



Pre-hospital rescue times and actions in severe trauma. A comparison between two trauma systems: Germany and the Netherlands



Alexander Timm^{a,*}, Marc Maegele^a, Rolf Lefering^b, Klaus Wendt^c,
Hendrik Wyen^d, the TraumaRegister DGU^{®1}

^a Department of Trauma and Orthopedic Surgery, University of Witten/Herdecke, Cologne-Merheim Medical Centre (CMMC), Ostmerheimer Str. 200, 51109 Cologne, Germany

^b Institute for Research in Operative Medicine (IFOM), University of Witten/Herdecke, Ostmerheimer Str. 200, Building 38, 51109 Cologne, Germany

^c Department of Trauma Surgery, University of Groningen, University Medical Center Groningen (UMCG), Hanzeplein 1, 9700 RB Groningen, The Netherlands

^d Department of Trauma, Hand and Reconstructive Surgery, Hospital of the Johann Wolfgang Goethe-University, Theodor-Stern-Kai 7, 60590 Frankfurt, Germany

ARTICLE INFO

Keywords:

Major trauma
Pre-hospital care
Rescue times
Emergency medical services
International comparison
Germany
The Netherlands

ABSTRACT

Introduction: The aim of this study was to compare the effect of national pre-hospital rescue strategies on the status of severely injured patients at the time of admission to a Trauma Center (TC) in Germany or the Netherlands.

Patients and methods: This retrospective database analysis based on the TraumaRegister DGU[®] (TR-DGU) of the German Trauma Society compares the pre-hospital trauma system of Germany with three Trauma Centers (TCs) from the Netherlands. It comprises trauma patients from 2009 to 2012 admitted to a Level I TC, all patients aged 16–80 years primarily admitted with an ISS ≥ 16 and data available for mode of transport, pre-hospital measures and total pre-hospital time. Additionally three subgroups were formed by mode of transportation and involved personnel: Ambulance/Physician, Helicopter/Physician, Ambulance/EMT. Primary endpoint is the patient's status at the time of admission to the trauma room. Secondary endpoint is hospital mortality.

Results: A total of 12,168 patients met the inclusion criteria. Major differences in the injury patterns, pre-hospital rescue time, transport strategy and actions are documented. The mean ISS in the German overall group was 28.6 ± 12.2 compared to 27.4 ± 12.8 in the Dutch overall group. In the subgroups the highest injury severity with 29.8 ± 12.7 for German patients and 31.0 ± 14.6 for Dutch patients was found in the Helicopter/Physician subgroups and the lowest in patients transported by ambulance under emergency medical technician (EMT) care i.e. 24.2 ± 8.9 for German patients and 23.6 ± 10.3 for Dutch patients. The mean total pre-hospital time for patients admitted to Dutch TCs of 53.8 ± 28.7 min was 15.1 min shorter than for patients transported to German TCs 68.7 ± 28.6 min. The overall mean pre-hospital volume replacement of 1103 ± 821 ml for German patients was about twice as high as for Dutch patients (541 ± 700 ml). In physician led subgroups in the Netherlands higher rates of intubation, catecholamine administration and chest tubes are recorded. The basic vital signs from on-scene to hospital admission did not show relevant changes. Additional parameters available in the trauma room revealed a lower mean Base Excess (BE) for Dutch patients and a diminished mean prothrombin ratio for German patients. No reliable evidence was found that differences in the mortality analysis resulted from different national pre-hospital strategy.

Conclusions: Many differences in the national pre-hospital strategy were demonstrated but the effect on patient's status at the time of admission to trauma room remains unclear. A follow-up study, which mitigates the now known injury patterns has to be initiated to further substantiate the findings of this study.

© 2014 Elsevier Ltd. All rights reserved.

* Corresponding author at: c/o Professor Marc Maegele, Department of Trauma and Orthopedic Surgery, Cologne-Merheim Medical Centre (CMMC), Private University of Witten/Herdecke, Campus Cologne-Merheim, Ostmerheimer Str. 200, D-51109 Cologne, Germany.

E-mail address: atimm.unikoeln@yahoo.de (A. Timm).

¹ Committee on Emergency Medicine, Intensive Care and Trauma Management of the German Trauma Society (Section NIS).

Introduction

Even within the European Union (EU) a great diversity of emergency medical systems (EMS) exist and studies assessing these systems in an international context are scarce. This study compares the pre-hospital trauma system of Germany with three Trauma Centers (TCs) from the Netherlands on the basis of the TraumaRegister DGU[®] (TR-DGU) focusing on severe trauma.

