imperative that the system is flexible to accommodate increased demands.

   Current Status: *The solicitation process for a TEMIS replacement will include an analysis of the current hosting capabilities and enhancements needed to accommodate future needs.*

3. **Support efforts to enhance Health Information Exchange (HIE) capability between hospital and EMS provider electronic medical record systems.** This will entail software development and close collaboration between hospital and EMS provider information technology (IT) departments.

   Current Status: *The EMS Agency, in collaboration with the Hospital Association of Southern California, has begun dialogue between hospital and EMS provider IT departments. The EMS Agency has also reached out to LANES to determine if there is a place for EMS in the current development plans, and to the California EMS Authority to seek partnership opportunities in the state's plan to develop a statewide HIE capability.*

4. **Enhance TEMIS capability to obtain data from non-trauma centers.** This will provide a much broader scope of the entire EMS system and trauma data system that will capture injured patients that happen to self-transport to a non-trauma center or who are triaged inappropriately by EMS providers. Currently this actual number is unknown.

   Current Status: *With the recent opening of the emergency departments at St. Vincent Medical Center and Martin Luther King Jr. Community Hospital, the EMS Agency has worked closely with Lancet to develop a web-based "9-1-1 Receiving Hospital Outcome" database. Both hospitals have agreed to pilot this new database to collect emergency department patient outcome on all patients transported to hospitals via the EMS system. The database is in its final stages of development and training is being developed. The anticipated roll out date to pilot the database in these two hospitals is late September 2015.*

5. **Work with the DHS ORCHID system to include a field for the EMS Report Form unique patient identifier in the patient care record.** This would allow EMS to track any patient brought in by a 9-1-1 ambulance to a DHS hospital throughout their hospital stay and seamlessly provide patient outcome data for QI purposes. Such data has not been collected in the past. Its collection would allow EMS to better analyze the effectiveness of pre-hospital interventions and make changes to EMS practices.

   Current Status: *The DHS ORCHID system has a field which can be used to input the EMS Report Form number. It is not clear if this field is being consistently filled out by nurses entering triage data across all DHS facilities. EMS will work with hospital staff to better understand current practices and identify and implement practices that will result in greater usage of this field.*

6. **Establish a permanent compliance expectation for data collection and reporting with EMS providers.** In light of the Board's recent approval to provide Measure B funding to improve EMS provider agency data collection capability, a permanent compliance expectation for data collection will be established through our committee process and in collaboration with the State EMS Authority.

   Current Status: *In collaboration with EMS providers, the EMS Agency annually reviews and updates its data collection and submission policy to ensure consistency with state and national guidelines. The EMS Agency also participates in State sponsored data work groups attempting to established standardized reports among the 31 local EMS agencies. Additionally, the EMS Agency drafted a data mapping document that matches TEMIS data elements to the National EMS Information System (NEMSIS) data elements, which will be crucial in benchmarking LA County against other EMS systems.*

7. **Support the participation of all trauma centers in the ACS Trauma Quality Improvement Program (TQIP).** There are more than 300 participating trauma centers across the United States; five trauma centers in LA County currently participate. TQIP works to elevate the quality of care for trauma patients. TQIP accomplishes its work by collecting data from the trauma centers, providing feedback about the trauma center's performance and identifying institutional steps that trauma center staff can take to improve patient outcomes. The program uses risk-adjusted benchmarking to provide the trauma center with accurate national comparisons. TQIP also provides education and training to help trauma center staff improve the quality of data and accurately interpret benchmark reports. The product allows networking and information sharing about best practices with other trauma professionals. Participation of all trauma centers in LA County will allow the EMS Agency to benchmark our system and individual trauma center performance relative to other trauma systems utilizing TQIP.

   Current Status: *DHS is negotiating the Trauma Center Service Agreement with the trauma centers. The cost of participation in TQIP by all trauma centers has been proposed to be funded through Measure B.*

Achieving the above recommendations will greatly benefit system performance through enhanced evaluation capability that will identify gaps and opportunities to improve the quality of care provided to the injured patient. These recommendations will provide a full picture of each patient's experience from the time 9-1-1 is accessed for medical assistance to the time the patient is discharged from the trauma center or rehabilitation center. Additionally, these recommendations will allow timely, accurate and comprehensive system and patient-centered

outcome analysis whereby the LA County trauma system can be benchmarked with other trauma systems in the nation, leading to further data-based development of best practices.

V. RISK-ADJUSTED ANALYSIS OF TRAUMA CARE IN LOS ANGELES COUNTY:

Proposed methodology for the Emergency Medical Services (EMS) agency to regularly assess the County trauma care system using clear and objective criteria and needs-based data and issue publicly available reports so that the allocation of resources will be spent and driven by accurate data on community needs.

A. Introduction

Since the establishment of the trauma system in 1984, LA County has noted a decrease in trauma mortality rates and has experienced consistently lower mortality rates than those reported for the nation as a whole.[3, 4] Injured patients transported via 9-1-1 are directed to one of Los Angeles County's 14 designated trauma centers in accordance with the EMS Agency Reference No. 506: *Trauma Triage* (Attachment VI).

While it is well-established that trauma centers improve outcomes[5], it is less clear what parameters would best optimize the overall trauma system. At present, there are no clearly established metrics to determine how many trauma centers are ideal in a system. Increased patient volume at trauma centers, however, is associated with improved outcomes, particularly in complex patients and those with traumatic brain injury.[6, 7] Thus, the ACS requires a minimum of 1,200 trauma admissions or 240 severe trauma patients annually to achieve Level I designation. Adding additional trauma centers to a system can have the unintended negative consequence of decreasing patient volume at any one trauma center and the experience each surgeon will have in managing trauma.[8] However, too few trauma centers in a regional system can lead to increased transport times and subsequent delays in accessing definitive care. Also, long transit distances can be difficult for patients when they are released with no way to return home and for family members who may have difficulty visiting the injured person at a time of great need. While the longstanding dogma that a one-hour time window ("golden

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[3]Demetriades D, Murray J, Sinz B, Myles D, Chan L, Sathyaragiswaran L, Noguchi T, Bongard FS, Cryer GH, Gaspard DJ: **Epidemiology of major trauma and trauma deaths in Los Angeles County**. *J Am Coll Surg* 1998, 187(4):373-383.

[4]**CDC: Injury Prevention & Control: Data & Statistics** http://www.cdc.gov/injury/wisqars/fatal.html; accessed September 9, 2015.

[5]MacKenzie EJ, Rivara FP, Jurkovich GJ, Nathens AB, Frey KP, Egleston BL, Salkever DS, Scharfstein DO: **A national evaluation of the effect of trauma-center care on mortality**. *N Eng J Med* 2006, **354**(4):366-378.

[6]Freeman J, Nicholl J, Turner J: **Does size matter? The relationship between volume and outcome in the care of major trauma**. *J Health Serv Res Policy* 2006, **11**(2):101-105.

[7]Mullins RJ, Veum-Stone J, Hedges JR, Zimmer-Gembeck MJ, Mann NC, Southard PA, Helfand M, Gaines JA, Trunkey DD: **Influence of a statewide trauma system on location of hospitalization and outcome of injured patients**. *J Trauma* 1996, **40**(4):536-545; discussion 545-536.

[8]Tepas JJ, 3rd, Kerwin AJ, Ra JH: **Unregulated proliferation of trauma centers undermines cost efficiency of population-based injury control**. *J Trauma Acute Care Surg* 2014, **76**(3):576-579; discussion 579-581.

hour") is critical for trauma patient survival has not held up in more recent studies[9, 10], for critically injured patients, an hour can be too long. Trauma systems help ensure critical patients get the care they need as quickly as possible. Appropriate pre-hospital routing protocols also protect against excessive transport times. Of note, two factors that have been found to be most important in improving outcomes are pre-hospital notification and the existence of performance improvement programs, both of which are required at all LA County trauma centers.

There is also ongoing national discussion regarding the relative performance of Level I versus Level II designated trauma centers. LA County trauma centers are verified by the ACS, which assesses each hospital against a set of criteria and assigns a level of trauma designation. In its most recent evaluation of LA County hospitals, the ACS assessed 5 hospitals as meeting Level I requirements and 9 hospitals as meeting Level II requirements. All of these hospitals are designated as Trauma Centers by the EMS Agency and utilize the same trauma criteria and destination protocols. This practice is supported with national literature that demonstrates equivalent outcomes (based on mortality data) for patients in Level I vs. Level II centers.[11, 12] While some studies suggest Level I hospitals may have better patient outcomes,[13,14] the risk of bias in these studies is high (e.g., many studies are led by academic Level I centers) and there are few data to support the presumed reasons that may underlie any observed differences. For example, while some may postulate that the constant presence of specialists on-site in Level I trauma centers may support higher quality care, a prospective study evaluating in-house versus home-call found no difference in outcomes.[15] While studies have not found a direct association between the existence of a surgical residency program or participation in research activities on trauma patient outcomes[16], it is reasonable to believe that the presence

[9]Lerner EB, Moscati RM: **The golden hour: scientific fact or medical "urban legend"?***Acad Emerg Med* 2001,**8**(7):758-760.

