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Management of polytrauma patients in the UK: Is there a 'weekend effect'?

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ABSTRACT

Background/purpose: It has been suggested that hospital admission during weekends poses a risk for adverse outcomes and increased patient mortality, the so-called 'weekend effect'. We undertook an evaluation of the impact of weekend admissions to the management of polytraumatised patients, in a Level I Major Trauma Centre (MTC) in the UK.

Materials and methods: A retrospective review of prospectively documented data of polytrauma patients (injury severity score (ISS) > 15), admitted between April 2013 and August 2015 was performed. Exclusion criteria included patients initially assessed in other institutions. All patients were initially managed at the emergency department (ED) according to ATLS® principles and underwent a trauma computed tomography (CT) scan, unless requiring immediate surgical intervention.

Results: During the study period 1735 patients (pts) were admitted under the care of the MTC. Four hundred and five pts were excluded as they were transferred from other institutions and 300 pts were excluded as their ISS was less than 16. Overall 1030 patients met the inclusion criteria, out of which 731 were males. Comparing the two groups (Group A: weekday admissions (670), Group B: weekend admissions (360)), there was no difference in pts gender, mechanism of injury, GCS at presentation, need for intubation and time to CT. Patients admitted over the weekend were younger ($p < 0.01$) and presented with haemodynamic instability more frequently ($p = 0.02$). Time to operating room was also lower during the weekend, but this did not reach statistical significance ($p = 0.08$). Mortality was lower in Group B: 39/360 pts (10.8%) compared to Group A: 100/670 pts (14.9%) ($p = 0.07$). The relative risk (RR) of weekend mortality was calculated as 0.726 (95% CI: 0.513–1.027).

Discussion/conclusion: Weekend polytrauma patients appear to be younger, more severely injured and present with a higher incidence of haemodynamic instability (shock). Overall, we failed to identify a "weekend effect" in relation to mortality, time to CT and time to operating room. On the contrary, a lower risk of mortality was noted for patents admitted during the weekend.

Introduction

Over the past year in the UK, there has been a great interest in the political, clinical and media setting with the so-called 'weekend-effect', in the provision of medical care. This term refers to the perception that there is an increased risk of adverse outcomes and an increased mortality in patients admitted into the hospital on Saturday and Sunday, compared to the other week days [1]. The primary cause of this suspected increased mortality has been suggested to be the reduced availability of senior staff clinicians and the reduced access to investigative services [2–4]. However, no solid evidence establishing this link is available [2], whereas other factors such as the severity of the condition and patients' comorbidities may also play a role in the clinical outcome of these patients [5,6].

Between 2011 and 2012 the UK government in association with the National Health Service (NHS) England opted to fund the development of major trauma centres (MTCs), with the hope of these designated centres being implemented by 2013 [7]. These would be specific hospitals, which would serve as major trauma hub points within certain counties, with the expectation that having dedicated specialised centres would improve the outcomes of patients with multiple injuries.

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In conjunction to this, the National health secretary published 10 set standards for weekend emergency admissions he expected hospital trusts in England to achieve by 2016–2017. Within these 10 standards, there is a heavy onus on the increasing presence of senior staff clinicians during the weekend [8]. Obviously for this to be achieved the work pattern and contracts of clinicians must be re-negotiated accordingly. The question however remains whether the evidence proposed by the government is valid. Studies have shown that this 'weekend effect' phenomenon is present in conditions or surgical procedures, which are time sensitive including neurological conditions [9], cardiac pathology [10] and emergency surgeries [11]. Little or no evidence is available in regards to the weekend effect in the major trauma service provision in England.

The aim of this study was to evaluate whether weekend admissions had an impact to the management and outcomes of polytraumatised patients, in a Level I MTC in West Yorkshire, England.

Patients and methods

Following institutional board approval we performed a retrospective review of prospectively documented data of all consecutive polytrauma patients (Injury Severity Score (ISS) > 15 [12,13]) admitted in our institution during a 28 month period (April 2013–August 2015). Exclusion criteria comprised of patients with an ISS < 15, patients initially assessed in other institutions and then transferred to our Department, as well as patients with complex isolated injuries referred for tertiary care.

