Analysis of Outcomes: Post-operative management of truncal GSW at Level I versus Level II trauma centers

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Disclosure Statement

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Background

- Implementation of ACS and state-wide trauma verification programs

- Level I vs Level II
  - Severe TBI treated at LI had significantly higher rates of survival
  - PTOS 15% lower odds of mortality, 35% increased odds of complication
  - North Carolina study showed similar rates of mortality
Background

♦ What about GSW victims?

♦ **Objective:** Determine if there is difference in outcomes of GSW management based on trauma center designation.

♦ **Hypothesis:** There would be a difference between Level I and II trauma centers with respect to mortality and complications following intervention for truncal GSW because of low volume of GSW managed at Level II centers.
Methods

- The Pennsylvania Trauma Outcome Study database was retrospectively queried from 2003-2015 and all adult (age ≥18) admitted with a firearm-related injury to an accredited Level I or II trauma center in Pennsylvania were included.

- Dead on arrival, transfer, and cases with a head Abbreviated Injury Scale (AIS) score ≥3 were excluded.

- The specific population of interest included all patients with truncal injuries (thorax AIS and/or abdomen AIS≥3).
Methods

- The data points collected from the PTOS included:
  - Patient demographics; injury classification; shock index; motor Glasgow Coma Scale [GCS]; accreditation level of the treating trauma center; length of stay; complications; any major surgery; and, discharge disposition

- No changes or modifications in the criteria for classification of GSW, or other variables of interest, were noted over the period of the study.
Methods

- Patients were stratified based on the trauma center accreditation level: Level I and Level II.

- Univariate analysis using Kruskal-Wallis and Fischer’s exact tests were performed on continuous and categorical variables, respectively.

- Multilevel mixed-effects logistic regression models assessed the adjusted impact of trauma center level (Level I) on overall mortality and complications.
Results

- 385,689 adult patients presenting to Pennsylvania Level I or II, 17,465 firearm-related injuries were identified.

- 4,761 met inclusion criteria and were treated at a Level I (3,949) or a Level II (812) trauma centers.

- Of note, gunshot wounds to the abdomen that received non-operative management represented 1.29% at Level I and 0.62% at Level II centers of cases included in the study (p=0.094).
Results

- The age of both cohorts was similar ($p=0.004$); those treated at Level I centers had a mean age of $29.6 \pm 12.1$ years when compared to the mean age of $30.9 \pm 12.2$ years of those treated at Level II centers.

- Males represented a significantly ($p<0.001$) predominant portion of the population at both Level I (93.4%) and Level II (88.4%) centers.
Results

- Unadjusted mortality rate was not different between the two trauma center levels (Level I: 16.8%; Level II: 14.2%; p=0.063).

- Adjusted analysis did not reveal any significant differences between both center levels for mortality, AOR 1.113, p=0.630.
Results

- The unadjusted complication rate was significantly higher at Level I centers (Level I: 35.6%; Level II: 29.4%; \( p=0.001 \)).

- In adjusted analysis, there was a trend toward higher complications following surgical intervention at Level I centers, AOR 1.360, \( p=0.060 \), respectively.
Results

- Level I centers were associated with a 2.9 (p<0.001) odds of post-surgical complications and 3.7 (p<0.001) odds of mortality following major surgery.

- Level II centers were associated with a 4.1 (p<0.001) odds ratio of post-surgical complications and a 39.8 (p=0.002) odds ratio of mortality following major surgery.
## Results

- **Adjusted odds ratios (AOR) for mortality and complications**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mortality AOR (95% CI)</th>
<th>p</th>
<th>Complications AOR (95% CI)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>1.113 [0.721-1.717]</td>
<td>0.630</td>
<td>1.360 [0.987-1.873]</td>
<td>0.060</td>
</tr>
<tr>
<td>Major surgery</td>
<td>4.571 [2.942-7.100]</td>
<td>&lt;0.001</td>
<td>3.094 [2.584-3.705]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Age</td>
<td>1.024 [1.015-1.033]</td>
<td>0.019</td>
<td>1.017 [1.011-1.023]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ISS</td>
<td>1.058 [1.049-1.067]</td>
<td>&lt;0.001</td>
<td>1.026 [1.019-1.032]</td>
<td>&lt;0.001</td>
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<tr>
<td>Motor GCS</td>
<td>0.673 [0.635-0.712]</td>
<td>&lt;0.001</td>
<td>0.971 [0.925-1.019]</td>
<td>0.225</td>
</tr>
</tbody>
</table>

**AUROC:**

- Mortality: 0.863
- Complications: 0.692

*Adjusted for male sex, shock index and injury year
Conclusion

- The effect of trauma center level on mortality is not significant.

- There is a trend toward higher odds of complication associated with level I centers potentially related to more severely injured patients being managed at these facilities.
References