[10]Newgard CD, Meier EN, Bulger EM, Buick J, Sheehan K, Lin S, Minei JP, Barnes-Mackey RA, Brasel K, Investigators ROC: **Revisiting the "Golden Hour": An Evaluation of Out-of-Hospital Time in Shock and Traumatic Brain Injury**. *Ann Emerg Med* 2015, **66**(1):30-41 e33.

[11]Clancy TV, Gary Maxwell J, Covington DL, Brinker CC, Blackman D: **A statewide analysis of Level I and II trauma centers for patients with major injuries**. *J Trauma* 2001, **51**(2):346-351.

[12]Brown JB, Watson GA, Forsythe RM, Alarcon LH, Bauzza G, Murdock AD, Billiar TR, Peitzman AB, Sperry JL: **American College of Surgeons Trauma Center verification versus state designation: Are Level II centers slipping through the cracks?** J Trauma Acute Care Surg 2013;75:44-49.

[13]Cudnik MT, Newgard CD, Sayre MR, Steinberg SM: **Level I versus Level II trauma centers: an outcomes based assessment**. *J Trauma* 2009, **66**(5):1321-1326.

[14]McConnell KJ, Newgard CD, Mullins RJ, Arthur M, Hedges JR: **Mortality benefit of transfer to Level I versus Level II trauma centers for head-injured patients**. *Health Serv Res* 2005, **40**(2):435-457.

[15]Demarest GB, Scannell G, Sanchez K, Dziwulski A, Qualls C, Schermer CR, Albrecht RM: **In-house versus on call attending trauma surgeons at comparable Level I trauma centers: a prospective study**. *J Trauma* 1999, **46**(4):535-540; discussion 540-532.

[16]Liberman M, Mulder DS, Jurkovich GJ, Sampalis JS: **The association between trauma system and trauma center components and outcome in a mature regionalized trauma system**. *Surgery* 2005, **137**(6):647-658.

of research programs in Level I trauma centers produce value to a trauma system as a whole by increasing focus on system-wide quality and performance improvement, support for data analysis, and other factors necessary to support improvements in care across an entire trauma system. For example, LAC+USC trauma department organizes an annual trauma conference that is attended by staff from hospitals across LA County.

Despite overall laudable trauma-related mortality rates in LA County, the uncertainties about system optimization raise questions regarding how to continue to improve and achieve the best patient outcomes across the entire system. A risk-adjusted analysis of trauma outcomes comparing different regions within the County trauma system can help in this regard. Risk-adjusted models are important to account for variations in known factors that can affect a patient's likelihood of mortality. These factors that should be taken into account in order to arrive at appropriate conclusions include age, presenting vital signs and mental status, comorbidities, need for mechanical ventilation and mechanism of injury, especially blunt versus penetrating.

Benchmarking against national data is important, but a thorough internal system evaluation may also identify areas for improvement. Such an analysis was completed by the Los Angeles Biomedical Research Institute at Harbor-UCLA and is described below. The purpose of this evaluation was to establish a risk-adjusted model to perform valid comparisons of trauma care by service planning area (SPA) within the County for ongoing system evaluation.

B. Methods

1. Subjects and Setting

This analysis includes adult patients treated at County designated Level I or II trauma centers from 2012 through 2014. All patients 15 years of age or older with at least one ICD-9 injury diagnostic code signifying a traumatic mechanism of injury are included in the County trauma registry and were included in this analysis. In addition, patients triaged to a trauma center based upon pre-hospital criteria, guideline or judgment [Reference No. 506: *Trauma Triage* (Attachment VI)] were included. Pediatric patients, defined as less than 15 years of age by the EMS Agency protocols, were excluded, given their different pathophysiology and destination protocols. In addition, patients who were pronounced dead on-scene of the injury were excluded.

2. Data collection

The data that was collected from the trauma registry included the following: mortality (lived versus died), age, gender, blunt versus penetrating mechanism of injury, patient's home zip code, zip code where the injury occurred, pre-hospital and emergency department (ED), Glasgow Coma Scale (GCS), pre-hospital and initial ED systolic blood pressure (SBP), respiratory rate (RR), heart rate (HR), the calculated revised trauma

score (RTS), the calculated injury severity scale (ISS), the requirement for patient intubation, hospital code, and whether the hospital was a Level I or Level II trauma center.

LA County is divided into SPAs to allow for targeted public health programs specific to community needs. These SPAs are used as designated regions for the purposes of this analysis to evaluate for regional differences in trauma care. To determine the SPA associated with the subject, the zip code of the injury location was prioritized. If documentation on zip code of injury was missing, then the patient's home zip code was used to determine the SPA. If the home zip code was then found not to be associated with a SPA (e.g., patient was from outside of the country or zip code was missing), then the patient was excluded.

3. Outcomes

The primary outcome of interest was the risk-adjusted mortality by SPA as defined by survival to hospital discharge. The secondary outcome was mortality at Level II compared to Level I trauma centers.

4. Primary Analysis

To perform a robust mortality risk adjustment, the analysis used two different multivariable models that have been validated in the literature: the Trauma Score – Injury Severity Score (TRISS)[17]and the HAIDER model.[18]

Derived from a multiple regression analysis of the Major Trauma Outcome Study database, TRISS determines the probability of survival of a patient from the ISS and the Revised Trauma Score (RTS) using the formula:

$Ps = 1/ (1+e^{-b})$, and b = b0 + b1 (RTS) + b2 (ISS) + b3 (Age index).

The coefficients b0, b1, and b2 are different for blunt and penetrating trauma.

	Blunt	Penetrating
B0	-0.4499	-0.25355
B1	0.8085	0.9934
B2	-0.0835	-0.0651

[17]Boyd CR, Tolson MA, Copes WS: **Evaluating trauma care: the TRISS method. Trauma Score and the Injury Severity Score**. *J Trauma* 1987, **27**(4):370-378.
[18]Haider AH, Hashmi ZG, Zafar SN, Castillo R, Haut ER, Schneider EB, Cornwell EE, 3rd, Mackenzie EJ, Efron DT: **Developing best practices to study trauma outcomes in large databases: an evidence-based approach to determine the best mortality risk adjustment model**. *J Trauma Acute Care Surg* 2014, **76**(4):1061-1069.

B3	-1.7430	-1.1360

To ascertain the reliability of the calculated RTS and ISS in the database, a manual crosscheck was performed and calculated, using the emergency department vital signs for systolic blood pressure (SBP), respiratory rate (RR), and Glasgow coma scale (GCS).

The more recently developed HAIDER risk-adjusted model, based upon an analysis of the 2009-10 National Trauma Data Bank (NTDB), includes six covariates: age, hypotension, pulse, GCS, ISS, and a need for ventilator use. The exact categories used for the HAIDER model are based upon this published analysis: GCS categories (categorized as referent GCS 3 = 0, GCS 4-5 = 1, GCS 6-8 = 2, GCS 9-12 = 3, and GCS 13-15 = 4) and ISS categories (categorized as referent ISS 1-8 = 0, ISS 9-15 = 1, ISS 16-24 = 2, ISS 25-75 =3). The differences per category for this analysis were weighted as equivalent (e.g., the difference between a GCS category of 3 to 4 is the same as a GCS category change from 1 to 2).

Using both models separately, the outcome for each SPA was compared to all others as the reference group (e.g. SPA 1 vs. all other SPAs together). To account for the multiple comparisons with 8 SPAs, the 99.3% confidence intervals for the odds ratios (OR) was calculated rather than the standard 95% confidence interval for single comparisons. In addition, Level II trauma centers were compared to Level I trauma centers using both models. For this comparison, Level I trauma centers were taken as the reference group and the OR and 95% confidence interval (CI) was calculated. Confidence intervals that cross 1 signify no difference in outcomes, while values less than 1 convey benefit and greater than 1 convey harm.

5. Sensitivity analysis

To adjust for other potential systematic differences in the comparison cohorts, we calculated the TRISS-adjusted and HAIDER-adjusted mortality risk for the following subgroups: 1) penetrating trauma patients only, 2) blunt trauma patients only, 3) excluding patients who were pulseless on arrival to the emergency department, and with the following modifications to the models: 1) adjusting for inter-facility transfers and 2) adjusting for presence of comorbidities. Finally, because subjects who live within one zip code are likely to have risk factors and outcomes that are correlated with one another, we used a generalized estimating equation (GEE) to adjust for correlations within zip code by using the proc genmod option in SAS v. 9.3 (Cary, NC). The zip code of residence was used. If the home zip code was found not to be associated with a SPA (e.g., patient was from outside of the country, zip code was missing, or didn't make sense), the zip code of injury was used.

C. Results

There were 63,614 adult subjects in the database. After excluding those without SPA assignment, there were 60,422 subjects for the primary analysis. The distribution of trauma patients, stratified by blunt and penetrating mechanism, is given in Table 1. The overall mortality rate for all patients during the time studied is 3.8% (2409/63614), which is less than the current national average as reported by the ACS. As is found in other trauma systems, there is a significant increase risk of death with penetrating mechanisms (blunt 3% versus penetrating 8.1%; odds ratio 2.2 95% CI 2.1-2.4, $p<0.0001$), which highlights the importance of risk-adjusted analysis.

