Published in final edited form as:

J Trauma Acute Care Surg. 2013 July ; 75(1): 44–49. doi:10.1097/TA.0b013e3182988729.

AMERICAN COLLEGE OF SURGEONS TRAUMA CENTER VERIFICATION VERSUS STATE DESIGNATION: ARE LEVEL II CENTERS SLIPPING THROUGH THE CRACKS?

Joshua B. Brown, MD, Gregory A. Watson, MD, Raquel M. Forsythe, MD, Louis H. Alarcon, MD, Graciela Bauza, MD, Alan D. Murdock, MD, Timothy R. Billiar, MD, Andrew B. Peitzman, MD, and Jason L. Sperry, MD, MPH

Division of General Surgery and Trauma, Department of Surgery, University of Pittsburgh Medical Center

Abstract

Objectives—Single center experience has shown that American College of Surgeons (ACS) trauma verification can improve outcomes. The current objective was to compare mortality between ACS verified and State designated centers in a national sample.

Methods—Subjects 16yr from ACS verified or State designated level I and II centers were identified in the NTDB 2007–08. A predictive mortality model was constructed using TQIP methodology. Imputation was used for missing data. Probability of mortality in the model determined expected deaths. Observed to expected (O/E) mortality ratios with 90%CI and outliers (90%CI above or below 1.0) were compared across ACS and State level I and II centers. The mortality model was repeated with ACS vs. State included.

Results—There were 900,274 subjects. The model had an AUC of 0.92 to predict death. Level I ACS centers had a lower median O/E ratio than State (0.95 [IQR 0.82–1.05] vs 1.02 [0.87–1.15], $p<0.01$), with no difference in level II centers. Level II State centers had more high O/E outliers (Table). ACS verification was an independent predictor of survival in level II centers (OR 1.26; 95%CI 1.20–1.32, $p<0.01$), but not in level I centers ($p=0.84$).

Conclusions—Level II centers have a disproportionate number of high mortality outliers and ACS verification is a predictor of survival. Level I ACS centers have lower O/E ratios overall but no difference in outliers. ACS verification appears beneficial. This data suggests that level II centers benefit most, and promoting level II ACS verification may be an opportunity for improved outcomes.

Level of Evidence: III

Keywords

verification; American College of Surgeons; mortality ratios

Correspondence and Reprints: Jason L. Sperry, MD, MPH, Division of Trauma and General Surgery, Department of Surgery, University of Pittsburgh Medical Center, 200 Lothrop Street, Pittsburgh, PA 15213, Phone: (412) 692-2850, Fax: (412) 647-1448, sperryjl@upmc.edu.

This paper was presented as an oral presentation at the annual meeting of the Eastern Association for the Surgery of Trauma in Phoenix, AZ, Jan 11th–15th, 2013.

Introduction

Development of trauma systems has become a priority since the recognition of serious deficiencies in the care of injured patients nearly fifty years ago.¹ Several landmark studies subsequently demonstrated dramatic improvements in outcomes after regionalization of trauma care.²⁻⁵ Shortly thereafter the American College of Surgeons (ACS) began offering trauma center verification based on criteria set forth in the Resources for the Optimal Care of the Injured Patient.^{6, 7} More recent data consistently support the benefits realized from maturing trauma systems in the United States,⁸⁻¹³ and the ACS continues to refine the verification criteria and process.¹⁴

The process of obtaining trauma center verification is rigorous and demands significant financial and resource support from hospitals.^{15, 16} The ACS verification process is considered by many to be the highest attainable standard by a trauma center. Trauma system development has occurred primarily at the state level, and most have legislation that designates trauma centers within the state network of hospitals. This includes standards for center designation, which are often modeled after ACS verification criteria, however regional variation in designation standards make benchmarking difficult across centers.¹⁷

ACS verification among trauma centers has been supported by single center experience demonstrating improvements in outcomes and efficiency with achievement of ACS verification.^{9, 18-20} The ACS is currently in the process of moving toward outcome evaluation a part of the verification process.²¹ To date, however; little evidence is available characterizing differences in outcomes for trauma centers that attain ACS verification compared to those that operate with state designation only.

The study objective was to evaluate differences in mortality for ACS verified trauma centers as compared to state designated trauma centers without ACS verification from a national perspective. The study hypothesis was that ACS verification would improve mortality on a larger scale when compared with state only designated centers.

