



Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Pre-hospital times and clinical characteristics of severe trauma patients: A comparison between mountain and urban/suburban areas

Rauch Simon, MD^{a,*}, Dal Cappello Tomas, MSc^a, Strapazzon Giacomo, MD, PhD^a, Palma Martin, BSc^a, Bonsante Francesco, MD^b, Gruber Elisabeth, MD^c, Ströhle Mathias, MD^d, Mair Peter, MD^d, Brugger Hermann, MD^a, International Alpine Trauma Registry Study Group

^a Institute of Mountain Emergency Medicine, EURAC Research, Bolzano, Italy

^b Department of Anaesthesiology and Intensive Care Medicine, Bolzano Central Hospital, Bolzano, Italy

^c Department of Anaesthesiology and Intensive Care Medicine, Bruneck Hospital, Bruneck, Italy

^d Department of Anaesthesiology and Intensive Care Medicine, Innsbruck Medical University Hospital, Innsbruck, Austria

ARTICLE INFO

Article history:

Received 8 November 2017

Received in revised form 22 January 2018

Accepted 23 January 2018

Available online xxxx

Keywords:

Trauma

Mountain

Urban

Helicopter rescue

ABSTRACT

Objective: We investigated pre-hospital times, clinical characteristics and therapeutic interventions in multisystem trauma patients injured in mountainous areas in comparison to both urban and suburban trauma patient admissions.

Methods: Pre-hospital and in-hospital data collected from trauma patients included in the International Alpine Trauma Register (IATR) hosted in Bolzano, Italy (aged 16–80yr with an ISS \geq 16), were compared with trauma patient data published from those urban and suburban areas included in the Trauma Register DGU® (TR-DGU) of the German Trauma Society.

Results: A total of 94 patients from the IATR and 11,020 patients from the TR-DGU met the inclusion criteria. Due to longer treatment-free intervals (mean 59.1 vs. 19.7min), total out-of-hospital time was reportedly longer in individuals injured in mountainous areas, compared to urban/suburban areas (117.4 \pm 142.9 vs. 68.7 \pm 28.6min, $p=0.002$), despite the more frequent helicopter rescue (93% vs. 40%, $p<0.001$). 57% of IATR patients were hypothermic at hospital arrival, mean ISS was higher (38.5 \pm 15.8 vs. 28.6 \pm 12.2, $p<0.001$) and patients with a systolic blood pressure (SBP) \leq 90mmHg were more frequent (27% vs. 15%, $p=0.005$), yet less patients had received volume therapy (82% vs. 93%, $p=0.001$). However, overall no difference in hospital mortality was observed (11% vs. 17%, $p=0.159$).

Conclusion: Trauma incidents in mountainous areas commonly feature significantly increased out-of-hospital time which is associated with a more severe ISS, higher risk of accidental hypothermia and more frequent hypotension compared to urban/suburban trauma. Nonetheless, the mortality rate of IATR patients is comparable to urban/suburban trauma patients.

© 2018 Elsevier Inc. All rights reserved.

1. Introduction

Outdoor activities in the mountains have continued to gain popularity and have increasingly become more accessible over recent years [1]. In parallel, the number of rescue missions in mountainous environments has reportedly increased [2], plus the proportion of potentially life threatening injuries incurred has notably risen [3]. Multisystem trauma in mountainous areas is expected to differ in several aspects from trauma in an urban or suburban setting. This assertion is mainly due to the remote, technically challenging environment and the number of unique recreational activities encountered with an inherent risk

of fall. The injury mechanism, pattern and severity of mountain trauma sustained by patients might be distinct from trauma in an urban/suburban area. However, currently only scant data exist relating to the characteristic differences between mountain and urban/suburban trauma admissions. The aim of this study is to describe the out-of-hospital times, clinical characteristics and therapeutic interventions utilised in multisystem trauma patients in mountainous environments in comparison to urban/suburban trauma patient admissions; specifically relating in-hospital data to prehospital times and treatment interventions.

