Influence of In-House Attending Presence on Trauma Outcomes and Hospital Efficiency

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BACKGROUND: The influence of in-house (IH) attendings on trauma patient survival and efficiency measures, such as emergency department length of stay (LOS), ICU LOS, and hospital LOS, has been debated for more than 20 years. No study has definitively shown improved outcomes with IH vs home-call attendings. This study examines trauma outcomes in a single, Level I trauma center before and after the institution of IH attending call.

STUDY DESIGN: Patient data were collected from the University of Kentucky's trauma registry. Based on the Trauma-Related Injury Severity Score, survival rates were compared between the IH and home-call groups. To evaluate efficiency, emergency department LOS, ICU LOS, and hospital LOS were compared. A separate subanalysis for the most severely injured patients (trauma alert red) was also performed.

RESULTS: The home-call group (n = 4,804) was younger (p = 0.018) and had a higher Injury Severity Score (p = 0.003) than the IH group (n = 5259), but there was no difference in Trauma-Related Injury Severity Score (p = 0.205) between groups. In-house attending presence did not reduce mortality. Emergency department LOS, ICU LOS, and hospital LOS were shorter during the IH period. Emergency department to operating room time was not different. There was no change in trauma alert red mortality with an attending present (20.7% vs 18.2%, p = 0.198).

CONCLUSIONS: In-house attending presence does not improve trauma patient survival. For the most severely injured patients, attendings presence does not reduce mortality. In-house coverage can improve hospital efficiency by decreasing emergency department LOS, hospital LOS, and ICU LOS. (J Am Coll Surg 2014;218:734–740. © 2014 by the American College of Surgeons)

Organized trauma systems and designated trauma centers result in timely patient care and reductions in mortality.[1] The influence of in-house (IH) attendings on trauma patient survival and efficiency has been debated for more than 20 years. Early studies demonstrated that IH coverage improved mortality for the most severely injured patients.[2,3] Consequently, the American College of Surgeons Committee on Trauma (ACS COT) Level I designation now requires attending presence within 15 minutes of patient arrival for the highest level of alert.[4] For large urban centers, where attending faculty live some distance from the hospital, this effectively resulted in a mandate for IH attending coverage. Many trauma centers now routinely include a designated IH attending physician as part of the initial resuscitation team.

A number of studies support that IH attendings improve efficiency measures, such as faster decisions, fewer errors, decreased time to disposition, and reductions in hospital stay.[5-8] Does an IH attending improve survival? Twenty years of research have failed to show a meaningful reduction in overall mortality.[1-8] This retrospective study compares trauma patient outcomes and hospital efficiency before and after the institution of IH attending call at a mature, ACS-verified Level I trauma center serving the central and southeastern regions of Kentucky. We hypothesize that there will be no difference in patient mortality between groups.

METHODS

Institutional Review Board approval was obtained. The trauma database was queried for patients 16 years of

Disclosure Information: Nothing to disclose.

Presented at the Southern Surgical Association 125th Annual Meeting, Hot Springs, VA, December 2013.

Received December 6, 2013; Accepted December 10, 2013.

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ISSN 1072-7515/13/$36.00
http://dx.doi.org/10.1016/j.jamcollsurg.2013.12.027

Abbreviations and Acronyms

ACS COT = American College of Surgeons Committee on Trauma
IH = in-house
ISS = Injury Severity Score
LOS = length of stay
OH = home-call
OR = operating room
TAR = trauma alert red
TRISS = Trauma-Related Injury Severity Score

age or older admitted during two 21-month periods: the home-call (OH) attending period from July 1, 2009 to March 31, 2011 and the IH attending period from July 1, 2011 to March 31, 2013. The 2 groups represent seasonally matched periods before and after implementation of IH attending coverage on our trauma service in May 2011.

Patient characteristics of age, sex, Injury Severity Score (ISS) and Trauma-Related Injury Severity Score (TRISS) were compared between the 2 periods. Emergency department (ED) length of stay (LOS), time from ED to the operating room (OR), ICU and hospital LOS, and mortality were compared between groups.

A subanalysis was performed on the most severely injured patients, trauma alert red (TAR), examining efficiency measures and mortality. Additionally, percentage of TAR with the attending present within 15 minutes was included.

Using quality-assurance data required for ACS Level I designation, preventable, potentially preventable, and non-preventable deaths were compared for the 2 time periods.

Univariate comparisons were performed using Fisher's exact tests for binary variables, *t* tests for continuous normally distributed variables, and Mann-Whitney U tests for non-normal continuous variables. Multivariable logistic regression analyzed the risk of death between the 2 periods with adjustment for age, ISS, sex, and TRISS. Multivariable linear regression was performed on the natural log transformed for ICU LOS and hospital LOS between the 2 periods with similar adjustment. Significance was set at $p < 0.05$ for all statistical tests. SPSS software (version 21; IBM Corp.) was used for all analyses.

RESULTS

A total of 10,099 patients were seen, 4,804 in the OH period and 5,295 during the IH period. Volume increased by 10.2% in the IH period. Patient characteristics are shown for the 2 groups in Table 1. The groups are well matched with respect to number, age, sex, and injury severity. Mean age was higher ($p = 0.018$) and ISS lower ($p = 0.003$) for the IH attending group. The TRISS scores were not statistically different between groups.

In-house vs OH attending coverage outcomes are compared in Table 2. Emergency department LOS and ICU LOS were shorter for the IH attending group ($p < 0.001$). Median hospital LOS was the same (3 days), but the IH period was 13% shorter when adjusted for long-stay outliers ($p < 0.001$). Fewer patients went to the OR (19.2% vs 23.8%; $p < 0.001$) in the IH group and more were admitted to the ICU (23.4% vs 20.5%; $p < 0.001$). Intensive care unit LOS was 27% shorter in the IH attending group ($p < 0.001$). Time from the ED to the OR was the same in both groups. There was no statistically significant reduction in mortality rates (5.3% vs 5.9%; $p = 0.177$) between the 2 periods (odds ratio = 0.87; 95% CI, 0.69−1.09; $p = 0.224$).

Demographics for the subanalysis of TAR patients are presented in Table 3. Trauma alert red increased in the IH period from 14.2% to 17.0% of total trauma patients. Age and sex were not statistically different. Both the ISS ($p = 0.009$) and TRISS ($p = 0.022$) were higher for the IH group.

Trauma alert red outcomes are displayed in Table 4. Timely attending presence increased from 51.2% to 87.8% ($p < 0.001$) in the IH group. Emergency department LOS and ICU LOS were shorter in the IH group ($p < 0.001$ and $p = 0.002$, respectively). Hospital LOS was the same. In the IH group, fewer patients went to the OR (28.5% vs 37.6%; $p < 0.001$) and more were admitted to the ICU (62.2% vs 52.8%; $p < 0.001$). Time to OR was shorter when the attending was present ($p = 0.012$). After

Table 1. All Trauma Patient Demographics

Patient demographics	OH attendings, July 2009 to March 2011	IH attendings, July 2011 to March 2013	p Value
Patients, n	4,804	5,295 (+10.2%)	
% Male	65.7	63.9	0.058
Age, y, mean (SD)	44.0 (19.4)	45.0 (19.7)	0.018
ISS, median (IQR)	9 (5−17)	9 (4−16)	0.003
TRISS, median (IQR)	0.993 (0.972−0.997)	0.993 (0.970−0.997)	0.205
% TAR	14.2	17.0	<0.001

IH, in-house; ISS, Injury Severity Score; IQR, interquartile range; OH, home-call; TAR, trauma alert red; TRISS, Trauma-Related Injury Severity Score.