Prehospital Prediction of the Severity of Blunt Anatomic Injury

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**Objectives:** To evaluate the ability of paramedics to predict patients requiring a major trauma service. To assess whether paramedic prediction of severity of injury to individual body regions is accurate and could add to overall paramedic prediction of injury severity.

**Methods:** Helicopter paramedics in Victoria prospectively recorded the severity of injury to the head, thoracic, and abdomen regions, and whether the patient required a major trauma service, for primary response adult (>15 years) trauma patients. Paramedic predictions of injuries were compared with patient outcomes. Major trauma was defined as death in hospital; an Injury Severity Score >15; intensive care unit admission >24 hours; and urgent surgery. A severe anatomic injury was defined as an Abbreviated Injury Scale severity ≥3. The sensitivity, specificity, positive predictive value, and negative predictive value were calculated.

**Results:** Two hundred and seven patients were enrolled in the study, with 62.3% defined as major trauma. The sensitivity of paramedic predictions ranged from 57.6 (95% confidence interval [CI]; 45.4–68.9) for the head to 38.5 (95% CI; 22.1–57.9) for the abdomen. Specificities ranged from 98.3 (95% CI; 93.5–99.6) for the thorax to 93.5 (95% CI; 87.9–96.6) for the head region. The sensitivity and specificity of paramedic predictions of a major trauma status were 97.7 (95% CI; 93–99.2) and 28.2 (95% CI; 19.3–39.1), respectively. The paramedics correctly categorized all patients who were admitted to an intensive care unit, required urgent surgery or died in hospital as major trauma.

**Conclusions:** Paramedics were unable to reliably identify severe injury to individual body regions. Sensitivity of paramedic judgment of major trauma status was high. Assessment of the severity of injury to individual body regions did not appear to improve accuracy.

**Key Words:** Prehospital triage, Blunt trauma, Major trauma, Trauma system, Injury severity.

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has found that the anatomic criteria (Abbreviated Injury Scale [AIS] ≥4) were highly predictive of the need for intensive care unit (ICU) admission and mortality, the validity of these blunt anatomic criteria has not been verified prospectively. If paramedics were able to accurately identify the anatomic injury patterns requiring a major trauma service, then this could substantially improve triage performance. The current study evaluated the ability of experienced helicopter paramedics to identify severe anatomic injuries to the head, thoracic, and abdominal regions, and to judge overall injury severity.

**PATIENTS AND METHODS**

**Setting**

The State of Victoria covers an area of 276,000 km² with a population of over 5 million, of which 73% live in the metropolitan area of Melbourne. The state operates a regionalized trauma system with three major trauma services (MTS) (two adult, one pediatric) all located in central Melbourne. Air Ambulance Victoria operates fixed and rotary wing services, providing primary response (direct transfer from the incident scene) or a secondary transfer to a specialist facility for...
trauma, medical, and surgical emergencies. There are three helicopter services strategically located around the state. The helicopters typically operate within a radius of approximately 150 km of their respective bases.

**Paramedics**

The helicopter services in Victoria are staffed by one paramedic, a pilot, and air crewman. Helicopter paramedics are required to complete a 3-year undergraduate degree, a 1-year postgraduate qualification, followed by a further postgraduate qualification in aeromedical medicine.

Helicopter paramedics are trained in infusion of fluids (including blood), the establishment of arterial lines for interhospital transfers, intubation including rapid sequence intubation, decompression of tension-pneumothoraces, surgical cricothyroidotomy, and mechanical ventilation including the use of paralyzing agents for the intubated patient. They carry a range of drugs for pain relief, resuscitation, and the management of life threatening cardiac, respiratory, and medical emergencies.

**Study Design**

A prospective validation study was undertaken to investigate the ability of helicopter paramedics to identify severe anatomic injuries to the head, thorax, and abdomen, and a patient’s overall injury severity.

**Patients**

All primary response trauma patients >15 years transported to an adult MTS, between August 2004 and April 2005 were eligible for inclusion. Isolated burns injuries were excluded. However if the burn injury was as a result of blunt trauma, such as a motor vehicle crash where the vehicle caught fire, the patient was included. Relevant Institutional review boards approved the study.