Using the TRISS model to calculate the percent of actual deaths compared to expected deaths, the County System scored 81.4% (95%CI 79.8-82.9%), indicating that our system has almost 20% fewer deaths than expected.

In the multivariable analysis of mortality by SPA using both the TRISS and the HAIDER model (Table2), both models demonstrated better outcomes in SPA 5 (when compared to all other SPAs), while mortality was higher in SPA 7. There was also a non-significant trend toward higher mortality in SPA 6 and lower mortality in SPA 2 using the HAIDER model. Outcomes in all other SPAs were statistically the same.

Level I trauma centers were not found to be superior to Level II trauma centers, though the sample size (n of 14 trauma centers) is not sufficient to draw definitive conclusions as to the relative value of Level I vs. Level II designation.

The results did not change substantively with any of the sensitivity analyses.

D. Limitations

Trauma center quality benchmarking is based upon risk-adjusted observed-expected mortality ratios. The assumption is that proper risk-adjustment will allow a valid comparison of one trauma center's mortality rates (or Level I vs. II trauma centers) to another. There are numerous known patient-related and injury-related factors that must be considered in the risk-adjustment, such as age, whether the injury was blunt or penetrating, the injury severity score, the revised trauma score, the organ system involved, etc. The TRISS and HAIDER models are two examples of existing risk-adjustment models. However, despite efforts to achieve an unbiased assessment, no statistical method or model can perfectly adjust for mortality-risk. There will always be unmeasured confounders that have unknown effects on the results. Variation in patient volume has also been shown to produce unreliable mortality estimates,

especially at low-volume centers. The quality of the data that has been collected may also be limited because of missing and misclassified data.

E. Conclusions

These results confirm that the LA County trauma system achieves overall excellent outcomes with an actual overall mortality nearly 20% lower than expected based on national norms. Some variations in outcome were noted by SPA. Improved outcomes were associated with injuries that occurred in SPA 5 and worse outcomes were associated with injuries that occurred in SPA 7. These results warrant further evaluation by the EMS Agency to identify best practices and areas for improvement.

Table 1 – Incidence of Blunt and Penetrating trauma by SPA

SPA	Blunt	Penetrating	Total = 60422
1	1702 (82.4%)	363 (17.6%)	2065 (3.4%)
2	10660 (90.7%)	1090 (9.3%)	11750 (19.5%)
3	5696 (88.7%)	724 (11.3%)	6420 (10.6%)
4	10617 (86.1%)	1710 (13.9%)	12327 (20.4%)
5	3214 (93.3%)	231 (6.7%)	3445 (5.7%)
6	9750 (74.0%)	3419 (26.0%)	13169 (21.8%)
7	4754 (84.4%)	882 (15.7%)	5636 (9.3%)
8	4661 (83.1%)	949 (16.9%)	5610 (9.3%)
Total	51054	9368	60422

Table2. TRISS–adjusted and HAIDER-adjusted mortality for each SPA with all other SPAs as reference.

	TRISS Odds ratio for death, [99.3%CI]	**HAIDER Odds ratio for death, [99.3%CI]**
SPA 1	0.73, [0.44-1.22]	0.88, [0.54-1.42]
SPA 2	0.89, [0.70-1.13]	0.78, [0.61-1.00]
SPA 3	1.16, [0.87-1.55]	1.17, [0.87-1.58]
SPA 4	1.20, [0.93-1.55]	1.16, [0.90-1.51]
SPA 5	0.59, [0.37-0.94]	0.43, [0.27-0.67]
SPA 6	1.00, [0.77-1.32]	1.28, [0.99-1.67]
SPA 7	1.38, [1.00-1.90]	1.58, [1.14-2.19]
SPA 8	1.28, [0.91-1.79]	1.17, [0.83-1.65]

VI. RE-ESTABLISHING A LEVEL I TRAUMA CENTER IN SOUTH LOS ANGELES/TIME LINE:

Options to re-establish a Level I trauma care system to service the South Los Angeles community given the high incidence of trauma mortality in that area; a timeline for the establishment of a Level I trauma care system in South Los Angeles.

As discussed previously, the basic requirements of a Level I and II trauma center are the same (Attachment II). However, Level I trauma centers have the following additional requirements:

- Annual volume standards
  - Minimum of 1,200 trauma program admissions, or
  - Minimum of 240 trauma patients per year whose Injury Severity Score (ISS) is greater than 15, or
  - An average of 35 trauma patients (with an ISS greater than 15) per trauma program surgeon
- Additional physician specialists who are immediately available (e.g., pediatrics, cardiothoracic)

- Trauma research program
- Accreditation Council on Graduate Medical Education (ACGME) approved surgical residency program

Level I trauma centers are housed in or affiliated with academic medical centers. Level I trauma medical directors should have established research productivity, with regular participation in academic trauma forums such as the American Association for the Surgery of Trauma (AAST) and the American College of Surgeons Committee on Trauma (ACS-COT). One of the trauma surgeons who remain clinically active in trauma care should direct formal, regularly scheduled trauma research meetings, with documentation of the ongoing activities.

The administration of a Level I trauma center must also demonstrate support for the research program such as by providing basic laboratory space, sophisticated research equipment, advanced information systems, bio-statistical support, and salary support for basic and translational scientists or seed grants for less experienced faculty.

It should be noted that a hospital cannot be directed by the EMS Agency to meet the (ACS) and Title 22 requirements of a Level I trauma center. Also, once a designated trauma hospital meets the Level I requirements, it would automatically be identified as a Level I trauma center with no further action needed from the County.

There are several potential benefits that Level I designation may present to a community that were not measured in the analysis and that may support a specific facility's desire to seek Level I designation. This includes the impact of research activities that support the development and implementation of evidence-based practices, a focus on training new physicians who may choose to remain within the local area for future employment, and greater ability to attract and retain specialists. Given these potential benefits, if a hospital should seek to achieve Level I designation, it is appropriate to be supportive of their efforts.

Following is an evaluation of the feasibility, and associated estimated timelines, of re-establishing a Level I trauma center in SPA 6. This section of the report was completed through an interview process conducted by EMS Agency staff. Utilizing the requirements for Level I trauma center designation, EMS Agency staff met with key administrators of the Level II trauma centers that currently or formerly served SPA 6 (St. Francis Medical Center, California Hospital Medical Center, and Martin Luther King Jr. Community Hospital) to ascertain the facilities' leadership priorities, interest in future Level I designation, and potential timeline of such a designation if the hospital chooses to pursue it. Additional investigation would need to be performed by each hospital to estimate any potential financial investment required to achieve Level I designation.

St. Francis Medical Center (SFM)

Staff met with SFM administration to discuss the hospital's possible interest in Level I trauma center designation. During this meeting SFM leadership indicated that they are very interested in developing the relationships needed to meet the criteria to be designated as a Level I trauma center. The hospital is not currently accredited by the ACGME as a sponsoring institution nor is it a participating site in a medical residency rotation. Hospital leadership has reached out to several academic training centers to assess interest in a partnership for a surgical residency rotation through SFM. The hospital would also have to develop additional surgical subspecialty coverage that is immediately available (vs. available on-call) to qualify for Level I designation. Once appropriate partners are identified, SFM estimates it will take approximately one year to prepare the hospital, hire appropriate faculty, establish contractual relationships, and begin a surgical residency rotation, all of which are precursor steps to potential future Level I designation.

California Medical Center (CAL)

Staff met with CAL administration to discuss the hospital's possible interest in Level I trauma center designation. During this meeting CAL leadership indicated that they have been planning for future Level I trauma center designation for several years. CAL has family medicine residency program which has been in place for over 30 years. The hospital employs a Director of Medical Education to ensure compliance with educational program requirements and to develop the academic requirements of the ACGME.

The internal strategic decision to seek Level I designation was made based on interaction and reports from the ACS reviews from the past five surveys. Per CAL, the ACS has consistently encouraged it to develop a residency program given that the quality of service provided at CAL, the complexity of patient cases, and the level of expertise of its staff and the significant volume of cases which would provide an ideal environment to train future trauma surgeons. The 2008 ACS report recommendations also stated, "*Consider adding a residency rotation to the trauma service in view of the large number of severely injured patients being treated*".

Because CAL has already begun the process of developing an academic program, they estimate that it would be feasible for them to meet all requirements of Level I designation within the next two to three years.

Martin Luther King Jr. Community Hospital (MLKCH)

Staff met with MLKCH administration to discuss the hospital's current priorities, plans for a residency program and interest in Level I trauma center designation. MLKCH opened in June

2015. They have an emergency department approved to receive 9-1-1 ambulance transports. To date, the hospital board's and administration's priorities have been to complete all of the processes needed to fully open the hospital. They state it will take time to adapt to full patient volumes, optimize patient throughput, enhance care coordination with partners in the area, expand inpatient and outpatient service offerings, and recruit additional physicians.