2. Materials and methods

Out-of-hospital and in-hospital data collected from trauma patients included in the International Alpine Trauma Register (IATR) [4] were analysed and compared with trauma patient data published from

* Corresponding author at: Institute of Mountain Emergency Medicine, EURAC Research, Viale Druso 1, 39100 Bolzano, Italy.

E-mail address: simon.rauch@eurac.edu (S. Rauch).

those urban and suburban areas in Germany included in the TraumaRegister DGU® (TR-DGU) of the German Trauma Society [5]. Only trauma patients aged 16–80 years with an Injury Severity Score (ISS) ≥ 16 , whom arrived at the hospital with vital signs, were included in the analysis.

The IATR is a transnational platform for the prospective collection and storage of data relating to severe trauma patients (ISS ≥ 16), encountered in mountainous or remote areas, that are not readily accessible by the regular emergency medical services. This registry is hosted in Bolzano, Italy [4]. In this comparison, those patients already in cardiac arrest upon arrival of the rescue team, burn patients (if the burn represented the predominant injury), and drowned patients were excluded from the IATR prior to analysis. Equally, in North Tyrol, Austria, patients who suffered accidents on resort prepared ski slopes were also excluded. Data collection in the IATR is based on the Utstein-Style [6], which requires comprehensive data collection on multiple parameters. These parameters include accident (type of outdoor activity, mechanism of injury); mission characteristics (technical difficulty of the terrain, terrestrial rescue, air rescue or combined rescue) and timing (time of accident, time of emergency call, time of arrival of the first rescue team, time of hospital admission). Medical data collected included: i) vital signs at the scene (i.e. systolic blood pressure, respiratory rate, Glasgow Coma Scale (GCS) and body temperature); ii) out-of-hospital Advance Trauma Life Support (ATLS) interventions (i.e. endotracheal intubation, intravenous cannulation, fluid and drug administration); iii) ISS and Abbreviated Injury Scale (AIS) based on in-hospital diagnosis; iv) vital signs and laboratory data on admission (i.e. haemoglobin, INR, base excess, body temperature), plus out-of-hospital and in-hospital mortality ratings. In this study, patient data collected between December 2010 and June 2013 in the provinces of North Tyrol (Austria) and South Tyrol (Italy) were analysed.

The TraumaRegister DGU® of the German Trauma Society (TR-DGU) was founded in 1993, and in 2013 >600 hospitals reported over 33,000 trauma cases. The majority of these hospitals actively reporting trauma admissions are situated in Germany, and with only a few regions not contributing to the registry, a representative view of trauma care in Germany is given [7]. Data from urban and suburban regions are collected in the TR-DGU without subgroup monitoring of the location. Previously, Timm and co-workers used this comprehensive database to compare German and Dutch trauma care systems (2009–2012). Specific factors such as prehospital rescue times, clinical characteristics and therapeutic actions in severe trauma cases (ISS ≥ 16) were closely examined [5]. Subsequently, data from German trauma centres published in this aforementioned analysis by Timm et al., representing severe trauma cases from urban/suburban areas, were also included in our comparative analysis. However, only variables available from both registers (IATR and TR-DGU), were used to inform the comparative analysis. All patients from the TR-DGU and 85% of IATR-patients were treated in a Level I trauma centre. Germany, as well as Italy and Austria, have a physician based out-of-hospital approach to emergency patients and thus form a good comparison.

2.1. Statistical analysis

Data are presented as percentages or as mean \pm standard deviation, as appropriate. Fisher's exact test was used to compare proportions and Welch's *t*-test to compare continuous data. Tests were two-sided and $p < 0.05$ was considered statistically significant. R version 3.2.3 was used for the analysis [8].

3. Results

During the study period, a total of 94 patients from the IATR and 11,020 patients from the TR-DGU® met the inclusion criteria. Mean age was 46.0 ± 16.1 yr for IATR patients and 45.8 ± 18.3 yr for TR-DGU®

patients ($p = 0.905$). The majority of patients in both registers were male (86% in IATR and 75% in TR-DGU respectively, $p = 0.012$).

