Injury, Int. J. Care Injured (2005) **36**, 1298–1305

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# Is paramedic judgement useful in prehospital trauma triage?

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Accepted 14 July 2005

**KEYWORDS**
Paramedic;
Judgement;
Trauma;
Pre-hospital;
Injury severity;
Anatomic injury;
Trauma triage;
Major trauma status

**Summary** Precise prehospital trauma triage criteria are critical for ensuring patients with severe injuries are transported to trauma centres. Most prehospital trauma triage criteria adopt a combination of physiological, anatomic and mechanism of injury components, but this approach still fails to identify a number of patients with severe injuries and often burdens trauma centres with patients suffering minor injuries. Paramedic judgement has been identified as an alternative method for the triage of trauma patients. This study critically reviewed the literature regarding the ability of paramedics to predict injury severity, and found there is no clear evidence supporting paramedic judgement as an accurate triage method. However, the studies were limited due to significant data losses, variable definitions of major trauma, differences across EMS and trauma care systems, variable paramedic experience levels and incomparable methods of data collection. The role of paramedic judgement in identifying patients with severe blunt anatomic injuries requires further investigation.


## Introduction

Trauma systems have demonstrated their effectiveness for improving outcome for severely injured patients.[19,23,25] Effective trauma systems rely on accurate prehospital triage criteria to correctly identify trauma patients for transfer to an appropriate facility.[2,10] The majority of trauma deaths occur before reaching hospital or within four hours of the incident.[1] Therefore, it is essential that the triage criteria adopted deliver severely injured patients to the right hospital in the shortest possible time.[2,14]

Prehospital trauma triage criteria generally adopt a combination of physiological, anatomic

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doi:10.1016/j.injury.2005.07.010

and mechanism of injury components.[1,2,14] This approach is designed to capture all patients suitable for a trauma centre,[2,21,39] however often results in considerable overtriage, where minor trauma patients are triaged to trauma centres. There is also a substantial number of patients with severe injuries that are not identified.[8,34,40]

In order to identify prehospital criteria predictive of major trauma, a variety of triage tools and methods have been developed. Examples of triage tools include the trauma score (TS), revised trauma score (RTS), prehospital index (PHI), circulation, respiratory, abdomen, motor and speech scale (CRAMS),[5] Baxt trauma triage rule (TTR),[4] and Kane's checklist.[20] Whilst accurate for predicting mortality, these tools have been found to be poor predictors of survivors suffering major injuries.[5,11] Significantly, these tools fail to identify a number of patients with serious blunt injuries to the head, thoracic and abdominal regions who present with minimal physiological changes in the prehospital environment.[5,6,11,15,41]

Both the American College of Surgeons (ACS)[2] and the American College of Emergency Physicians (ACEP),[1] provide guidelines for the development of prehospital trauma triage algorithms based on physiological, anatomic, mechanism, age and comorbidity criteria. They also recommend these guidelines should be tailored to each particular trauma system's unique requirements, and evaluated to ensure optimal system performance.[1,2] The identification of blunt anatomical injuries in the prehospital setting is notoriously difficult,[9,24] however anatomic injury patterns are key predictors of major trauma.[9,16] If field personnel were able to accurately identify the anatomic injury patterns requiring a major trauma service, then this could substantially improve triage performance. Prehospital personnel are uniquely placed to fully appreciate the significance of the forces and mechanisms likely to cause such injuries, therefore the clinical judgement of paramedics as a factor in identifying anatomic injury patterns as a triage tool warrants exploration.[20]

This paper critically reviews the literature relating to paramedic judgement of the injury severity of trauma patients. The paper addresses three main issues: paramedic prediction of the severity of injury according to anatomical region; paramedic prediction of overall injury severity or major trauma status; and the performance of paramedic prediction as a triage method.

## Methods

A literature search of Medline (1951—May 2004), the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials (The Cochrane Library, Issue 2, 2004), CINAHL (1982—May 2004) and the Australian Directory of Pre-hospital Research (Monash University, Centre for Ambulance and Paramedic Studies) trauma database was conducted to identify relevant articles.

The following terms were used in various combinations to identify articles for this review: paramedic, prehospital, pre-hospital, ambulance, emergency medical systems, emergency medical service, flight-nurse, EMS, helicopter, judgment, judgement, triage, trauma triage, injury severity score, severity scores, ISS, anatomical criteria, prehospital index, injury severity, pattern of injury, systematic review, meta-analysis, trauma systems, validation study, trauma triage tools and major trauma.

Abstracts of relevant papers were reviewed and full text versions obtained. References of articles were screened for other relevant literature not identified by the electronic search. Systematic reviews and meta-analyses of paramedic judgement were preferentially considered. Studies were considered relevant to the objectives of this review if they assessed the ability of paramedics, or other providers of prehospital care (e.g. nurse, flight nurse, physician), to predict major trauma status, apply trauma triage criteria, and/or predict injury severity.

## Results

Twelve articles were identified that specifically evaluated paramedic judgement in relation to prehospital triage, with nine specifically evaluating paramedic judgement of injury severity or major trauma status. No systematic-reviews or meta-analyses were found that related to paramedic judgement of injury severity and prehospital trauma triage criteria. Table 1 summarises the studies and the results reported.

The findings of published studies investigating paramedic judgement of injury severity or need for a major trauma centre vary, with some authors describing paramedic judgement as a useful and accurate method,[10,15,22,37] whilst others have found their judgement to be a relatively poor indicator.[12,13,17,28] Ornato et al.[26] compared the TS, CRAMS scale and paramedic judgement, concluding that no method performed sufficiently accurately, however paramedics were better at identifying patients requiring surgical operations. Two studies evaluating paramedic triage decisions of all patients for a range of transport and disposition options, found that paramedics misclassify too many patients for this to be an adequate triage procedure.[27,36] Richards and Ferrall[30] found paramedics were accurate at