Several barriers to establishing MLKCH as a trauma center were identified by MLKCH leadership. The shortage of physicians serving the area is a particular concern. Not only does it impact referrals and ability for patients to find follow up medical care in the community, hospital administration sees it as a barrier to expanding hospital specialty services to include trauma care. Another barrier identified is re-establishing a residency program, as this will require developing an academic physician practice as well as obtaining ACGME accreditation. ACGME requires significant planning for institutional enhancements and staffing specific to academic requirements.

LA County has approximately 260 resident slots in the Medicare Program under the physician training program at the former King Drew Medical Center (KDMC). Under Federal law, the entity(ies) that enter into a Medicare agreement at the same physical location as KDMC has access to the residency slots that existed as of Fiscal Year 2005-06. While these slots can be accessed should the decision be made to re-establish a physician training program and while MLKCH administration considers establishment of training programs a priority, it does not anticipate completing the ACGME accreditation process within the next three years.

According to Federal regulations, some residency slots may be temporarily used by another facility under the Medicare GME affiliated group arrangement. Under this arrangement, another hospital with a physician training program could enter into a Medicare GME affiliation agreement whereby that hospital could then access the residency slots attached to the KDMC site. It should be noted that the purpose of the Federal legislation to preserve the residency slots at the KDMC location was to support physician training within the medically underserved area as these physicians would be more likely to stay and continue to provide care in the area. For this reason we would not support slots being temporarily transferred to a hospital outside the area.

While MLKCH hospital leadership is open to working towards future trauma center designation, if this is identified as a community need, administrators indicated that the above priorities take precedence for the next several years. As stated in the January 20, 2015 report to the Board on the feasibility of establishing trauma services at MLKCH, it would take a minimum of three to five years to prepare the hospital for the Level II trauma center designation process. Further time would be required to meet the requirements for Level I designation, if the hospital chose to pursue this additional designation.

While MLKCH does not currently have definitive plans to establish itself as a trauma center, the hospital and the EMS Agency are working closely to ensure that any trauma patients who present to MLKCH are provided with appropriate initial evaluation and management. Specifically, the EMS Agency and representatives from MLKCH met this summer with St. Francis Medical Center and the Los Angeles County Fire Department to discuss plans to provide immediate and definitive care to severely injured patients who walk-in or those transported by private vehicle to MLKCH. The plan is called 9-1-1 Trauma Re-Triage and the EMS Agency has received positive feedback regarding this process. The plan is an expeditious four-step process which involves:

1. Immediate identification of patients meeting defined criteria for immediate transport to St. Francis Medical Center
2. Contact with the 9-1-1 system for emergency paramedic transportation
3. Preparation of the patient for immediate transport; medical records may be sent at a later time
4. Direct physician-to-physician handoff between MLKCH ED and the St. Francis trauma service; a dedicated telephone number was established for this purpose

Although MLKCH will not be a trauma hospital for the foreseeable future, given the high rates of trauma in the area, we believe it is important that ED physicians at MLKCH are prepared to deal with trauma patients who walk in the door, are mis-triaged, or who worsen rapidly. Therefore EMS will work with ED physicians at MLKCH to ensure they complete an Advanced Trauma Life Support (ATLS) Course, a curriculum which provides advanced training for the initial care of trauma patients. MLKCH has been very supportive of this initiative. We feel confident that these measures will ensure that MLKCH provides a high level of initial care and management of trauma patients until they can be transferred to a trauma center.

VII. Trauma Prevention

Despite decades of progress in the development of trauma centers and trauma systems, injury remains the leading cause of potential years of life lost and leaves millions of Americans chronically disabled every year. Trauma systems must have an organized and effective approach to injury prevention and must prioritize their efforts based on local trauma registry and epidemiologic data.

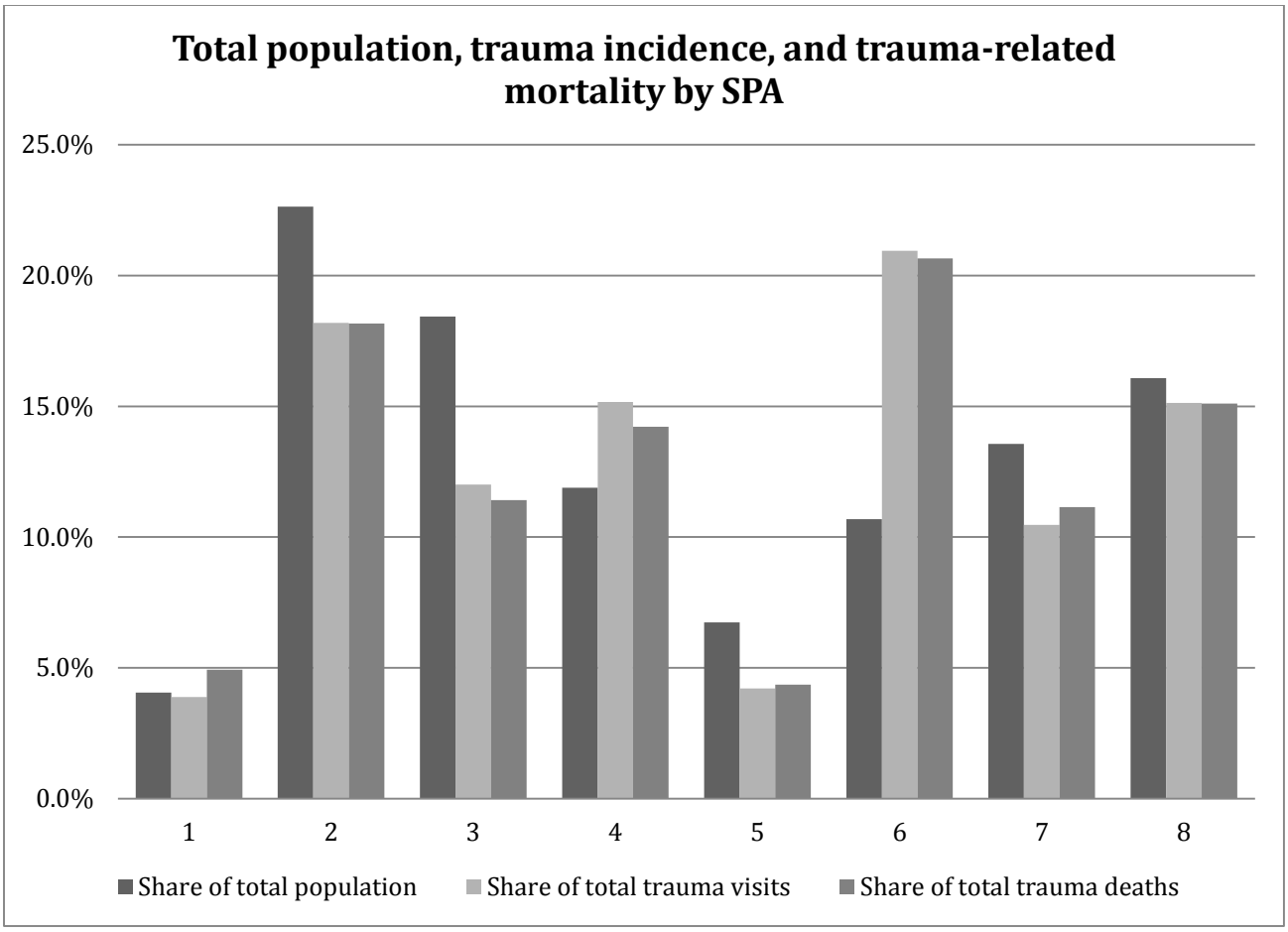
State regulations require that local EMS agencies establishing a trauma system include coordination with public and private agencies and trauma centers in injury prevention. Effective injury prevention begins with a focus on the most common causes of injury in the community. These causes must include contributing factors such as drug and alcohol abuse, access to firearms, cultural, environmental, socioeconomics, domestic violence, and behavioral health problems. The same causes are often linked with the most common

mechanisms of injury presenting to a specific trauma center. Much work has been done through legislation and public policy, such as the helmet and car seat laws and automobile manufacturing standards, in addressing injury prevention on a national level.

In LA County each trauma center is contractually obligated to have an injury prevention program and must identify the three most common causes of injury or traumatic death at their trauma center or in the community using the trauma registry or other available epidemiologic data. Program and intervention strategies should be selected based on these data.

As data collection processes and equipment improve, along with the ability to localize precisely where significant injuries occur in the community, the EMS Agency believes there should be a renewed emphasis on trauma prevention and it should take on a stronger leadership role in coordinating the various stakeholders to develop programs and make recommendations to governmental entities for trauma prevention opportunities. This effort is particularly important in areas with disproportionally high incidents of trauma, such as SPA 6, as noted in the following figure, which demonstrates the percentage of the LA County population that lives in each SPA compared with the percentage of trauma-related visits (i.e., trauma incidence) by SPA of the patient residence and percentage of trauma-related mortality by SPA of patient residence, for trauma volume 2012-2014.[19]

19 Based on an analysis of EMS system data, 2014.



Whereas SPA 6 comprises 10.7% of the county's population, residents of SPA 6 comprised 21.0% of total trauma visits and 20.7% of trauma-related deaths between 2012 and 2014. A disproportionately high number of trauma visits (15.2%) and deaths (14.2%) were also seen in SPA 4 (compared to 11.9% of the total population) although the disparity was not as great as what is observed in SPA 6. SPA 1 also experienced a higher rate of overall trauma-related deaths (4.9%) as compared to their share of the overall population (4.1%), primarily due to a large number of deaths from motor vehicle accidents though, again, the differences were not as pronounced as that seen in SPA 6.