Patients and Methods

The National Trauma Databank (NTDB) from 2007 to 2008 was queried for all patients 16 years old admitted to an ACS verified level I or level II trauma center, or a state designated level I or level II trauma center that did not attain ACS verification. Centers that were both state designated and ACS verified were analyzed as ACS verified centers. Demographics, injury characteristics, and outcomes were collected. To address missing data, multiple imputation was performed for age, injury severity score (ISS), initial systolic blood pressure (SBP), heart rate (HR), Glasgow Coma Score (GCS) motor component, head abbreviated injury score (AIS), and abdominal AIS. Multiple imputation using a fully conditional specification model based on available demographics, prehospital and admission physiology, and injury characteristics with a successive impute and predict algorithm for each imputed variable and predict algorithm for non-imputed variables was performed using a single imputation step to develop a complete dataset.

To obtain expected mortality for calculation of observed to expected (O/E) mortality ratios, a predictive mortality model was developed using a previously published model from the Trauma Quality Improvement Project (TQIP).²² Covariates utilized in the model (Table 1) were entered into a forward stepwise logistic regression model with a threshold for covariate entry of $p < 0.2$. The model was evaluated for accuracy in predicting mortality using receiver operating characteristic (ROC) area under the curve (AUC) calculation and the omnibus test of model coefficients. A probability of death between 0 and 1 was calculated for each subject based on the model. The probability of mortality was summed across all patients at

individual trauma centers to derive an expected number of deaths for each included center. The actual number of deaths at each center was then divided by the expected number of deaths to obtain an O/E mortality ratio for each center. A 90% confidence interval (CI) was calculated for each O/E ratio based on a Poisson distribution for observed to expected deaths described by Ulm.²³ Outlier centers were identified using the O/E ratio and 90% CI. High outliers, or poor performers, were defined as centers with an O/E ratio and 90% CI entirely greater than 1. Low outliers, or good performers, were defined as centers with an O/E ratio and 90% CI entirely less than 1.

The main outcomes of interest included median O/E ratios and proportions of high and low outliers. These outcomes were compared between ACS verified and state designated trauma centers. Finally, the stepwise logistic regression model described above was repeated with the addition of trauma center type (ACS versus state) included as a covariate to determine if ACS verification or state designation was independently associated with survival. These comparisons were performed separately in level I and level II trauma centers.

Data analysis was conducted using SAS JMP version 7 (SAS institute; Cary, NC) and SPSS version 19 (IBM; Chicago, IL). For univariate analyses Chi-square tests were used to compare categorical variables, and Mann-Whitney tests to compare continuous variables. Continuous data are presented as median (interquartile range [IQR]) or mean±standard deviation. A p value of 0.05 was considered significant.

Results

The NTDB contained 900,274 subjects meeting inclusion criteria. Table 2 describes the characteristics of the overall study population. Among the mortality prediction model covariates that were imputed, GCS motor score was missing in 10%, SBP in 5%, ISS in 4%, age in 4%, HR in 6%, mechanism in 7%, head AIS in 4%, abdominal AIS in <1%, and transfer status in 1% of patients. These subjects were treated at 246 ACS verified centers and 128 state designated centers. Table 3 describes the characteristics of the included facilities.

The logistic regression model demonstrated an ROC AUC of 0.92 to predict mortality, indicating excellent discrimination. The omnibus test for model coefficients was highly significant ($p<0.0001$), indicating the covariates accounted for a significant amount of variation in mortality.

When comparing O/E ratios between level I centers, ACS verified centers as a group had a lower median O/E ratio than state designated centers (0.95 [IQR 0.82 – 1.05] vs. 1.02 [0.87 – 1.15], $p<0.01$). There was no difference in median O/E ratios between ACS verified and state designated level II trauma centers (0.94 [0.81 – 1.06] vs. 0.87 [0.71 – 1.09], $p=0.30$).

Among level I centers (Fig. 1), there was no difference between ACS verified centers and state designated centers in low O/E ratio outliers (28% vs. 16%, $p=0.10$) or high O/E ratio outliers (15% vs. 24%, $p=0.16$). Among level II centers (Fig. 2), there was no difference between ACS verified centers and state designated centers in low O/E ratio outliers (23% vs. 21%, $p=0.57$). Level II state designated centers had a significantly higher proportion of high O/E ratio outliers than ACS verified centers (13% vs. 4%; odds ratio [OR] 3.59; 95% CI 1.12 – 11.50, $p=0.03$).

