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Adherence with the pre-hospital triage protocol in the transport of injured patients in an urban setting

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ABSTRACT

Background: Pre-hospital triage protocols are an important component in the treatment of injured patients. The aim was to determine the level of, and factors associated with, adherence to the pre-hospital trauma triage criteria for urban patients transported in New South Wales, Australia.
Method: This retrospective study included patients injured in urban areas who were transported by road for the treatment of traumatic injuries in the period 1 July 2006 to 30 June 2007.
Results: Of the 57,775 transported to hospital due to traumatic injury, 9344 (16%) met one or more of the pre-hospital triage criteria. Of these, 74% were transported to a protocol adherent major or regional trauma centre. Adherence rates differed by triage criteria met and was lowest for patients meeting physiologic-only criteria (63.5%) and highest for patients meeting all three triage criteria of physiology, mechanism and injury (85.4%). Female gender, increasing patient age, patients classified as having had a fall, the qualification level of treating officer and patients transported between midday to 18:00 (relative to those transported between midnight to 06:00) were factors associated with significantly lower levels of protocol adherence with respect to hospital destination. Minimal time differences were evident between patients transported to protocol adherent and non-adherent destinations.
Conclusion: Based on the post hoc evaluation of triage status, adherence to the triage protocol was 74%. Analysis of patient destinations for protocol non-adherence appears to indicate that paramedic interpretation and discretion played a role in determining hospital choice. There was a marginal time difference between those transported to protocol adherent and non-adherent destinations. Future research needs to determine whether deviations from protocol are associated with differential mortality.
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Introduction

Pre-hospital triage involves the estimation of injury severity and the determination of the most appropriate health-care facility for the injured patient.[1,2] The American College of Surgeons Committee on Trauma (ACS-COT) published the first pre-hospital triage decision tree in 1986 which has since been revised on a number of occasions.[1,3–5]. Central to triage is the designation of hospital destinations based on both available resources and on expertise of hospital personnel with appropriate skills.[1]. The goal of pre-hospital triage is to ensure that the injured patient is appropriately matched to a hospital best able to provide the level of care required for the treatment of injuries sustained, and for patients to be transported in the shortest possible timeframe.[1,2]

The triage decision is based on anatomic, physiologic and high risk mechanism criteria, available resources, and time and distance factors to hospital. Generally, urban and rural patients follow different triage-transport protocols due to differences in distances to high level care facilities; for patients in urban areas, triage tools act as a bypass system of lower tier hospitals whilst for patients in rural settings inter-hospital transfer protocols are imperative.[1] The ACS-COT field triage has reportedly been adopted by many jurisdictions, largely without modification.[6,7] An important

Abbreviations: ACS-COT, American College of Surgeons Committee on Trauma; ASNSW, Ambulance Service of New South Wales; CAD, Computer Aided Dispatch; EMS, emergency medical services; GCS, Glasgow Coma Scale; GSW, gun-shot wound; HREC, Human Research Ethics Committee; I, injury triage criteria; M, mechanism triage criteria; MTC, Major Trauma Centre; P, physiology triage criteria; PHCR, Patient Health Care Record; RTC, Regional Trauma Service; SBP, systolic blood pressure; SSWAHS, Sydney South West Area Health Service.

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question is the level of adherence to field triage criteria by emergency medical services (EMS) personnel in the transport of the injured patient. Only a few studies have investigated adherence to pre-hospital triage protocols, with adherence rates ranging from 34% to 86% depending on the specific triage criteria examined.[6,8–13]

Ambulance Service of NSW (ASNSW) paramedics are required to adhere to numbered, prescriptive protocols; these are available electronically and are detailed in a pocket book carried by officers in the field. The pre-hospital trauma triage system, introduced in New South Wales (NSW) in 2001, included at its core the major trauma protocol which was termed Protocol 4 (P4). In 2007 P4 was updated and renamed Protocol T1. This update followed a re-evaluation of evidence available at the time regarding pre-hospital triage criteria and the operational performance of the ambulance service. As part of this process, and in realisation of the imperative to increasingly base clinical and operational practice on evidence, an assessment in relation to adherence by paramedics to P4 was undertaken. This paper describes the results of this assessment.

The pre-hospital major trauma triage protocol, 'P4', was activated when an injured patient met one or more physiologic, anatomic or mechanistic triage criteria (see Box 1). On receipt of a notification that the arrival of a P4 patient was imminent, a trauma team is to be assembled in the resuscitation area in order to provide simultaneous management of primary survey assessment and resuscitation and immediate definitive care where appropriate.[14–16] In urban NSW, activation of P4 specified the bypass of all hospitals in favour of a designated Major Trauma Centre (MTC) or Regional Trauma Centre (RTC).[14] Rural patients represent a special case due to the vast distances required to travel and follow a modified form of the protocol to include a preliminary protocol step[15,16]; as this paper is focused on urban patients this special case is not discussed further.