3.1. Prehospital times and mode of transport

Mean overall out-of-hospital time (time from accident to hospital admission), was 117.4 ± 142.9 min in mountainous areas, compared to a lesser 68.7 ± 28.6 min in urban/suburban areas ($p = 0.002$). In mountain trauma patients, the overall out-of-hospital time varied over a wide range from 30 min to >17 h. Similarly, the treatment-free interval, defined as time from accident to arrival of the first rescue personnel on scene, was longer in mountainous terrain (mean 59.1 vs. 19.7 min respectively; number of patients available from TR-DGU $n = 8798$). Within this pre-defined time frame, mean time from accident to emergency call was reportedly 37.0 ± 139.1 min in the IATR (not recorded in the TR-DGU). Fig. 1 shows out-of-hospital times in mountain and urban/suburban trauma patients. Out-of-hospital times were longer in mountainous compared to urban/suburban areas, despite the fact that HEMS was more frequently used for patient evacuation and transport in IATR scenarios (93% vs. 40%, $p < 0.001$). Out-of-hospital time intervals in mountain trauma patients grouped by rescue mission characteristics are shown in Table 1.

3.2. Mechanism and pattern of injury

Blunt trauma was the predominant injury sustained in those patients included in the IATR and TR-DGU (100% and 95.6% respectively, $p = 0.036$). Fall was the most frequent mechanism of injury in the mountains (59.6%, see Table 2), whereas traffic accident (61.5%) was the most prevalent mechanism in urban and suburban areas. In Table 3, the type of activity preceding severe trauma in mountainous environments is compared with the mechanism of injury in urban/suburban trauma. The injury severity delineated by the mean ISS was 38.5 ± 15.8 in IATR patients and 28.6 ± 12.2 in patients included in TR-DGU ($p < 0.001$). Differences in injury patterns, displayed as Abbreviated Injury Scale (AIS) ≥ 3 of different body regions, are shown in Table 4 (information available for 55 patients from IATR).

3.3. Prehospital management

Patients whom presented with a low systolic blood pressure (≤ 90 mmHg) at the scene were more frequently reported in the IATR, as compared to the TR-DGU (41% vs. 19%, $p < 0.001$). Although the rate of patients with a low systolic blood pressure was higher in the IATR, less patients from IATR, as compared to TR-DGU, received out-of-hospital volume therapy (82% vs. 93%, $p = 0.001$). The majority of patients received out-of-hospital analgesic treatment (82% of IATR patients and 78% of TR-DGU patients, $p = 0.526$). The rate of unconscious patients with GCS ≤ 8 was equal in both registers (34% vs. 34%, $p = 0.913$). Out-

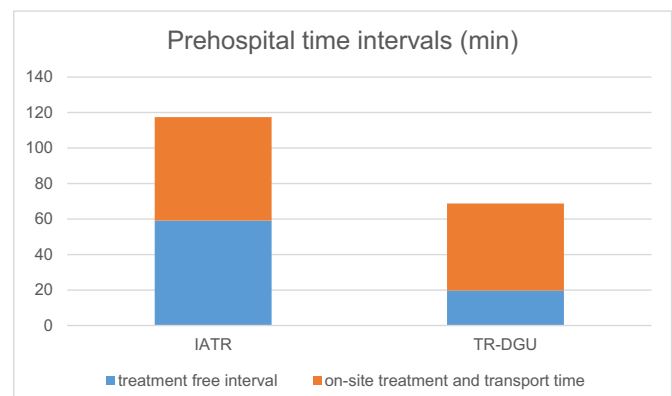


Fig. 1. Prehospital time intervals.

Download English Version:

<https://daneshyari.com/en/article/10217091>

Download Persian Version:

<https://daneshyari.com/article/10217091>

[Daneshyari.com](https://daneshyari.com)