German pre-hospital rescue system

Germany is known for its physician based pre-hospital approach to emergency patients. A physician who received special training and is qualified as a primary care physician is transported to the scene by helicopter emergency services (HEMS) or ground vehicle. Ground EMS physicians are stationed in a network of hospitals or fire and rescue stations. Primary care physicians are dispatched as a primary response when an impairment of vital functions is probable or as secondary response after a request from an ambulance crew [1]. The HEMS in Germany consists of a dense network of helicopter bases each covering a radius of about 50 km² [2]. In EMS and HEMS the physician is accompanied by an emergency medical technician (EMT) trained in Advanced-Life-Support (ALS). On scene they meet with an ambulance crew consisting of one EMT capable of ALS and a driver trained in Basic Life Support (BLS) hence the name “rendezvous”-system. German EMTs are allowed to perform a strictly limited set of therapeutic measures without the presence of a physician under special circumstances and only according to fixed protocols set by the regional Medical Director of Emergency Services. What these measures may include is defined by the German Board of Physicians: Vein cannulation, application of crystalloid infusion, early defibrillation, endotracheal intubation without relaxation and administration of defined medication [3,4]. In an attempt to cope with legal insecurities recent legislative changes were made to the training of German EMTs [5]. As a recent study by Wyen et al. [6] demonstrated the so called “golden hour” is often failed in Germany although concepts which focus on reducing the pre-hospital time like Pre-hospital Trauma Life Support[®] (PHTLS) have been integrated into the training of physicians and EMTs [7]. Fast and continuous treatment – so called: “treat and run” – is top priority, while “load and go” approaches are considered a last resort [8–10].

Dutch pre-hospital rescue system

There is no similar ground EMS physician system in the Netherlands. In the Netherlands pre-hospital primary care is the domain of paramedics [11]. In 2003 80% of the paramedics were also qualified as intensive-care or anesthesiology nurses [11]. All paramedics are PHTLS certified and perform measures independently according to mandatory nationwide protocols which include the administration of a predefined set of drugs on a daily basis without the presence a physician [12,13]. The nationwide protocols include indications regulating the dispatch of a Mobile Medical Team (MMT) by the rescue centre as primary or secondary unit comprising a physician which is either a specially trained anaesthesiologist or surgeon, a paramedic and a pilot/driver [11,13,14]. In the Netherlands regionalised trauma care was introduced in 1999 with first 10 then 11 trauma regions each with a Level I TC [15]. Initially each of these TCs provided a ground MMT team but during recent years this concept was abandoned in favour of four MMTs provided by four Level I Trauma Centers in the four cardinal directions. These four MMTs were equipped with helicopters (HMMT) each covering a radius of about 100 km during daylight hours [11,15]. During bad weather conditions four ground vehicles are available.

Although both EMS systems share similar components they vary in numerous details, which sparked the hypothesis off that the status of a severely injured German or Dutch patients differ at the time of admission to the trauma room due to different national rescue strategies. This study is a first descriptive approach to evaluate the differences between the both national EMS systems and build a sound baseline for further research.

Patients and methods

TraumaRegister DGU[®] (TR-DGU) database analysis

This study is based on a retrospective data analysis from the TraumaRegister DGU[®] (TR-DGU). The TR-DGU was founded by the German Trauma Society in 1993 and in the year 2012 the TR-DGU received approx. 25,000 entries from more than 600 participating Trauma Centers. Besides German TCs inter alia three Level I Trauma Centers from the Netherlands contributed data in the relevant time period from 2009 to 2012 to the TR-DGU. Data before 2009 could not be used in this study due to changes in the definition of the transportation categories, and the available number of Dutch Trauma Centers. All patients in the database are prospectively documented on standard documentation sheets during 4 consecutive phases: (A) pre-hospital phase, (B) emergency department and initial surgery, (C) intensive care unit (ICU) and (D) discharge. The data is submitted to the database hosted by an independent data centre of a German university institute. For additional information and annual reports visit: www.traumaregister.de.

Data anonymity for the participating hospitals and patients is guaranteed. Statistical analysis was conducted using SPSS (Statistical Package for the Social Sciences; version 21, IBM Inc., Armonk, NY, USA). Data are presented as percentages or as mean with standard deviation (\pm SD), as appropriate. Since the primary intention of this study was explorative rather than confirmative, formal statistical testing was largely avoided. Furthermore, the large number of patients (especially in the German subgroup) leads to statistically significant results even in case of minor differences which are not clinically relevant. Therefore, only a few data were compared statistically, using the Mann–Whitney *U*-test for continuous variables, and the chi-squared test for categorical variables. Observed and expected mortality rates were compared using the standardised mortality ratio (SMR). 95% confidence intervals (CI) were calculated based on the respective CI for the observed mortality rate. The present study is in line with the publication guidelines of the TraumaRegister DGU[®] and registered as TR-DGU project ID 2012-022.

Inclusion criteria

Patients meeting the following criteria were included:

- Age 16–80 years
- Injury Severity Score (ISS) \geq 16
- Primary admission to a Level I TC (\geq 50 data patients per year 2009–2012)
- Data available for mode of transport, pre-hospital measures and total pre-hospital time

Patients arriving at the TC with private/public transport were excluded from analysis.

Patients were divided in three subgroups defined by the mode of transportation utilised to reach the TC: (a) transport by ambulance accompanied by a physician (later referred to as Ambulance/Physician); (b) transport by physician staffed helicopter (later referred to as Helicopter/Physician); (c) transport by ambulance and EMTs (later referred to as Ambulance/EMT). There are currently no

Download English Version:

<https://daneshyari.com/en/article/3239904>

Download Persian Version:

<https://daneshyari.com/article/3239904>

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