In an effort to expand access to trauma prevention services, the EMS Agency plans to update its Trauma Plan with the State to include specific language about an enhanced trauma prevention program to be implemented in partnership with the Department of Public Health's Division of Chronic Disease and Injury Prevention (DPH DCDIP). The proposed amendment would be submitted to the State for approval in early 2016. Based on preliminary discussions with DPH DCDIP, the amendment will include a plan to enhance trauma prevention by developing the relationship between DPH and the EMS Agency, particularly through the use of the trauma data, analysis of injury type and location, coordination with the trauma hospitals,

evaluation of areas of greatest need for targeted programs and community outreach, and development and implementation of evidence-based strategies that facilitate linkages between community-based organizations, parks, public health outreach, mental health providers and trauma centers. Such activities are proposed to be funded using DHS' historical share of the 2015-16 increase in Measure B funding that result from annual changes in total assessed square footage across the County, or approximately $685,000. This proposal will come to the Board for approval in a future budget adjustment. Increases to this initial proposed allocation could be considered in the future based on program needs and available funding. We will continue to update the Board on the status of this proposed amendment and the EMS Agency's and DPH DCDIP's plans to build a County trauma prevention program that targets those areas within the County with a disproportionately high incidence of trauma.

VIII. Conclusion

In summary, over the coming months, DHS recommends the following specific steps:

- DHS will return to the Board with a specific recommendation for distribution of FY14-15 Measure B funds among the private hospitals as well as a proposed methodology for ongoing distribution of funds for FY15-16 in a way that maximizes the effectiveness of the trauma system.
- EMS Agency will take steps outlined on pages 6-8 with respect to improving trauma-related data collection activities.
- EMS Agency will frequently engage with, and where necessary provide technical assistance to, hospitals serving SPA 6, particularly the current Level II trauma centers at St. Francis Medical Center and California Hospital, with respect to their plans for potential future Level I trauma center designation.
- EMS Agency will continue to engage with MLK Community Hospital to ensure any trauma patients that present receive rapid and appropriate initial evaluation, management, and transfer to a designated trauma center. This will include coordination of additional training for MLKCH ED physician staff in Advanced Trauma Life Support.
- The County should enhance focus on trauma prevention, particularly in regions of LA County that experience a disproportionate burden of illness, including most pronouncedly SPA 6. As part of this effort, the EMS Agency will seek State approval for revision of the EMS Trauma Plan to include additional focus on trauma prevention activities across LA County. Funds available for trauma prevention activities will be added to the DPH budget in a future budget adjustment to be presented for approval to the Board.

With the continued support of the Board of Supervisors, the Los Angeles County trauma system will continue to mature, particularly in the areas of trauma prevention and data collection and analysis activities, ensuring that we are continuing to enhance the overall trauma system and reduce deaths from trauma across all areas of the County.

Improving Trauma Care Countywide and in "Hot Spot" Areas

The stated purpose of Measure B funding is to: 1) avoid a life-threatening shutdown of the Los Angeles County (County) trauma network; 2) maintain and expand the trauma network Countywide, while ensuring more timely response to critical and urgent medical emergencies; and 3) respond effectively to biological and chemical terrorism.

In October 2014, the American College of Surgeons (ACS) adopted guidelines it recommends lead trauma agencies, such as the County's Department of Health Services' Emergency Medical Services Agency, use to best serve the needs of injured patients and optimize regional trauma system functions. Among other things, ACS recommended that lead agencies assess their trauma system using measures of trauma system access, quality of care, population mortality rates and trauma system efficiency.

ACS proposed various assessment measures including the number of Level I and Level II trauma centers per resident, transport times, the percentage of severely injured patients seen at each trauma center, trauma-related mortality rates, frequency and nature of inter-hospital transfers, and percentage of time on diversion status. Other

-MORE –

	MOTION
SOLIS	_____
RIDLEY-THOMAS	_____
KUEHL	_____
KNABE	_____
ANTONOVICH	_____

measures exist including rates of blunt versus penetration traumas at each trauma center, regional variances in years of life lost and other quality of life measures.

It is critical that the trauma care system be reassessed on a regular schedule using clear and objective criteria and reliable data so that the allocation and spending of trauma care resources is responsive to and driven by needs assessment data and best practices in trauma care resource allocation.

Accurate data is critical. Reliable data shows that the County as a whole has one of the best trauma care systems in the world. The overall mortality rate is 3.6%, well below the national average of 4.2%.

Reliable data also shows there are huge regional variations in the volume of trauma injuries and trauma deaths. For example, South Los Angeles residents are more likely to require trauma care, and there are more deaths due to trauma in Service Planning Area (SPA) 6 than any other SPA. While South Los Angeles accounts for 10% of the County's population, it accounts for 20% of the trauma-related deaths.

Although more data and analysis are needed to get a complete picture of the County's trauma care needs, existing data shows a clear and urgent need for increased access to trauma care in SPA 6, which does not currently have a Level I trauma center.

It is critical that the Board of Supervisors (Board) both move forward to address immediate needs and take steps to obtain comprehensive data to make future decisions regarding the allocation of scarce resources to maintain a stable and robust trauma care system that serves the entire County, especially those areas experiencing high trauma mortality rates.

On June 9, 2015, the Department of Health Services released a letter to the Board with a proposed new allocation methodology for non-County hospitals but the implementation details of the proposed new methodology have not yet been resolved.

I THEREFORE MOVE THAT THE BOARD OF SUPERVISORS:

1) Approve recommendation #1 of the Department of Health Services (DHS) June 9, 2015 letter to the Board of Supervisors (Board) to maintain trauma certification

of the non-County of Los Angeles (County) trauma centers through December 31, 2015 without specific financial terms for the extension period; and

2) Refer back to recommendations #2 and 3 of the DHS June 9, 2015 letter to the Board and direct the Director of DHS to:

   a. Continue to develop and refine a proposed revised methodology for allocating Measure B, Maddy Emergency Medical Services Fund and Richie's Fund dollars to non-County hospitals and, once the methodology is completed and the impact of the new methodology on the trauma system is analyzed, return to the Board to seek authority to put in place a superseding agreement retroactive to July 1, 2015;

   b. Report back in writing within 90 days on recommendations to improve the accuracy, quality and timeliness of the data collected on the County's public and private trauma care system;

   c. Report back in writing within 90 days on a proposed methodology for the Emergency Medical Services agency to regularly assess the County trauma care system using clear and objective criteria and needs-based data and issue publicly available reports so that the allocation of resources will be spent and driven by accurate data on community needs; and

   d. Report back in writing within 90 days on options to re-establish a Level I trauma care system to serve the South Los Angeles community given the high incidence of trauma mortality in that area. The report back should include a timeline.

####

(YV)

TRAUMA CENTER REQUIREMENTS **ATTACHMENT II**

Title 22 Requirements	LEVEL II	LEVEL I *
Surgical Specialties include the following departments	- General - Neurologic - Orthopedic - Obstetric/Gynecologic - Ophthalmologic - Oral or Maxillofacial or Head/Neck - Plastic - Urologic	- General - Neurologic - Orthopedic - Obstetric/Gynecologic - Ophthalmologic - Oral or Maxillofacial or Head/Neck - Plastic - Urologic
Non-Surgical Specialties include the following departments	- Emergency - Anesthesiology - Internal medicine - Pathology - Psychiatry - Radiology	Same as Level II
Volume Standards		One of the following Patient Volumes: - Minimum of 1200 trauma admissions; or - Minimum of 240 trauma patients per year with an Injury Severity Score (ISS) > 15; or - An average of 35 trauma patients (with an ISS > 15) per trauma program surgeon per year
Emergency Department	An emergency department, division, service or section staffed with qualified specialists in emergency medicine who are immediately available & in-house at all times	Same as Level II
Qualified **Surgical** Specialist Availability	Immediately Available for trauma team activation and Promptly Available for consultation: - General surgery	Same as Level II
	On-call and Promptly Available: - Neurologic - Orthopedic - Obstetric/Gynecologic - Ophthalmologic - Oral or Maxillofacial or Head/Neck - Plastic - Reimplantation/Microsurgery - Urologic	On-call and Promptly Available: - **Cardiothoracic** - Neurologic - Orthopedic - Obstetric/Gynecologic - Ophthalmologic - Oral or Maxillofacial or Head/Neck - **Pediatrics** - Plastic - Reimplantation/Microsurgery - Urologic
	Available for consultation or consultation and transfer agreements for adults and pediatric trauma patients requiring the following surgical services:	Same as Level II