Logistic regression analysis demonstrated ACS verification was an independent predictor of survival for level II centers (OR 1.26; 95% CI 1.20 – 1.32, $p<0.01$). ACS verification versus state designation was not associated with survival in level I centers (OR 1.00; 95% CI 0.97 – 1.04, $p=0.84$).

Discussion

Regionalized trauma systems have brought dramatic improvements in the care of injured patients.^{2, 3, 5} The ACS has taken a leadership role in promoting and setting standards for trauma system development. The U.S. Department of Health and Human Services has provided support for development and ongoing reassessment of state-based efforts in trauma system development.²⁴ In 2005, thirty-eight states had legislated authority to designate trauma centers and thirty-four used some modification of the ACS criteria for trauma center verification to designate trauma centers.²⁵ Nine additional states without legislated trauma systems utilize ACS verification for trauma centers.

ACS verification is the most rigorous and comprehensive process, serving as a model in many state based systems. It not only outlines the resources and capabilities that are required, but also delineates research, educational, and leadership responsibilities.¹⁴ Some authors have shown that the financial commitment to achieve ACS verification may be as high as \$3million per year in the process.¹⁶ Moreover, cost analysis demonstrates that federal and state funding is important to maintaining the financial viability of a trauma center.²⁶ Thus it is not surprising that many hospitals opt not to pursue ACS verification if designated by the state as a trauma center. Accordingly, a 2003 national survey of trauma centers demonstrated that 53% of level I centers and 70% of level II centers were state designated without ACS verification, while only 25% of level I centers and 19% of level II centers underwent ACS verification when already designated by the state.²⁷

Despite this, evidence persists demonstrating a variety of benefits for hospitals achieving ACS trauma center verification. Demetriades and colleagues examined the NTDB to determine the impact of ACS verification and level on outcomes in severe injury (ISS>15).⁹ The authors examined 130,154 patients from 256 trauma centers over ten years. A significant increase in mortality was noted for non-verified centers when compared to ACS verified level I centers in multivariate analysis after controlling for demographics, injury severity and specific injury patterns.

Maggio et al reported their experience as a previously ACS verified level I trauma center that failed to meet re-verification criteria in 2001.²⁰ The trauma program undertook staff and programmatic changes to achieve ACS verification two years later. The authors studied outcomes and cost effectiveness over the six-year period following their unsuccessful re-verification visit. They demonstrated a 15% reduction in mortality for severely injured patients (ISS>24) and improvements in a variety of performance measures. They also demonstrated a significant financial improvement from net financial loss in the early study period to record profits at the end of the study. They note this was not achieved by cost reduction measures, but increasing volume and optimizing hospital capacity and resources.

A study by Piontek and colleagues reported on outcomes and costs while achieving ACS level II verification.¹⁹ The authors used internal and external controls to validate the results and mitigate potential effects that may be seen as medical and trauma care improves over time. They demonstrated after achieving ACS verification a 22% reduction in severity adjusted O/E mortality ratios. Further, they noted a post-verification 10% decrease in length of stay (LOS), 10% decrease in readmissions, and 5% reduction in overall trauma costs despite increased workforce expenditures. The authors did not see similar improvements using the internal and external controls, concluding ACS level II verification had a significant benefit for both patients and the hospital.

DiRusso et al took the unique opportunity to study performance, outcomes, and cost in a state designated level I trauma center after achieving ACS level I verification.¹⁸ The authors compared pre and post verification data, demonstrating a small but significant reduction in

overall trauma mortality and 17% reduction in mortality for severely injury patients (ISS>30). They also noted a significant decrease in LOS with an estimated cost reduction of \$4,000 per trauma patient after accounting for increased staffing costs. Finally, a reduction in post-injury complications was seen as well. The authors conclude that achieving ACS verification even in an already state designated trauma center had beneficial effects on patient care and outcomes.

The results of the current study are consistent with prior work. When examining level I centers, ACS verified centers as a group had a lower median O/E ratio. There was no difference in either high or low outlier centers, however. This suggests that overall, ACS verification may have some benefit to level I centers, as suggested by DiRusso and colleagues,¹⁸ however there is not excessive variation of very high or low performing centers when compared with state designated centers. This is also demonstrated by the narrow IQR for O/E ratios in level I centers. ACS verification versus State designation was not associated with a difference in survival when added to the mortality prediction model, a similar finding reported by Smith and colleagues in an investigation of level I ACS verified compared to state designated centers.²⁸ The authors examined an earlier version of the NTDB, finding no difference in overall adjusted mortality, but a lower acute respiratory distress syndrome associated mortality for ACS verified centers.