A fundamental question in the operation of the pre-hospital triage and the focus of this paper is, given that a patient satisfied P4 criteria in urban NSW, 'what proportion were transported to an appropriate, designated, centre as specified by P4 and in what time frame?' The aims of this paper are therefore to: (i) document the profile of EMS trauma callouts in this period; (ii) to examine the rate of paramedic adherence to the major trauma triage protocol; (iii) to determine predictors of failure of adherence to P4, and (iv) to examine differences, if any, in the time-to-care for those transported to trauma centres and those transported to alternative destinations.

Box 1. Protocol 4 (P4) pre-hospital trauma triage criteria.

Vital signs/physiology (P+)
Respiratory distress
Respiratory rate <10 or >30/min, or cyanosis
Systolic blood pressure (SBP)
SBP < 90 mmHg, or
No radial pulse in children
Conscious state
V – responsive to verbal stimuli
P – responsive to painful stimuli
U – unconscious
Injuries (I+)
Serious trauma to 'any' body region
Penetrating injury – head, neck, chest, abdomen, perineum, back
Head – dilated pupil(s), open head injury, severe facial injury
Chest – subcutaneous emphysema, major flail segment, crush
Abdomen – distension, rigidity, crush
Spinal – weakness, sensory loss
Major limb – amputation, crush, vascular injury with ischemia, bilateral femur fracture
Burns
Partial or full >20% TBSA in adults or >10% in children
Mechanism (M+)
Motor vehicle crash >60 km/h
Major deformation of the vehicle/airbag deployment
Fatal injury in same vehicle
Patient ejected from vehicle
Cyclist or pedestrian struck by vehicle ≥30 km/h
Fall from ≥3 m
Injuries to multiple body regions
IF PATIENT MEETS 1 OR MORE OF THE ABOVE, TRANSPORT TO MTC or RTC
If patient dying, transport to nearest hospital
IF none of P, I or M met, transport to nearest hospital

Materials and methods

Study participants

A retrospective evaluation of the ASNSW pre-hospital trauma triage protocol known as P4 was undertaken for those injured in the period 1 July 2006 to 30 June 2007. The ASNSW serves the population of NSW (6.89 million people with 4.34 million residing in the capital Sydney).[17] Officers within each of the six qualification levels (Level 1: trainee; Level 2: paramedic intern; Levels 3, 3c, 4: paramedic; Level 5: intensive care paramedic) receive the same training across the State.

Injured persons who sustained a traumatic injury and transported by road directly from the scene of injury to hospital with an urban area – and who met the P4 triage criteria, were the subject of analysis. Traumatic injury was defined as the primary diagnosis being burns, drowning, electrocution, blunt or penetrating trauma. Location was defined according to the rules governing P4, which denoted urban – rural status for each EMS crew base of operation. Fig. 1 presents the number of incidents that ASNSW responded to in the study period through to the selection of the 9344 injured patients of interest to this study.

Data sources

Two data sources were used: (1) the Patient Health Care Record (PHCR)[18] and (2) the Computer Aided Dispatch (CAD) database. Patient details in the PHCR database and the CAD database were linked by ASNSW Operational Information Unit specifically for this project. In linking the two data sources, only the first transport from the scene and hence, the first destination was considered.

The PHCR was completed by the treating officers for each patient and documents details of the incident, patient injuries and physiology, patient care, computer-based time-stamps manually recorded on the PHCR, and paramedic level and skills. There is a medical and legal obligation to complete the PHCR for every callout and adherence to this is mandatory. PHCR information is manually entered into the PHCR database by a number of trained coders and is used for the purposes of clinical governance, development and improvement of protocols and pharmacology use, research, activity data, revenue generation, external contracts and service planning.

The ASNSW uses the Medical Priority Dispatch System (MPDS®) and Primary Triage application (ProQA®) for the prioritisation of all emergency calls in NSW, and this is wholly integrated with the Computer Aided Dispatch (Tritech CAD) and Computer Telephony Integrated (CTI) phone systems. Data from this integrated system are referred to as CAD data. CAD data collected were: emergency medical response category or priority; nature of problem/incident; automatic time-stamps and location of operations centre assigning case. Data such as geo-coded location were collected via the mobile data terminal, which is also used to direct the crew to the hospital destination.

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