*Additional Level I requirements are in Bold

Title 22 Requirements	LEVEL II	LEVEL I *
	- Burns - Cardiothoracic - Pediatric - Reimplantation/Microsurgery - Spinal cord injury	
Qualified **Non-Surgical** Specialist Availability	Immediately Available: - Emergency Medicine	Same as Level II
	Promptly Available: - Anesthesiology (*Shall have a mechanism established to ensure that the anesthesiologist is in the operating room when the patient arrives. May be fulfilled by supervised senior residents or certified registered nurse anesthetists who are capable of assessing emergent situations in trauma patients and of providing any indicated treatment. In such cases, the staff anesthesiologist on-call shall be advised about the pt, be promptly available at all times, and be present for all operations.)*	**Immediately Available:** **- Anesthesiology** *(May be fulfilled by supervised senior residents or certified registered nurse anesthetists who are capable of assessing emergent situations in trauma patients and of providing any indicated treatment. In such cases, the staff anesthesiologist on-call shall be advised about the pt, be promptly available at all times, and be present for all operations.)*
	Promptly Available: - Radiology Available for Consultation: - Cardiology - Gastroenterology - Hematology - Infectious Diseases - Internal Medicine - Nephrology - Neurology - Pathology - Pulmonary Medicine	Same as Level II
Service Capabilities	- Radiological service: - Immediately Available: a radiological technician capable of performing plain films and computed tomography (CT) imaging - Promptly Available: - Angiography - Ultrasound	Same as Level II
	Clinical lab service shall have: - Comprehensive blood bank or access to a community central blood bank	Same as Level II

*Additional Level I requirements are in Bold

Title 22 Requirements	LEVEL II	LEVEL I *
	- Clinical laboratory services immediately available	
	- Surgical service: - OR suite available or being utilized for major trauma patients - Promptly Available OR staff who are unless operating on trauma patients and back-up personnel who are Promptly Available	- Surgical service: - OR suite available or being utilized for major trauma patients - **Immediately Available** OR staff who are unless operating on trauma patients and back-up personnel who are Promptly Available
	- Appropriate surgical equipment and supplies as determined by the trauma program medical director	- Appropriate surgical equipment and supplies as determined by the trauma program medical director **- Cardiopulmonary bypass equipment** **- Operating microscope**
Supplemental Services - Emergency Service	- Designate an ED physician to be a member of the trauma team - Provide emergency medical services to adult and pediatric patients - Appropriate adult and pediatric equipment and supplies as approved by the director of emergency medicine in collaboration with the trauma program medical director	Same as Level II
Intensive Care Unit	- Promptly Available Qualified specialist to care for trauma patients in the ICU	- **Immediately Available** Qualified specialist in-house to care for trauma patients in the ICU
	- Appropriate equipment and supplies as determined by the physician responsible for the ICU and the trauma program medical director - Qualified specialist (above) shall be a member of the trauma team	Same as Level II
Burn Care	- May be provided through a written transfer agreement with a Burn Center	Same as Level II
Pediatric Care	- In-house pediatric trauma care shall have: - Appropriate pediatric equipment and supplies and be capable of initial evaluation and treatment of pediatric trauma patients	Same as Level II

*Additional Level I requirements are in Bold

Title 22 Requirements	LEVEL II	LEVEL I *
	- Pediatric ICU approved by the California State Department of Health Services' California Children Services (CCS) - Multi-disciplinary team to manage child abuse and neglect - Hospitals without a Pediatric ICU shall establish and utilize written criteria for consultation and transfer of pediatric patients needing intensive care	
Miscellaneous	- Physical therapy - Rehabilitation Center *(May be provided through a transfer agreement)* - Respiratory care - Acute hemodialysis capability - Occupational therapy - Speech therapy - Social service - Acute spinal cord injury management capability *(May be provided through a transfer agreement)* - Protocol to identify potential organ donors - Outreach program: - Capability to provide both telephone and on-site consultations with physicians in the community - Trauma prevention - Inter-facility transfer agreements - Continuing Education: - for staff physicians, nurses, allied health personnel, local EMS personnel, other community physicians and health care personnel - Quality Improvement Process: - to include structure, process, and outcome evaluations which focus on improvement efforts to identify root causes of problems, intervene to reduce or eliminate these causes, and take steps to correct the process	Same as Level II plus: **- Trauma research program** **- ACGME approved surgical residency program**

*Additional Level I requirements are in Bold

Title 22 Requirements	LEVEL II	LEVEL I *
	- detailed audit of all trauma related deaths, major complications and transfers - multi-disciplinary trauma conferences - participate in the trauma system data management	

ATTACHMENT III

DESIGNATED TRAUMA CENTERS IN LOS ANGELES COUNTY

LEVEL I

Children's Hospital of Los Angeles
4650 W. Sunset Boulevard
Los Angeles, CA 90027

Cedars Sinai Medical Center
8700 Beverly Boulevard
Los Angeles, CA 90048

Harbor-UCLA Medical Center
1000 W. Carson Street
Torrance, CA 90502

LAC+USC Medical Center
1200 N. State Street
Los Angeles, CA 90033

Ronald Reagan UCLA Medical Center
757 Westwood Plaza
Los Angeles, CA 90095

LEVEL II

Antelope Valley Medical Center
1600 West Avenue J
Lancaster, CA 93534

California Hospital Medical Center
1401 S. Grand Avenue
Los Angeles, CA 90015

Henry Mayo Newhall Hospital
23845 McBean Parkway
Valencia, CA 91355

Huntington Hospital
100 W. California Boulevard
Pasadena, CA 91105

Long Beach Memorial Medical Center
2801 Atlantic Avenue
Long Beach, CA 90806

Northridge Hospital Medical Center
18300 Roscoe Boulevard
Northridge, CA 91328

Providence Holy Cross Medical Center
15031 Rinaldi Street
Mission Hills, CA 91345

St. Francis Medical Center
3630 E. Imperial Highway
Lynwood, CA 90262

St. Mary Medical Center Long Beach
1050 Linden Avenue
Long Beach, CA 90813

REVIEW PERIOD: January 1, 2012 through December 31, 2014

PART I: *TIMELINESS OF DATA SUBMITTED*

TPS-1 Initial information (sequence number, patient name, admit date, and mode of entry) shall be entered into the TEMIS database within fifteen (15) days of admission. The remainder of TPS-1 shall be completed and entered within thirty (30) days of admission.

TPS-2 All additional information shall be entered into the TEMIS database within sixty (60) days of discharge.

TIMELINESS RATING

- Total cases entered for the review period = 76,648
- Number of TPS-1 forms entered on time = 72,237 (94%)
- Number of cases with TPS-2 information entered on time = 76,627 (99%)
- TIMELINESS = **96%**
- **EXCELLENT** TIMELINESS of TPS-1 & TPS-2 data entered.

PART II: *COMPLETENESS OF DATA SUBMITTED*

In order to maintain a useful and reliable database, the number of deficits *(e.g., blank and not documented)* must be kept at a minimum. At least ninety (90) percent of all mandatory data entry fields should contain valid data.

All mandatory data fields were reviewed for quality of data entered, and the findings are outlined in the following pages. Fields with less than 90% valid data are shown in **boldprint**.

TRAUMA SYSTEM DATA AUDIT REPORT **ATTACHMENT IV**

DATA ENTRY FIELD	# Entered	% Valid
Patient Information (Total Patient Volume 76,648)		
Full Name	76,355/76,648	99%
- Invalid Name = 293		
Admission Date	76,648/76,648	100%
Sequence Number	76,566/76,648	99%
- Invalid Sequence Number = 82		
City of Residence	72,582/76,648	95%
- blank = 1,768		
- not applicable = 589		
- not documented = 1,709		
Residence Zip Code	75,172/76,648	98%
- blank = 1,473 (HGH 1,134)		
- not applicable = 2		
- not documented = 1		
Age	76,641/76,648	99%
- blank = 7		
Sex	76,648/76,648	100%
Ethnicity	76,641/76,648	99%
- blank = 5		
- not documented = 2		
Mode of Entry	76,648/76,648	100%
Blunt vs Penetrating	76,608/76,648	99%
- blank = 6		
- not applicable = 34		
E-Codes	76,569/76,648	99%
- blank = 68		
- not applicable = 10		
- not documented = 1		
Location E-Codes	67,965/76,648	**88%**
- blank = 8,651		
- not applicable = 8		
- not documented = 24		
Prehospital (Mode of Entry EMS = 69,034)		
EMS Form Available	62,320/69,034	90%
- yes = 62,320		
- no = 4,029		
- blank = 1,341		
- not applicable = 1,325		
- not documented = 19		
Injury Date	62,235/62,320	99%
- Incorrect Date = 9		
- blank = 29		
- not documented = 47		
Injury Time	2,442/62,320	**39%**
- blank = 5,374		
- not applicable = 255		
- not documented = 54,249		