For level II centers, there was no difference when comparing median O/E ratios in ACS verified and state designated centers. There were a significantly higher proportion of high O/E ratio outliers representing poor performers among state designated level II centers when compared to ACS verified level II centers. This suggests more variation among level II centers, evidenced by larger IQR of O/E ratios in level II centers, particularly for state designated centers. Finally, among level II centers, ACS verification was independently associated with a 26% increase in the odds of survival when compared with state designated centers.

These findings may occur for several reasons. State designated level I trauma centers serve as the flagship of the regional trauma system. It is likely that even without ACS verification, a rigorous set of criteria, standards, and regular review is in place for level I centers that reduces variation across state designated and ACS verified centers when examined as a group. Further, large level I centers despite state designation or ACS verification are the most likely to attract surgeons and practitioners with particular interest in trauma care, education, and research. Dedicated staff with a commitment to trauma likely prevent large level I centers for having significantly poor performance and slipping into a low performer category. Moreover, large state designated level I centers often have a significant commitment from hospital leadership to maintain the trauma program regardless of ACS verification.

This may not be the case for state designated level II centers. The surgeons and staff taking care of injury patients may not be dedicated trauma surgeons or practitioners and a significant administrative commitment to trauma may be lacking in some cases. Unless ACS verification in a level II center is supported and sought by the staff and hospital administration, a lower level of commitment may result in significant variation and the higher proportion of high O/E outliers seen. The active commitment among ACS verified level II centers may play a role in the association with increased survival seen in multivariate analysis. This is certainly not to say on an individual basis that level II state designated centers lack commitment to injured patients, as there are certainly low O/E outliers representing high performing centers in this group. However it appears that variation in outcomes is higher among this group of centers, representing an opportunity for improvement.

It is not clear from the current data why ACS verification had a beneficial effect on outcome. This may be particularly puzzling as ACS verification criteria frequently form the basis for designation in state trauma systems. Prior work suggests that the rigorous performance improvement program required under ACS verification may underlie some of the benefit realized with ACS verification.^{13, 20} Additionally, as ACS verification is a voluntary process, pursuing this verification represents a level of commitment from the practitioners and hospital to trauma that drives performance and outcome improvement as mentioned above. Some suggest that variations in process of care drive variation in outcomes.²¹ The current analysis demonstrated that ACS verified centers appeared to have less variation in O/E ratios as a group among both level I and II centers, and ACS verified centers attention to improving process of care measures may also contribute to the improved outcomes seen here. ACS verification in this setting likely represents a consistent level of care delivered in comparison to a wide variety of standards among state trauma systems, and can potentially drive outliers towards excellent patient care.

This study has several limitations for consideration. First are those inherent to a retrospective design. Second are those outlined by American College of Surgeons Committee on Trauma for use of the NTDB.²⁹ The advantage of the NTDB is access to a large number of patients in a national sample; however the caveat is the limited number of variables accessible for analysis. This limits the type of data that can be used to control for potential confounders, as well as the outcomes that can be examined. This may affect the covariates available for the mortality prediction model; however the model did perform well to discriminate mortality. The study population is limited to those centers that report data to the NTDB which over represents ACS verified centers, as NTDB participation is a requirement for ACS verification. However, those state centers that do report to the NTDB may have more stringent standards and represent a higher performing group of state designated centers. Thus, the observed differences between ACS verified and state designated centers seen in this study may actually be smaller with fewer outliers than if state designated centers that do not report to the NTDB were captured. Further, the NTDB does not contain data that allows evaluation of process of care measures or other factors that might drive the variation in outcomes. Finally, the heterogeneity of the data at the national level requires careful application in individual trauma systems.

In conclusion, this study demonstrates that ACS verification when compared to state designation only appears to be beneficial for outcomes in trauma patients. Level I ACS verified centers as a group have lower O/E mortality ratios than state designated centers. Level II centers seem to benefit most from ACS verification, as state designated centers have significantly more poor performing outliers. ACS verification was also associated with improved survival in level II centers. Further study is warranted to establish what factors underlying ACS verification drive this phenomenon. Promoting ACS verification among level II trauma centers may represent an opportunity for improved outcomes in select trauma systems.

