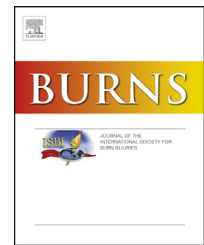


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The impact of major trauma network triage systems on patients with major burns

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ABSTRACT

Introduction: Trauma is a leading cause of death and disability worldwide. Patients presenting with severe trauma and burns benefit from specifically trained multidisciplinary teams. Regional trauma systems have shown improved outcomes for trauma patients. The aim of this study is to determine whether the development of major trauma systems have improved the management of patients with major burns.

Methods: A retrospective study was performed over a four-year period reviewing all major burns in adults and children received at a regional burns centre in the UK before and after the implementation of the regional trauma systems and major trauma centres (MTC). Comparisons were drawn between three areas: (1) Patients presenting before the introduction of MTC and after the introduction of MTC. (2) Patients referred from MTC and non-MTC within the region, following the introduction of MTC. (3) Patients referred using the urban trauma protocol and the rural trauma protocol.

Results: Following the introduction of regional trauma systems and major trauma centres (MTC), isolated burn patients seen at our regional burns centre did not show any significant improvement in transfer times, admission resuscitation parameters, organ dysfunction or survival when referred from a MTC compared to a non-MTC emergency department. There was also no significant difference in survival when comparing referrals from all hospitals pre and post establishment of the major trauma network.

Conclusion: No significant outcome benefit was demonstrated for burns patients referred via MTCs compared to non-MTCs. We suggest further research is needed to ascertain whether

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Abbreviations: %TBSA, percentage total body surface area; ED, emergency department; EoE, East of England; HEMS, helicopter emergency medical service; IBID, International Burn Injury Database; LOS, length of stay; MTC, major trauma centre; MTN, major trauma network; NAO, National Audit Office; NCEPOD, national confidential enquiry into patient outcome and death; TARN, The Trauma Audit and Research Network; UK, United Kingdom.

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burns patients benefit from prolonged transfer times to a MTC compared to those seen at their local hospitals prior to transfer to a regional burns unit for further specialist care.

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1. Introduction

Trauma is a leading cause of death and disability for all age groups, causing around 5 million deaths worldwide each year [1]. The National Audit Office (NAO) in the United Kingdom (UK) estimates that 20,000 cases of major trauma occur in England each year resulting in 5400 deaths [2]. The International Burn Injury Database reported 31,344 burns treated between 2003 and 2007 in the UK. Of these 21,777 were admitted to hospital and 442 of these resulted in death [3]. Patients presenting with severe trauma and burns can benefit from being managed in units with specifically trained multidisciplinary teams, providing essential rapid and coordinated care. Evidence from the USA, Australia, Germany and Finland demonstrates significantly improved care and outcomes with rationalised trauma services [4–7].

Historically, in England there was significant variability in mortality between hospitals demonstrated by The Trauma Audit and Research Network (TARN). Patients who sustained severe trauma injuries were taken to the nearest emergency department (ED), irrespective of the severity and type of injury or the capability of the hospital to provide adequate resuscitation or definitive care [8,9]. The national confidential enquiry into patient outcomes and death (NCEPOD) 2007 report 'Trauma – Who Cares?' identified deficiencies in care received by trauma patients. [10] The NAO report 'Major Trauma Care in England' in 2010 [2] similarly identified deficiencies in trauma care within the NHS and a failure to improve care, despite evidence of poor outcomes. This report recommended the establishment of regional major trauma networks (MTN). First established in April 2010, there are currently 22 major trauma networks in the UK with 26 designated major trauma centres that deal with the most severe form of trauma [11].

The streamlined major trauma networks utilise pre-hospital triage protocols to identify potential major trauma patients at high risk. These protocols vary depending on the geographical setting. In the systems investigated, with regards to major burns, the urban trauma system utilises a bypass protocol with transport of the patient directly to a MTC, bypassing the local hospitals. The rural trauma system utilises a non-bypass protocol, transferring the patient directly to the local hospital first. The urban trauma system hospitals are supported by the Helicopter Emergency Medical Service (HEMS) allowing rapid delivery of prehospital medical care and transportation. The system has been audited and has demonstrated an improved care process and better outcomes with a significant increase in the number of patients surviving major trauma [12].

Major trauma centres have the facilities to provide resuscitation, massive transfusion protocols, and consultant-led trauma teams 24/7 within the emergency department. Immediate access to diagnostic imaging, interventional radiology, and immediate access to operating theatres is also

required. Dedicated major trauma beds and intensive care facilities provide comprehensive and definitive care and rehabilitation of all injury patterns. If the MTC does not have specialised, quaternary facilities (such as dedicated burns care), following the initial stabilisation of the patient in the emergency department, they are transferred to a burns centre. In the systems investigated there was no burn centre co-located with a MTC, so all patients with major burns were stabilised in the ED of the MTC or non-MTC hospital, before being transferred to a burn centre.

Until now, the focus on the outcomes of the major trauma networks has been on the overall case mix seen. Severe burns form part of the varied presentations of trauma. The aim of this study is to determine the impact of major trauma centres on the management of patients with major burns. This study aimed to answer this by addressing three main comparisons. This study looked at burns patients referred for treatment at a quaternary burns centre that is not co-located with a major trauma centre. Firstly, a comparison was made between resuscitation and outcome parameters of patients referred from emergency departments in major trauma centres against patients referred from non-major trauma centres. Secondly, a comparison was made of patients referred from urban hospitals before and after the advent of MTCs. Thirdly, burns patients managed by an urban bypass triage protocol (which addresses burns) (Fig. 1) were compared to patients managed by a non-bypass rural triage protocol (which does not address burns) (Fig. 2) in the context of a major trauma network.

2. Materials and methods

A retrospective study was carried out over a four-year period reviewing all major burns injuries in adults and children received at a regional burns centre before and after the implementation of the major trauma systems and MTCs. This covered a period pre MTC introduction (November 2008 to April 2010) and the period after MTC (April 2010 to April 2012). The International Burn Injury Database (IBID) and our local intensive care database METAVISON (iMDSoft Dedham MA, USA) were used for data collection. Institutional ethical approval through the research and development department committee was obtained for this research. Inclusion criteria were: patients with isolated resuscitation burns, i.e. >15% Total Body Surface Area (TBSA) in adults or >10% TBSA in children and all patients admitted to the Burns Intensive Treatment Unit (BITU); and patients referred from an urban or rural trauma network hospital.

Exclusion criteria were patients admitted with medical causes of skin loss (i.e. staphylococcal scalded skin syndrome, toxic epidermal necrolysis syndrome and Steven Johnson's syndrome); patients referred from outside the two trauma networks and transfer delays over 48 h.

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