



Review

Does the use of dedicated dispatch criteria by Emergency Medical Services optimise appropriate allocation of advanced care resources in cases of high severity trauma? A systematic review



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ABSTRACT

Background and objectives: The deployment of Enhanced Care Teams (ECTs) capable of delivering advanced clinical interventions for patients at the scene of incidents is commonplace by Emergency Medical Services in most developed countries. It is unclear whether primary dispatch models for ECT resources are more efficient at targeting deployment to patients with severe trauma than secondary dispatch, following requests from EMS personnel at scene.

The objective of this study was to review the evidence for primary and secondary models in the targeted dispatch of ECT resources to patients with severe traumatic injury.

Methods: This review was completed in accordance with a protocol developed using the PRISMA guidelines. We conducted a search of the MEDLINE, EmBase, Web of Knowledge/Science databases and the Cochrane library, focussed on subject headings and keywords involving the dispatch of ECT resources by Emergency Medical Services. Design and results of each study were described. Heterogeneity in the design of the included studies precluded the completion of a meta-analysis. A narrative synthesis of the results therefore was performed.

Results: Five hundred and forty-eight articles were screened, and 16 were included. Only one study compared the performance of the different models of dispatch. A non-statistically significant reduction in the length of time for HEMS resources to reach incident scenes of 4 min was found when primary dispatch protocols were utilised compared to requests from EMS personnel at scene. No effect on mortality; severity of injury or proportion of patients admitted to intensive care was observed.

The remaining studies examined the processes utilised within current primary dispatch models but did not perform any comparative analysis with existing secondary dispatch models.

Conclusions: This review identifies a lack of evidence supporting the role of primary dispatch models in targeting the deployment of Enhanced Care Teams to patients with severe injuries. It is therefore not possible to identify a model for ECT dispatch within pre-hospital systems that optimises resource utilisation.

Further studies are required to assess the efficiency of systems utilised at each stage of the process used to dispatch Enhanced Care Team resources to incidents within regionalised pre-hospital trauma systems.

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Introduction

Worldwide mortality rates due to major trauma are rising [1–5]. The incidence of trauma among the young is high with an average of 36 life-years lost in each trauma death [6]. Trauma also has a large socio-economic burden because for every trauma death, there are approximately two survivors with permanent disability [7]. In addition to the physical effects following severe traumatic injury, survivors often suffer from significant psychological sequelae including anxiety, depression and post-traumatic stress disorder [8]. The associated loss of productivity and socio-economic factors associated with morbidity following significant trauma result in a high burden of disease within populations.

The use of specialist resources, staffed by Enhanced Care Teams (ECTs) capable of delivering advanced clinical interventions for patients at the scene of incidents, is commonplace in most developed countries [9–11]. Delivery of advanced clinical interventions early in the pre-hospital phases of care, in addition to expedient transfer to centres for definitive care, has been shown to confer benefits to patients with severe injuries [10–21]. It is therefore fundamental that robust and efficient frameworks exist to ensure that specialist resources are targeted to those patients with greatest clinical need within areas covered by Emergency Medical Services as early as possible following severe traumatic injury.

Two models of dispatch for ECT resources currently exist: ‘Primary’ (dispatch of resources prior to the arrival of EMS at scene) and ‘Secondary’ (dispatch of resources following EMS request from scene). Primary dispatch models, utilising dedicated dispatch criteria, are designed to minimise delays in Enhanced Care Team resources arriving at the scene of incidents involving patients with time critical injuries. Such models were highlighted as a key component of the chain of survival in trauma care 20 years ago [22]. Despite their widespread introduction, however, the dispatch of specialist resources remains inefficient. Tasking of Helicopter Emergency Medical Service (HEMS) resources, in particular, is associated with considerable levels of cancellation [23] and conveyance of large numbers of patients that do not have life-threatening injuries [24]. The structure of primary dispatch models, and the criteria used to deploy resources to incidents, lack standardisation [25]. The continued evolution of regionalised trauma systems in England requires that such issues are addressed to ensure that valuable, yet relatively scarce, specialist resources can be targeted to those patients in greatest clinical need as soon as possible following severe injury.

To date, it remains unclear as to whether primary dispatch models for ECT resources are more efficient at targeting deployment to patients with severe trauma than the reliance on requests from EMS personnel at scene. The processes that underpin primary dispatch models including the initial prioritisation of

incidents by Emergency Medical Services and the criteria used to guide ECT resource deployment require evaluation.

The objective of this study was to review the evidence for both primary and secondary models in the targeted dispatch of ECT resources to patients with severe traumatic injury.

Patients and methods

Information sources and strategy

This systematic review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria [26]. With the assistance of a medical librarian, the electronic databases MEDLINE (1950–5 August 2014), EmBase (1988–5 August 2014), Web of Science/Knowledge (1970–5 August 2014) and the Cochrane Library (1993–5 August 2014) were searched using OVID and a combination of Medical Subject Headings (MeSH) and text words for dispatch of Enhanced Care Team resources (Fig. 1). The strategy was limited to human studies with no limits for study design or language of publication. Non-English titles, abstracts and manuscripts were translated and evaluated for inclusion. A limit of 1990 was applied to publication year as modern trauma systems, with integrated Enhanced Care Team resources, are a relatively recent innovation. In addition to the electronic search strategy, the reference lists of the manuscripts that were reviewed were examined to identify any additional articles not captured by the main search strategy.

A protocol was developed using the PRISMA guidelines [26] and it was registered in the PROSPERO database (www.crd.york.ac.uk/PROSPERO), registration number: CRD42014011841, before the search was conducted.

Study selection and data collection process

We imported the titles and abstracts of identified studies into a bibliographical database library using Endnote[®] version X7.1 (Thomson Scientific, Carlsbad, CA). Duplicate citations were removed manually. Two reviewers (C.Mc.Q. and M.S.) independently assessed the titles and abstracts. Studies were included if they presented primary data which evaluated the performance of dispatch systems for civilian Enhanced Care Teams. Studies evaluating dispatch/triage decisions for military resources, mass casualty/disaster incidents or remote settings and inter-facility transfers were excluded. Case reports and studies which did not address dispatch for major trauma were also excluded. Any citation selected by at least one reviewer was retrieved and independently assessed by the same two reviewers for inclusion in the systematic review. Inter-rater agreement was calculated using kappa statistics, and all screening conflicts were resolved by way of consensus.

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