**Data Collection**

Paramedics completed a separate data collection form when completing their patient care record. Paramedics were asked to record whether the patient had a mild, moderate, severe, or no injury to the head (including face, neck, and cervical spine), thoracic, abdomen or pelvic contents, and pelvic girdle regions. To evaluate their judgment of overall injury severity for a MTS, irrespective of operational practices and logistical reasons to transport to a MTS, paramedics recorded whether the patient status was considered as: minor (does not require a MTS), moderate (the patient’s injuries or illness in combination with other factors, suggest the patient requires a MTS), severe (the patient’s injuries or illness clearly indicate the patient requires a MTS). The data collection form was designed to minimize impact on their normal operations to ensure compliance with the study. Paramedics attended a briefing before the study to familiarize them with the objectives and procedures for the study. Additional data were obtained from the patient care record. Patient outcome details were obtained from the trauma registries at the two adult MTS hospitals. For this study, the definition of major trauma was the presence of at least one of the following criteria: an Injury Severity Score (ISS) >15; ICU admission >24 hours; urgent surgery for intracranial, intrathoracic, or intra-abdominal injury, or for fixation of pelvic or spinal fractures; or death after hospital admission. A severe anatomic injury was defined as an AIS severity of ≥3. Paramedic predictions of no injury, minor, or moderate for an anatomic region were considered to be an AIS ≤2 severity.

**Data Analysis**

Confidence intervals (95%) were calculated for sensitivity, specificity, positive predictive value (PPV), and negative predictive value using logistic regression techniques. Variables were summarized using proportions for categorical variables and medians and interquartile ranges for continuous variables when comparing groups. Categorical variables were analyzed using χ² tests, whereas continuous variables were assessed using Wilcoxon rank-sum tests. All statistical analyses were performed using Stata (Stata Statistical Software Release 8.0, Stata Corporation, College Station, TX).

**RESULTS**

The helicopter paramedics enrolled 207 patients in the study. Of these, 129 (62.3%) were classified at hospital discharge as major trauma patients. The profile of the study population is shown in Table 1. Motor vehicle crashes were the predominant cause of injury (49.3%) followed by motorcycle or cyclists (23.2%). Blunt injury was the most common injury type (96.1%), with only 8 (3.9%) sustaining penetrating injury types. The prehospital times (time from incident occurrence to arrival at hospital) ranged from 43 minutes to 33 hours (remote injury site) (median 1.3 hours). The predominance of high force mechanisms, high ISSs, and long prehospital times reflects the nature of trauma cases and the geography of the system serviced by the helicopter services.

The performance of the physiologic criteria of the prehospital Trauma Triage Guidelines and the Triage-Revised Trauma Score (T-RTS) as predictors of major trauma is shown in Table 2.

**Overall Injury Severity Prediction and Major Trauma Status**

The sensitivity, specificity, PPV, and negative predictive value results for the paramedic prediction of a patient’s major trauma status are shown in Table 3. Paramedic assessment of overall injury severity identified all patients who required ICU admission, urgent surgery, or died as a result of their injuries. The patients under-triaged by paramedics (n = 3, 2.3%) were defined as major trauma solely by the criteria of an ISS >15 (range 17–26). The over-triage rate by the paramedics was 72% (n = 56). Of the patients over-triaged, 68% (n = 38) satisfied the prehospital triage guidelines mandating direct transfer to a MTS.
Paramedic Prediction of Severe Anatomic Injury

The results of the paramedic anatomic injury severity predictions are shown in Table 4. Patients who died in the emergency department and where insufficient investigations were undertaken to identify the full extent of their anatomic injuries (n=6) were excluded from the evaluation of the paramedic’s anatomic predictions, as postmortem records were not available for these cases before the completion of the study.