TRAUMA SYSTEM DATA AUDIT REPORT **ATTACHMENT IV**

DATA ENTRY FIELD	# Entered	% Valid
Injury City.....	50,456/62,320	**81%**
- blank = 6,429		
- not applicable = 30		
- not documented = 5,405		
Injury Zip Code.....	48,290/62,320	**77%**
- blank = 246		
- not applicable = 80		
- not documented = 13,704		
Provider…….....	62,028/62,320	99%
- blank = 37		
- not applicable = 208		
- not documented = 47		
Provider Unit.....	61,878/62,320	99%
- blank = 44		
- not applicable = 211		
- not documented = 187		
Dispatch Date ….....	62,000/62,320	99%
- Incorrect Date = 8		
- blank = 45		
- not applicable = 219		
- not documented = 48		
Dispatch Time….....	58,398/62,320	94%
- blank = 61		
- not applicable = 243		
- not documented = 3,618		
1st on Scene Time.....	57,768/62,320	93%
- blank = 59		
- not applicable = 246		
- not documented = 4,247		
Transport Arrival Time.....	57,649/62,320	93%
- blank = 60		
- not applicable = 245		
- not documented = 4,366		
Transport Left Scene Time.....	56,510/62,320	91%
- blank = 69		
- not applicable = 255		
- not documented = 5,486		
Injury Description.....	62,295/62,320	99%
- blank = 6		
- not applicable = 15		
- not documented = 4		
Mechanism of Injury.....	62,313/62,320	99%
- blank = 5		
- not applicable = 2		
Field Glasgow Coma Score….....	61,372/62,320	98%
- blank = 405		
- not applicable = 249		
- not documented = 294		
Field BP (systolic)….....	59,914/62,320	96%
- blank = 145		
- not documented = 1,588		
- not applicable = 673		

DATA ENTRY FIELD	# Entered	% Valid
Field BP (diastolic)….....	55,959/62,320	90%
- blank = 141		
- not applicable = 2,694		
- not documented = 3,526		
Field Heart Rate.....	60,618/62,320	97%
- blank = 131		
- not applicable = 322		
- not documented = 1,249		
Field Respiratory Rate.....	61,449/62,320	99%
- blank = 170		
- not applicable = 293		
- not documented = 408		
Field Intubation…….....	61,628/62,320	99%
- yes = 751		
- no = 60,877		
- blank = 320		
- not applicable = 322		
- not documented = 50		
Emergency Department (Direct Admits = 1,207)		
ED Notified.....	74,365/75,441	98%
- yes notification = 64,595		
- no notification = 9,770		
- blank = 81		
- not applicable = 196		
- not documented = 799		
Time Arrived.....	75,208/75,441	99%
- blank = 30		
- not applicable = 4		
- not documented = 199		
Time of Exit.....	74,773/75,441	99%
- blank = 68		
- not applicable = 49		
- not documented = 551		
Trauma Activation	75,311/75,441	99%
- yes activation = 54,988		
- no activation = 20,323		
- blank = 57		
- not applicable = 62		
- not documented = 11		
Time of Activation.....	71,709/75,441	95%
- blank = 511		
- not applicable = 19,681 (There was no activation on 20,323 patients)		
- not documented = 3,221		
Time of Initial Vital Signs.....	75,038/75,441	99%
- blank = 45		
- not applicable = 53		
- not documented = 305		

DATA ENTRY FIELD	# Entered	% Valid
ED Glasgow Coma Score….. *- blank = 142* *- not applicable = 232* *- not documented = 655*	74,412/75,441	99%
BP (systolic)….. *- blank = 35* *- not applicable = 247* *- not documented = 678*	74,481/75,441	99%
BP (diastolic)….. *- blank = 66* *- not applicable = 325* *- not documented = 789*	74,231/75,441	98%
Heart Rate..... *- blank = 68* *- not applicable = 130* *- not documented = 273*	74,940/75,441	99%
Respiratory Rate..... *- blank = 36* *- not applicable = 142* *- not documented = 652*	74,611/75,441	99%
Respirations Assisted….. *- yes = 3,666* *- no = 71,355* *- blank = 183* *- not applicable = 91* *- not documented = 146*	75,021/75,441	99%
O_2 Saturation….. *- invalid value = 10* *- blank = 252* *- not applicable = 193* *- not documented = 1,902*	73,084/75,441	97%
Supplemental O_2……..... *- yes = 13,288* *- no = 60,132* *- blank = 352* *- not applicable = 139* *- not documented = 1,514*	73,436/75,441	97%
Rationale for TPS Completion….. *- blank = 88* *- not applicable = 30* *- not documented = 5*	75,318/75,441	99%
Met Criteria……..... *- yes = 48,810* *- no = 26,405* *- blank = 163* *- not applicable = 37* *- not documented = 7*	75,234/75,441	99%
Criteria/Guideline……..... *- blank = 117* *- not applicable = 27* *- not documented = 3*	48,663/48,810	99%

DATA ENTRY FIELD	# Entered	% Valid
Next Phase.....	75,380/75,441	99%
- blank = 8		
- not applicable = 53		
OR / ICU (total documented ICU = 17,771, OR = 6,709)		
ICU Arrival Date….....	17,757/17,771	99%
- blank = 9		
- not applicable = 5		
ICU Exit Date….....	17,733/17,771	99%
- blank = 29		
- not applicable = 6		
- not documented = 3		
OR Date….....	6,669/6,709	99%
- blank = 39		
- not documented = 1		
Start Time.....	6,339/6,709	94%
- blank = 54		
- not applicable = 1		
- not documented = 315		
End Time.....	6,278/6,709	94%
- blank = 60		
- not applicable = 4		
- not documented = 358		
Procedure ICD-9 Codes.....	6,638/6,709	99%
- blank = 69		
Next Phase (OR).....	6,435/6,709	96%
- blank = 105		
- not applicable = 162		
- not documented = 7		
Post-Hospital		
Discharge Date.....	76,626/76,648	99%
- blank = 21		
- not documented = 1		
Discharge Time.....	76,499/76,648	99%
- blank = 25		
- not applicable = 1		
- not documented = 123		
Prior Phase.....	76,626/76,648	99%
- blank = 21		
- not documented = 1		
Lived / Died.....	76,621/76,648	99%
- blank = 27		
Discharged to:	76,624/76,648	99%
- blank = 23		
- not documented = 1		
Discharge Capacity.....	76,038/76,648	99%
- blank = 506		
- not applicable = 94 (D/C capacity does not exist for expired patients. "Not Applicable" appropriately used for the 2,760 deaths.)		
- not documented = 10		

DATA ENTRY FIELD	# Entered	% Valid
Discharge ICD-9 Codes.....	76,099/76,648	99%
- blank = 64		
- not applicable = 478		
- not documented = 7		
Co-Morbid Conditions.....	73,764/76,648	96%
- blank = 332		
- not applicable = 1,992		
- not documented = 560		
Complications…….....	73,021/76,648	95%
- blank = 458		
- not applicable = 3,009		
- not documented = 160		
Transfers (Total Patient Transfers out = 10,550)		
Rationale for transfer.....	10,111/10,550	96%
- blank = 230		
- not applicable = 206		
- not documented = 3		
Facility Name.....	9,340/10,550	**88%**
- blank = 317		
- not applicable = 715 (614 are due to incorrect coding of patients in custody)		
- not documented = 178		
Finances		
Payer.....	76,431/76,648	99%
- blank = 183		
- not applicable = 1		
- not documented = 33		
Total Charges.....	71,906/76,648	94%
- blank = 1,268		
- not applicable = 8		
- not documented = 3,466		
Record Complete		
Record Identified as Complete.....	76,448/76,648	99%
- yes = 76,488		
- no = 197		
- blank = 1		
- not applicable = 2		

COMPLETENESS RATING

- The established 90% compliance was found in all mandatory data fields except for the following:
    - Location E-Code
    - Injury Time
    - Injury City
    - Injury Zip Code
    - Facility Name for Transfers
- COMPLETENESS = **96%***(6818/7100)*
- **EXCELLENT** COMPLETENESS of the data entered.

PART III: *ACCURACY OF DATA SUBMITTED*

To ensure that data entered in the database accurately reflects the information found in the patient's medical record, a medical record review is conducted as part of the site visit. Randomly selected medical records are compared with their corresponding TPS forms and the data found in TEMIS.

ACCURACY RATING

- Number of core mandatory fields reviewed = 11,250
- Number of core field discrepancies identified = 126
- ACCURACY = **99%**
- **EXCELLENT** correlation between TPS form, medical record, and data entered.

EMS SYSTEM DATA AUDIT REPORT **ATTACHMENT V**

REVIEW PERIOD: January 1, 2013 through December 31, 2013

PART I: ***TIMELINESS OF DATA SUBMITTED***

- Total number of EMS records for the review period = 606,712
- Number of EMS records submitted late (>75 days after incident)= 524,696
- Overall compliance with **TIMELINESS=** (524,696/606,712)= **14%**

PART II: ***COMPLETENESS OF DATA SUBMITTED***

In order to maintain a useful and reliable database, the number of fields with null values *(Blank, Not Applicable, and Not Documented)* must be kept at a minimum. *At least* ninety (90) percent of all mandatory fields should contain valid data. All time data fields were reviewed (see table below) - fields with less than 90% valid data are shown in **boldprint**.