Acknowledgments

Funding/Support: NIH NIGMS K23GM093032.

References

1. National Academy of Sciences, National Research Council. Accidental Death and Disability: The Neglected Disease of Modern Society. The National Academies Press; 1966.
2. West JG, Trunkey DD, Lim RC. Systems of trauma care: A study of two counties. Arch Surg. 1979; 114:455–460. [PubMed: 435058]

3. West JG, Cales RH, Gazzaniga AB. Impact of regionalization: The Orange County experience. *Arch Surg.* 1983; 118:740–744. [PubMed: 6847371]
4. Maull KI, Schwab CW, McHenry SD, Leavy P, Carl L, Woo P, Overholt S, Sinclair T, Aprahamian C. Trauma center verification. *J Trauma Acute Care Surg.* 1986; 26:521–524.
5. Shackford SR, Hollingworth-Fridlund P, Cooper GF, Eastman AB. The effect of regionalization upon the quality of trauma care as assessed by concurrent audit before and after institution of a trauma system: A preliminary report. *J Trauma Acute Care Surg.* 1986; 26:812–820.
6. American College of Surgeons Committee on Trauma. Optimal hospital resources for care of the seriously injured. *Bull Am Coll Surg.* 1976; 61:15–22.
7. American College of Surgeons Committee on Trauma. Resources for optimal care of the injured patient: an update. Task Force of the Committee on Trauma, American College of Surgeons. *Bull Am Coll Surg.* 1990; 75:20–29.
8. Sampalis JS, Denis R, Lavoie A, Frechette P, Boukas S, Nikolis A, Benoit D, Fleischer D, Brown R, Churchill-Smith M, et al. Trauma Care Regionalization: A Process-Outcome Evaluation. *J Trauma Acute Care Surg.* 1999; 46:565–581.
9. Demetriades D, Martin M, Salim A, Rhee P, Brown C, Doucet J, Chan L. Relationship between American College of Surgeons trauma center designation and mortality in patients with severe trauma (injury severity score > 15). *J Am Coll Surg.* 2006; 202:212–215. quiz A245. [PubMed: 16427544]
10. Durham R, Pracht E, Orban B, Lottenburg L, Tepas J, Flint L. Evaluation of a mature trauma system. *Ann Surg.* 2006; 243:775–783. discussion 783–775. [PubMed: 16772781]
11. 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. *NEJM.* 2006; 354:366–378. [PubMed: 16436768]
12. Haas B, Stukel TA, Gomez D, Zagorski B, De Mestral C, Sharma SV, Rubenfeld GD, Nathens AB. The mortality benefit of direct trauma center transport in a regional trauma system: a population-based analysis. *J Trauma Acute Care Surg.* 2012; 72:1510–1515. discussion 1515–1517. [PubMed: 22695414]
13. Ehrlich PF, McClellan WT, Wesson DE. Monitoring performance: longterm impact of trauma verification and review. *J Am Coll Surg.* 2005; 200:166–172. [PubMed: 15664089]
14. American College of Surgeons Committee on Trauma. Resources for optimal care of the injured patient. Chicago, IL: American College of Surgeons; 2006.
15. Goldfarb MGB, Gloria J, Coffey, Rosanna M. Trauma systems and the costs of trauma care. *Health Serv Res.* 1996;71–95. [PubMed: 8617611]
16. Rotondo MF, Bard MR, Sagraves SG, Toschlog EA, Schenarts PJ, Goettler CE, Newell MA, Robertson MJ. What price commitment: what benefit? The cost of a saved life in a developing level I trauma center. *J Trauma Acute Care Surg.* 2009; 67:915–923.
17. Nathens AB, Xiong W, Shafi S. Ranking of trauma center performance: the bare essentials. *J Trauma Acute Care Surg.* 2008; 65:628–635.
18. DiRusso, S.; Holly, C.; Kamath, R.; Cuff, S.; Sullivan, T.; Scharf, H.; Tully, T.; Nealon, P.; Savino, JA. Preparation and achievement of American College of Surgeons Level I trauma verification raises hospital performance and improves patient outcome. 2001.
19. Piontek FA, Coscia R, Marselle CS, Korn RL, Zarling EJ. Impact of American College of Surgeons verification on trauma outcomes. *J Trauma Acute Care Surg.* 2003; 54:1041–1046. discussion 1046–1047.
20. Maggio PM, Brundage SI, Hernandez-Boussard T, Spain DA. Commitment to COT verification improves patient outcomes and financial performance. *J Trauma Acute Care Surg.* 2009; 67:190–194. discussion 194–195.
21. Shafi S, Rayan N, Barnes S, Fleming N, Gentilello LM, Ballard D. Moving from “optimal resources” to “optimal care” at trauma centers. *J Trauma Acute Care Surg.* 2012; 72:870–877. [PubMed: 22491598]
22. Hemmila MR, Nathens AB, Shafi S, Calland JF, Clark DE, Cryer HG, Goble S, Hoeft CJ, Meredith JW, Neal ML, et al. The Trauma Quality Improvement Program: pilot study and initial demonstration of feasibility. *J Trauma Acute Care Surg.* 2010; 68:253–262.