### Table 1 Profile of Patients Enrolled by Helicopter Paramedics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male: 150 (72.5), Female: 57 (27.5)</td>
</tr>
<tr>
<td>Age (yr), median (range)</td>
<td>36 (16–83)</td>
</tr>
<tr>
<td>Injury Severity Score, median (range)</td>
<td>17 (1–75)</td>
</tr>
<tr>
<td>TRISS(^{*}) probability of survival, median (range)</td>
<td>98.3 (1.6–99.7)</td>
</tr>
<tr>
<td>Revised Trauma Score, median (range)</td>
<td>7.8 (3.2–7.8)</td>
</tr>
<tr>
<td>Mechanism of injury, n (%)</td>
<td>Ejection from vehicle: 27 (13.0), Motor or cyclist &gt;30 kph: 48 (23.2), Fall &gt;3 m: 13 (6.3), MCA &gt;60 kph: 102 (49.3), Vehicle rollover: 24 (11.6), Fatality in same vehicle: 6 (2.9), Pedestrian: 10 (4.8), Entrapment (extrication &gt;30 min): 44 (21.3), Other mechanism: 30 (14.5)</td>
</tr>
<tr>
<td>Major trauma outcomes criterion, n (%)</td>
<td>Inhospital death: 13 (6.4), ICU admission &gt;24 h: 78 (37.7), Urgent surgery: 64 (30.9), ISS &gt;15: 111 (53.6), One or more of above criteria: 129 (62.3)</td>
</tr>
<tr>
<td>Discharge disposition,(^{1}) n (%)</td>
<td>Home: 93 (44.9), Rehabilitation facility: 69 (33.3), Other hospital: 30 (14.5), Death: 13 (6.4), Hospital length of stay (d), median (range): 8 (0–69)</td>
</tr>
</tbody>
</table>

\(^{*}\) Trauma and Injury Severity Score.  
\(^{1}\) Two patients were still in hospital at the completion of the project.

### Table 2 Performance of Prehospital Triage Physiological Criteria and T-RTS

<table>
<thead>
<tr>
<th>Physiologic Criteria</th>
<th>Sensitivity (% (95% CI))</th>
<th>Specificity (% (95% CI))</th>
<th>PPV (%) (95% CI)</th>
<th>NPV (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate &lt; 50 &gt; 100</td>
<td>52.7 (44.1–61.2)</td>
<td>75.6 (64.9–83.9)</td>
<td>78.2 (68.3–85.6)</td>
<td>49.2 (40.3–58.0)</td>
</tr>
<tr>
<td>Systolic blood pressure &lt; 100 mm Hg</td>
<td>41.1 (32.9–49.8)</td>
<td>84.6 (74.8–91.1)</td>
<td>81.5 (70.2–89.2)</td>
<td>46.5 (38.4–54.7)</td>
</tr>
<tr>
<td>Respiratory rate &lt; 8 &gt; 20</td>
<td>50.8 (42.1–59.4)</td>
<td>70.5 (59.5–79.6)</td>
<td>73.6 (63.3–81.8)</td>
<td>47.0 (38.2–56.1)</td>
</tr>
<tr>
<td>Glasgow Coma Score &lt; 13</td>
<td>43.4 (35.1–52.1)</td>
<td>98.7 (91.5–99.8)</td>
<td>98.2 (88.6–99.8)</td>
<td>51.3 (43.4–59.2)</td>
</tr>
<tr>
<td>Oxygen Saturation &lt; 90%</td>
<td>10.5 (6.1–17.6)</td>
<td>100.0</td>
<td>100.0</td>
<td>43.3 (36.3–50.7)</td>
</tr>
<tr>
<td>Combination*</td>
<td>85.3 (78.1–90.4)</td>
<td>47.4 (36.7–58.5)</td>
<td>72.8 (65.2–79.3)</td>
<td>66.1 (52.8–77.2)</td>
</tr>
<tr>
<td>T-RTS</td>
<td>31.0 (23.3–40)</td>
<td>100.0</td>
<td>100.0</td>
<td>49.4 (41.6–57.1)</td>
</tr>
</tbody>
</table>

\(^{*}\) Combination includes one or more of: heart rate < 50 > 100; BP < 100 mm Hg; respiratory rate < 8 > 20; GCS < 13; SaO\(_2\) < 90%.

Applying a cutpoint of AIS \(\geq 3\) to correspond to the paramedic severe prediction, resulted in a sensitivity of 57.6% for the head region, 44.7% for the thorax and 38.5% for the abdomen. When a cutpoint of AIS \(\geq 4\) was applied to correspond to the paramedic’s prediction of severe, there was an improvement for head injury sensitivity (79.4%); however, the improvement was only marginal for the thoracic and abdomen regions (Table 4). The prehospital physiologic criteria associated with paramedics correctly identifying a severe anatomic injury (AIS \(\geq 3\), \(p < 0.05\)), was a systolic blood pressure of < 100 mm Hg for all regions and a Glasgow Coma Score (GCS) < 13 for the head region only.