INCIDENT LOCATION FIELDS	# Applicable records	# Valid	% Valid
Incident Street Number - Blank=100,172 - Not Documented=60,231 - Not Applicable=2,102	606,712	444,207	**73**
Incident Street Name - Blank=99,431 - Not Documented=9,628	606,712	497,653	**82**
Incident City - Blank=831 - Not Documented=294 - Not Applicable=1	606,712	605,586	99
Incident Zip - Blank=98,464 - Not Documented=137,653 - Not Applicable=7 - Invalid Entry=1,084	606,712	369,504	**61**
Latitude/Longitude - Blank=139,370 - Invalid Entry=57,604	606,712	409,738	**68**

EMS SYSTEM DATA AUDIT REPORT **ATTACHMENT V**

DATE/TIME FIELDS	# Applicable records	# Valid	% Valid
Dispatch Date - Blank=23 - Not Documented=2 - Not Applicable=8	606,712	599,936	99
Dispatch Time - Blank=12 - Not Documented=266 - Not Applicable=23	606,712	595,497	98
Arrival Date - Blank=19 - Not Documented=316 - Not Applicable=35	606,712	563,148	93
Arrival Time - Blank=23 - Not Documented=273 - Not Applicable=42	606,712	579,178	95
At Patient Date - Blank=8 - Not Documented=1110 - Not Applicable=314	606,712	490,312	**81**
At Patient Time - Blank=137 - Not Documented=1111 - Not Applicable=339	606,712	513,673	**85**
Left Date - Blank=129 - Not Documented=4769 - Not Applicable=48	606,712	605,394	99
Left Time - Blank=129 - Not Documented=4757 - Not Applicable=32	606,712	605,573	99
At Facility Date - Blank=251 - Not Documented=9685 - Not Applicable=61	606,712	496,148	**82**
At Facility Time - Blank=255 - Not Documented=9657 - Not Applicable=45	606,712	527,839	**87**
EMS Unit Available Date - Blank=449 - Not Documented=22762 - Not Applicable=518	606,712	104,902	**17**
EMS Unit Available Time - Blank=450 - Not Documented=739 - Not Applicable=528	606,712	360,726	**59**

SUMMARY: Overall compliance for **COMPLETENESS = 81%**

PART III: *ACCURACY OF TIME FIELDS*

Calculated Time Field	# Applicable records	# Valid	% Valid
Dispatch Time to Scene Arrival Time - Blank=38,436 - >1 hr< 2 hrs=1,613 - ≥ 2 hrs - < 3 hrs=582 - Invalid (> 3hrs)=3,946	606,712	562,135	93
Dispatch Time to At Patient Time - Blank=121,135 - >1 hr< 2 hrs=1,403 - ≥ 2 hrs - < 3 hrs=1,082 - Invalid (> 3hrs)=16,594	606,712	466,498	**77**
Arrival Time to At Patient Time - Blank= 122,447 - >1 hr< 2 hrs= 669 - ≥ 2 hrs - < 3 hrs= 669 - Invalid (> 3hrs)=272,146	606,712	210,781	**35**
At Patient to Left Time - Blank = 333,057 - >1 hr< 2 hrs= 1,064 - ≥ 2 hrs - < 3 hrs = 278 - Invalid (> 3 hrs) = 2,407	606,712	269,906	**44**
Arrival Time to Left Time - Blank=34 - >1 hr< 2 hrs=1,218 - ≥ 2 hrs - < 3 hrs= 226 - Invalid (> 3hrs) = 5167	606,712	596,859	98
Left Time to At Facility Time - Blank = 1,210 - >1 hr< 2 hrs= 610 - ≥ 2 hrs - < 3 hrs= 380 - Invalid (> 3hrs)= 1,568	606,712	602,952	99
At Facility Time to Available Time - Blank = 111,314 - >1 hr< 2 hrs= 5,180 - ≥ 2 hrs - < 3 hrs = 492 - Invalid (> 3hrs)= 517	606,712	489,209	**81**

SUMMARY: Overall **ACCURACY OF TIME FIELDS = 75%**

SUBJECT: TRAUMA TRIAGE **REFERENCE NO. 506**

PURPOSE: To establish criteria and standards which ensure that patients requiring the care of a trauma center are appropriately triaged and transported.

AUTHORITY: California Code of Regulations, Title 13, Section 1105(c) California Code of Regulations, Title 22, Section 100236 et seq. Health and Safety Code, Div. 2.5, Section 1797 et seq., and 1317.

PRINCIPLES:

1. Trauma patients should be secured and transported from the scene as quickly as possible, consistent with optimal trauma care.

2. An emergency patient should be transported to the most accessible medical facility appropriate to their needs. The base hospital physician's determination in this regard is controlling.

3. Paramedics shall make base hospital contact or Standing Field Treatment Protocol (SFTP) notification for approved provider agencies with the designated trauma center, when it is also a base hospital, on all injured patients who meet Base Contact and Transport Criteria (Prehospital Care Policy, Ref. No. 808), trauma triage criteria and/or guidelines, or if in the paramedic's judgment it is in the patient's best interest to be transported to a trauma center. Contact shall be accomplished in such a way as not to delay transport.

4. Do not delay transport of hypotensive patients with penetrating torso trauma in order to apply spinal immobilization.

5. EMT personnel may immediately transport hypotensive patients with life-threatening, penetrating injuries to the torso to the closest trauma center, not the Most Accessible Receiving (MAR), when the transport time is less than the estimated time of paramedic arrival. The transporting unit should make every effort to contact the receiving trauma center.

6. When pediatric and adult trauma patients are transported together in one aircraft, the receiving trauma center shall also be a pediatric trauma center.

7. Patients in blunt traumatic full arrest, not meeting Reference No. 814, should be transported to the most accessible medical facility appropriate to their needs.

POLICY:

I. Trauma Criteria – Requires immediate transportation to a designated trauma center.

Patients who fall into one or more of the following categories are to be transported directly to the designated trauma center, if transport time does not exceed 30 minutes.

A. Systolic blood pressure less than 90 mmHg, or less than 70 mmHg in infants age less than one year.

B. Respiratory rate greater than 29 breaths/minute (sustained), less than 10 breaths/minute, less than 20 breaths/minute in infants age less than one year, or requiring ventilatory support

C. Cardiopulmonary arrest with penetrating torso trauma unless based upon the paramedic's thorough assessment is found apneic, pulseless, asystolic, and without pupillary reflexes upon arrival of EMS personnel at the scene.

D. All penetrating injuries to head, neck, torso, and extremities proximal to the elbow or knee

E. Blunt head injury associated with a suspected skull fracture, altered level of consciousness (GCS less than or equal to 14), seizures, unequal pupils, or focal neurological deficit

F. Injury to the spinal column associated with acute sensory or motor deficit

G. Blunt injury to chest with unstable chest wall (flail chest)

H. Diffuse abdominal tenderness

I. Suspected pelvic fracture (excluding isolated hip fracture from a ground level fall)

J. Extremity injuries with:
   i. Neurological/vascular compromise and/or crushed, degloved, or mangled extremity
   ii. Amputation proximal to the wrist or ankle
   iii Fractures of two or more proximal (humerus/femur) long-bones

K. Falls:
   i. Adult patients from heights greater than 15 feet
   ii. Pediatric patients from heights greater than 10 feet, or greater than 3 times the height of the child

L. Passenger space intrusion of greater than 12 inches into an occupied passenger space

M. Ejected from vehicles (partial or complete)

N. Auto versus pedestrian/bicyclist/motorcyclist thrown, run over, or with significant (greater than 20 mph) impact

O. Unenclosed transport crash with significant (greater than 20 mph) impact

II. Trauma Guidelines – Mechanism of injury and patient history are the most effective methods of selecting critically injured patients before unstable vital signs develop. Paramedics and base hospital personnel should consider mechanism of injury and patient history when determining patient destination. At the discretion of the base hospital or approved SFTP provider agency, transportation to a trauma center is advisable for:

A. Passenger space intrusion of greater than 18 inches into any unoccupied passenger space

B. Automobile versus pedestrian/bicyclist/motorcyclist (impact equal to or less than 20 mph)

C. Injured victims of vehicular crashes in which a fatality occurred in the same vehicle

D. Patients requiring extrication

D. Vehicle telemetry data consistent with high risk of injury

E. Injured patients (excluding isolated minor extremity injuries):
   i. on anticoagulation therapy other than aspirin-only
   ii. with bleeding disorders

III. Special Considerations – Consider transporting injured patients with the following to a trauma center:

A. Adults age greater than 55 years

B. Systolic blood pressure less than 110 mmHg may represent shock after age 65 years

C. Pregnancy greater than 20 weeks gestation

D. Prehospital judgment

IV. Extremis Patients - Requires immediate transportation to the MAR:

A. Patients with an obstructed airway

B. Patients, as determined by the base hospital personnel, whose lives would be jeopardized by transportation to any destination but the MAR

V. When, for whatever reason, base hospital contact cannot be made, the destination decision for injured patients will be made by paramedics using the principles set forth above.

CROSS REFERENCE:

Prehospital Care Manual:
Ref. No. 501, **Hospital Directory**
Ref. No. 502, **Patient Destination**
Ref. No. 503, **Guidelines for Hospitals Requesting Diversion of ALS Units**
Ref. No. 504, **Trauma Patient Destination**
Ref. No. 808, **Base Hospital Contact and Transport Criteria**
Ref. No. 814, **Determination/Pronouncement of Death in the Field**