All patients were initially managed at the Emergency Department (ED) according to ATLS® principles by the multidisciplinary trauma team. Following the initial resuscitation and if any potential haemodynamic instability was addressed, all patients underwent a trauma computed tomography (CT) scan. In case of severe haemodynamic instability, the trauma CT was delayed and where deemed necessary patients underwent immediate surgical intervention.

TARN database

The Trauma Audit and Research Network (UK-TARN, http://www.tarn.ac.uk) database is a multicentre prospective trauma registry, which was initially designed to assess the effectiveness of the management of serious injury in the United Kingdom [14,15]. We requested and obtained the data for all patients treated from April 1st, 2013 to August 31st, 2015 in our institution. The inclusion criteria for patients to be included into the database are: admission to respective hospital for greater than three days (including subsequent referral from other centres if meet the three-day criteria), transferral to Intensive Care Unit (ICU) as well as patients who died from their traumatic injuries. Exclusion criteria are patients over the age of 65 presenting with isolated fractures of proximal femur or pubic rami. The TARN database documents in detail a variety of parameters which amongst others include: patient demographics, abbreviated injury score (AIS), Injury severity score (ISS), Glasgow Coma Scale (GCS) and a detailed treatment of care pathway (such as time to CT, first contact with doctor, time to theatre, etc.). A previous TARN publication has indicated a lack of reporting bias [16].

Data used for analysis

Data collected and evaluated included: patient demographics (age and gender); admission date and time; AIS and ISS; GCS; mechanism of injury; characteristics of initial assessment; the presence of shock, time to CT; time to theatre, length of hospital stay (LOS); and 30 day in-patient mortality. According to TARN shock was defined as the presence of a systolic blood pressure (SBP) < 110 mmHg pre-hospital or in the emergency department (ED), in the background of a blunt injury mechanism.

Subgroup analysis

We further investigated the effect of the time of admission to the management and outcomes of our cohort. For this purpose, two subgroups were created: the first group included patients admitted between 06:00 and 23:59 (defined as social hours) and the second group included those admitted between 00:00 and 05:59 (defined as unsocial hours).

Statistical analysis

Statistical analysis was undertaken using IBM SPSS Statistics version 22.0 software (SPSS Inc., Chicago, IL). Continuous data were analysed for differences using a two-tailed independent samples *t*-test, whereas for non-parametric data a χ^2 test or a Mann–Whitney *U* test was used to examine associations between variables. A *p*-value < 0.05 was considered significant.

Results

During the study period, a total of 1735 patients (pts) were admitted under the care of the MTC. Four hundred and five pts were excluded as they were transferred from other institutions, whereas another 300 pts were excluded as their ISS was less than 16. Thereafter, a total of 1030 pts were included for further

Table 1
Baseline characteristics of polytrauma patients, stratified according to the day of admission.

	Group A	Group B	Overall	*p*-Values*	Test
Number of patients (*n*)	670	360	1030	–	–
Age (years)	48.9	43.2	46.9	**0.01**	*t*-test
Gender (M/F)	471/199	260/100	731/299	0.517	χ^2
ISS	Median: 25	Median: 26	–	0.08	Mann–Whitney
Mechanism of injury	–	–	–	0.46	χ^2
GCS					
14–15	443	235	678	0.89	χ^2
9–13	81	46	127		
<8	140	78	218		
Presence of shock	94	72	166	**0.02**	χ^2
Average time to CT (h)	1.40	1.66	1.49	0.32	χ^2
Time to theatres (h)	53.8 (*n* = 272)	36.1 (*n* = 168)	47.0	0.08	χ^2
Staff seniority (consultant present)	524	277	801	0.61	χ^2

Group A: weekday admissions; Group B: weekend admissions; M: Male; F: Female; ISS: Injury Severity Score; GCS: Glasgow Coma Score; CT: computed tomography.
* The results in bold indicate statistical significance (level of 0.05).