### DISCUSSION

Paramedics were not able to accurately identify the severity of injuries to individual anatomic regions. Estimating the severity of injury to individual body regions does not seem to be a useful method for improving accuracy of prehospital triage of trauma patients. Prehospital prediction of patients likely to require a major trauma service by paramedics based on global injury severity assessment, proved to be highly sensitive method, with only 3 (2.3%) patients “under-triaged.”

Several other studies have found paramedic judgment to be an accurate triage method to identify severe injury.\(^{2,12,14,17}\) Fries et al., using a resource based definition for outcome measures, found sensitivity of paramedic judgment was better than the Trauma Triage Rule\(^{21}\) and their system’s triage criteria, but was less specific at determining minor trauma (sensitivity 91%, specificity 60%).\(^{12}\) Emerman et al. found paramedic judgment, the Circulation, Respiration, Abdomen, Motor, Speech scale, Prehospital Index, and the T-RTS performed similarly when compared using receiver operating curve analysis for patients who required an emergent operation for general or neurosurgery within 2 hours of emergency department arrival or died.\(^{2}\) Simmons et al. evaluated their system specific triage criteria and whether paramedic injury severity perception adds to the triage performance. Using the outcome measures of urgent surgery within 6 hours, ICU admission within 3 days, an ISS \(> 15\) and death, they found paramedics classified more patients requiring a trauma center than criteria independent of paramedic prediction (sensitivity 87%, specificity 73%).\(^{17}\) Lyle et al., using an ISS \(> 15\) and death to define major trauma, found paramedics successfully
triaged patients (sensitivity 77%, specificity 95%) according to their system triage guidelines.14

In contrast to our findings, a number of studies found that paramedic judgment was an inferior method to other criteria for identifying injury severity.10,11,13,16

The conflicting results related to paramedic judgment may be caused by differences in the trauma populations studied, emergency medical service and trauma systems, research methodologies, and outcome measures. There are a number of different definitions for evaluating trauma triage methods, with no consensus on a gold standard.2,11–13

Using the ISS as the sole measure to define major trauma has been found to have limitations for identifying some patients who require the specialist resources of a major trauma service.22 Similarly different definitions of ICU admission1,2,17 and urgent surgery were applied, where urgent surgery has been shown to exclude a number of patients in comparable studies.3 Applying the range of criteria (ISS >15, ICU >24 hours, urgent surgery, and death) in this study, captured patients who required the specialist services provided by a MTS. The fact that the three patients under-triaged were identified on the basis of an ISS may indicate a problem with the score rather than paramedic judgment.

In our study, 17 (12%) patients who were admitted to ICU >24 hours or had urgent surgery had an ISS <15 or both. Paramedics in our study correctly identified all patients admitted to ICU for >24 hours, all patients requiring urgent surgery, and all deaths after admission to hospital as major trauma. Although an ISS <15 suggests a low risk of death, a major trauma service may benefit some patients, particularly those that require ICU services, urgent surgery, or other expertise specific to a major trauma service.

Under-Triage and Over-Triage

A certain amount of over-triage is unavoidable, with 5% to 15% of patients involved in high energy mechanisms having severe injuries despite no physiologic distress or apparent anatomic injury pattern.24 The American College of Surgeons1 suggest an over-triage rate of 50% to attain an acceptable level of under-triage; however, studies have reported over-triage rates up to 90%.5,11,14,25–30 A trade-off exists between criteria offering high sensitivity with a low PPV and vice versa.5,10,30 The inability of prehospital trauma triage criteria to identify both major and minor trauma with acceptable accuracy, has been attributed to the type and limitations of the clinical data they are derived from.14,29,31