23. Ulm K. A simple method to calculate the confidence interval of a standardized mortality ratio (SMR). *Am J Epidemiol.* 1990; 131:373–375. [PubMed: 2296988]
24. Health Resources and Services Administration. Trauma-EMS systems program. Model trauma system planning and evaluation. 2006
25. Mann NC, MacKenzie E, Teitelbaum SD, Wright D, Anderson C. Trauma System Structure and Viability in the Current Healthcare Environment: A State-by-State Assessment. *J Trauma Acute Care Surg.* 2005; 58:136–147.
26. Selzer D, Gomez G, Jacobson L, Wischmeyer T, Sood RTB. Public hospital-based level I trauma centers: Financial survival in the new millennium. *J Trauma Acute Care Surg.* 2001; 51:301–307.
27. MacKenzie EJ, Hoyt DB, Sacra JC, Jurkovich GJ, Carlini AR, Teitelbaum SDHT. National inventory of hospital trauma centers. *JAMA.* 2003; 289:1515–1522. [PubMed: 12672768]
28. Smith J, Plurad D, Inaba K, Talving P, Lam L, Demetriades D. Are all level I trauma centers created equal? A comparison of American College of Surgeons and state-verified centers. *Am Surg.* 2011; 77:1334–1336. [PubMed: 22127082]
29. American College of Surgeons Committee on Trauma. National Trauma Databank User Manual: NTDB Research data set admission year 2008. Feb. 2010

Figure 1.

Risk adjusted observed to expected mortality ratios for ACS verified and state designated level I trauma centers. Each entry represents a single trauma center, ordered by ascending O/E ratio. Bars represent 90% confidence intervals. Centers with 90% CI completely below an O/E ratio of one (red line) represent low outliers while those completely above one represent high outliers

Figure 2.

Risk adjusted observed to expected mortality ratios for ACS verified and state designated level II trauma centers. Each entry represents a single trauma center, ordered by ascending O/E ratio. Bars represent 90% confidence intervals. Centers with 90% CI completely below an O/E ratio of one (red line) represent low outliers while those completely above one represent high outliers

Table 1

Covariate levels used for mortality prediction model

Covariate	Levels
Initial GCS motor	1
	2 – 5
	6
Initial SBP	0 mmHg
	1 – 90 mmHg
	> 90 mmHg
ISS	1–8
	9–24
	> 24
Age	16 – 65 years old
	> 65 years old
Initial HR	0 – 40 bpm
	>40 bpm
Mechanism	Firearm injury
	Any other mechanism
Head AIS	No injury
	1–2
	3–4
	5–6
Abdominal AIS	No injury
	1–2
	3–4
	5–6
Transfer status	Scene
	Transfer

Table 2

Study population characteristics

Age	42 (26 – 54)
Male sex (%)	66
ISS	9 (4 – 14)
Head AIS	0 (0 – 1)
Abdomen AIS	0 (0 – 1)
Firearm mechanism (%)	5
SBP	137±29
HR	89±22
GCS motor	6 (5 – 6)
Scene transport (%)	76

Table 3

Trauma center facility characteristics

	Level I N = 189	Level II N = 185
Trauma center type (%)		
ACS verified	65	67
ACS only	17	13
ACS + State	48	54
State designated	35	33
Bed size (%)		
200	3	9
201–400	20	55
401–600	37	28
> 600	40	8
ICU beds (mean±SD)	29±24	23±14
Teaching status (%)		
University	74	12
Community	24	62
Non-teaching	2	26
Profit status (%)		
Non profit	92	92
For profit	6	6
Not applicable	2	2