In Victoria, the trauma triage guidelines form the basis of paramedic decision-making processes and may in part have influenced their judgment of injury severity. The trauma triage guidelines classify physiologic abnormalities and anatomic injuries as major trauma for the purposes of prehospital triage, mandating patients with these criteria as requiring a MTS. Anatomic injury patterns include penetrating head and torso injuries, significant isolated blunt head and torso injuries, and lesser blunt injuries to two regions involving the torso injuries, significant isolated blunt head and torso injuries, and lesser blunt injuries to two regions involving the head and torso (Fig. 1). A review of the cases over-triaged found 38 (68% of cases over-triaged) satisfied the criteria for triage to a MTS, with either a physiologic derangement, or a mechanism associated with age, or specific injuries such as a penetrating head or thoracic wound or limb amputation. In comparison with the performance of the physiologic criteria of the triage guidelines and the T-RTS <11 (Table 2), paramedics were significantly more accurate at identifying a major trauma status.

Table 3 Paramedic Prediction of Major Trauma Status

<table>
<thead>
<tr>
<th>Major Trauma Status Defined by:</th>
<th>Sensitivity (%) (95% CI)</th>
<th>Specificity (%) (95% CI)</th>
<th>PPV (%) (95% CI)</th>
<th>NPV (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury Severity Score &gt;15</td>
<td>97.3 (92.0–99.1)</td>
<td>23.2 (15.8–32.7)</td>
<td>59.7 (52.4–66.6)</td>
<td>88.0 (68.7–96.1)</td>
</tr>
<tr>
<td>Intensive Care Unit stay &gt;24 h</td>
<td>100.0</td>
<td>19.4 (13.4–27.1)</td>
<td>42.9 (35.9–50.1)</td>
<td>100.0</td>
</tr>
<tr>
<td>Urgent surgery</td>
<td>100.0</td>
<td>17.5 (12.1–24.6)</td>
<td>35.2 (28.6–42.4)</td>
<td>100.0</td>
</tr>
<tr>
<td>Death</td>
<td>100.0</td>
<td>13.2 (9.0–18.7)</td>
<td>7.3 (4.3–12.2)</td>
<td>100.0</td>
</tr>
<tr>
<td>Major Trauma†</td>
<td>97.7 (93.0–99.2)</td>
<td>28.2 (19.3–39.1)</td>
<td>69.2 (62.2–75.5)</td>
<td>88.0 (68.7–96.1)</td>
</tr>
<tr>
<td>Major Trauma††</td>
<td>100.0</td>
<td>22.7 (15.8–31.5)</td>
<td>53.3 (46.0–60.4)</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* Major trauma if any of: ISS >15; ICU >24 h; urgent surgery; death.
† Major trauma if any of: ICU >24 h; urgent surgery; death (excludes ISS >15).

Table 4 Paramedic Prediction of Anatomic Injury Severity

<table>
<thead>
<tr>
<th>Injury Region</th>
<th>Sensitivity (%) (95% CI)</th>
<th>Specificity (%) (95% CI)</th>
<th>PPV (%) (95% CI)</th>
<th>NPV (%) (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIS ≥3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>57.6 (45.4–68.9)</td>
<td>93.5 (87.9–96.6)</td>
<td>80.9 (67.1–89.7)</td>
<td>82.2 (75.3–87.4)</td>
</tr>
<tr>
<td>Thoracic</td>
<td>44.7 (34.5–55.4)</td>
<td>98.3 (93.5–99.6)</td>
<td>95.0 (82.1–98.7)</td>
<td>71.3 (64.0–77.7)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>38.5 (22.1–57.9)</td>
<td>96.0 (91.9–98.1)</td>
<td>58.5 (35.2–79.0)</td>
<td>91.4 (86.3–94.6)</td>
</tr>
<tr>
<td>AIS ≥4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>79.4 (62.7–89.9)</td>
<td>88.2 (82.5–92.3)</td>
<td>57.4 (43.1–70.6)</td>
<td>95.5 (90.9–97.9)</td>
</tr>
<tr>
<td>Thoracic</td>
<td>52.7 (39.6–65.4)</td>
<td>92.6 (87.2–95.9)</td>
<td>72.5 (56.8–84.1)</td>
<td>84.1 (77.7–89.0)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>44.4 (17.7–74.9)</td>
<td>93.3 (88.7–96.1)</td>
<td>23.5 (9.1–48.6)</td>
<td>97.3 (93.7–98.9)</td>
</tr>
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</table>

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Anatomic Injury Pattern and Severity Prediction

This is the first study to our knowledge that has evaluated the ability of paramedics to identify severe injury to specific anatomic regions (head, thorax, and abdomen) in the field. This study does not support the use of blunt injury patterns to anatomic regions to assist in prehospital triage. Paramedics were unable to identify a number of severe injuries when a cutoff of AIS ≥3 was applied for the head, thoracic, and abdominal regions. However, their ability to identify more severe injuries improved when a cutoff of AIS ≥4 was applied, particularly for the head region.

Prehospital injury identification by anatomic region as a result of blunt trauma is notoriously difficult.6,9 Factors such as altered consciousness, intoxicated or drug affected patients or both, clothing, weather conditions, poor light,9 and the competing demands of multiple injuries, patients, and the transport expediency of the major trauma patient, are some of the issues facing paramedics in assessing and managing the trauma patient in the prehospital environment. Definitive diagnosis requires complex radiology, pathology results, and sometimes surgical exploration by experienced clinicians, and can still result in a number of clinically significant missed injuries.32,33

The clinical presentation of anatomic injuries is often time dependent, which may or may not be evident in the prehospital environment. It is possible for clinical identification of abdominal visceral injuries to be delayed after an initial unremarkable hospital examination.34 Predicting thoracic injury severity is also complicated, with 10% to 15% of patients with internal organ injuries having no associated chest wall injury.35 In a study evaluating the prehospital triage of head injuries directly to a neurosurgical center, a number of patients (69, 84% of transfers) who subsequently required secondary transfer for neurosurgical admission or operative intervention either failed to meet the direct triage criteria of a head injury and a GCS <14 and a Prehospital Index >3, or they had no history of a head injury according to the prehospital record.36 In situations where anatomic injury severity is not clearly evident or confounded by other significant or distracting injuries, predicting severe anatomic injury is likely to be based on suspicion related to the causative mechanism. High suspicion of injury is employed as a method of triage in some systems with reported rates of 60% over-triage.37

Paramedics in the current study were best able to identify severe head injuries. Prehospital assessment of head injury severity is based on the neurologic examination of the patient, with the GCS score used by prehospital personnel as a common tool for assessing neurologic status.27,38,39 A prehospital GCS <14 demonstrated a sensitivity of 62% and specificity of 89% for identifying AIS ≥4 head injuries.40 In this study, the paramedic prediction of severe head injuries was associated with a GCS <13. Paramedic prediction of severe injuries in all regions were associated with a systolic blood pressure <100 mm Hg. These findings are consistent with two studies3,17 that also found paramedic injury severity predictions tend to be associated with neurologic status (GCS score) and decreased blood pressure. In contrast, paramedics were least able to identify severe abdominal injuries in the current study. Potentially, the identification of abdominal injuries could be improved by the use of focused abdominal sonography for trauma examination in the prehospital environment.41,42

Limitations

There are a number of limitations to this study. The population of trauma patients in the study had a higher prevalence of major trauma patients (62.3%) than general trauma populations. The helicopter services are specifically targeted for the transport of patients exhibiting a high potential for major trauma such as high force mechanisms where transport times by road are likely to exceed 30 minutes. Helicopter paramedics are a more experienced and qualified paramedic group, who are exposed to a higher proportion of severely injured and complicated medical conditions than road ambulance paramedics. It is unlikely that paramedics with less exposure to major trauma would be any better at predicting severe anatomic injuries. Paramedic prediction of injury severity was based on the clinical assessment of the patient; however, helicopter dispatches are often secondary to road ambulance responses. On occasion, patients may be extricated and packaged by road paramedics for immediate transfer by helicopter to a MTS. In these circumstances, the helicopter paramedic is required to interpret the likely injury patterns from the first paramedics on scene, which may limit a full appreciation of the causative mechanisms and likely injury patterns.

CONCLUSIONS

This study found that prehospital prediction of severe anatomic injuries to the head, thoracic, and abdominal regions by helicopter paramedics did not assist in the triage of patients with severe injuries to a major trauma service. The ability to judge overall injury severity was highly sensitive even when physiologic derangement and overtly severe injuries to specific body regions were not present.

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