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In view of standardization Part 2: Management of challenges in the initial treatment of burn patients in Burn Centers in Germany, Austria and Switzerland

Benjamin Ziegler [a], *Christoph Hirche* [a], *Johannes Horter* [a], *Jurij Kiefer* [a], *Paul Alfred Grützner* [b], *Thomas Kremer* [a], *Ulrich Kneser* [a], *Matthias Münzberg* [b,*]

[a] *Department of Hand, Plastic and Reconstructive Surgery—Burn Center, BG Trauma Center Ludwigshafen/Rhine, Hand and Plastic Surgery, University Heidelberg, Ludwig-Guttmann-Str. 13, D-67071 Ludwigshafen, Germany*

[b] *Department of Trauma and Orthopedic Surgery, Air Rescue Center, BG Trauma Center Ludwigshafen/Rhine, Ludwig-Guttmann-Str. 13, D-67071 Ludwigshafen, Germany*

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ABSTRACT

Introduction: Initial therapy of severe burns in specialized burn trauma centers is a challenging task faced by the treating multi-professional and interdisciplinary team. A lack of consistent operating procedures and varying structural conditions was recently demonstrated in preliminary data of our group. These results raised the question on how specific treatment measures in acute burn care are met in the absence of standardized guidelines.

Material and methods: A specific questionnaire containing 57 multiple-choice questions was sent to all 22 major burn centers in Germany, Austria and Switzerland. The survey included standards of airway management and ventilation, fluid management and circulation, body temperature monitoring and management, topical burn wound treatment and a microbiological surveillance. Additionally, the distribution of standardized course systems was covered.

Results: 17 out of 22 questionnaires (77%) were returned completed. Regarding volume resuscitation, results showed a similar approach in estimating initial fluid while discrepancies persisted in the use of colloidal fluid and human albumin. Elective tracheostomy and the need for bronchoscopy with suspected inhalation injury were the most controversial issues revealed by the survey. Topical treatment of burned body surface also followed different principles regarding the use of synthetic epidermal skin substitutes or enzymatic wound debridement. Less discrepancy was found in basic diagnostic measures, body temperature management, estimation of the extent of burns and microbiological surveillance.

Conclusion: While many burn-related issues are clearly not questionable and managed in a similar way in most participating facilities, we were able to show that the most contentious issues in burn trauma management involve initial volume resuscitation, management of inhalation trauma and topical burn wound treatment. Further research is required to address

* *Corresponding author at*: Research group "Trauma meets Burns", Department of Trauma and Orthopedic Surgery, Center of Rescue and Emergency Medicine, BG-Trauma Center Ludwigshafen/Rhine, Ludwig-Guttmann-Str. 13, D-67071 Ludwigshafen, Germany.
E-mail address: matthias.muenzberg@bgu-ludwigshafen.de (M. Münzberg).

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these topics and evaluate a potential superiority of a regime in order to increase the level of evidence.

1. Introduction

Initial treatment of patients with severe burns remains a critical issue of burn medicine and is still controversially discussed [1]. Due to the severity of burns, an optimal treatment must be provided early after trauma. The systemic response to burns requires a substantial understanding of the complex pathophysiological sequences and extensive experience. A large number of questions regarding burn specific aspects need to be faced within the first hours of treatment to optimize outcomes of burn victims. For this reason, victims of major burn traumas should be exclusively treated in specialized, regional burn centers or should at least be transferred to a suitable center as soon as possible after initial stabilization [2].

We previously surveyed level-one burn centers in Germany, Austria and Switzerland and revealed a general lack of standardization in these centers. Personnel and infrastructural conditions vary, and consistent educational offers for further training are lacking [3]. These findings have been confirmed by several former investigations with focus on Germany and other European countries [4–6]

In the absence of detailed, standardized guidelines, most centers claim to use a produced standard operating procedure (SOP) to manage their burn room admissions [3]. These SOPs are mainly based on the guideline for "*Thermal and Chemical Injury*" of the German Society of Burn Medicine [7], *Advanced Trauma Life Support*® (ATLS®) [8] or the national "*Guideline on Treatment of Patients with Severe and Multiple Injuries*" [9]. These guidelines do not address burn-specific problems in detail, which raises the question about which treatment principles are used to face vital challenges in burn care.

After evaluating infrastructural and personnel conditions in the first part of the study [3], part two investigates treatment strategies and concepts during admission process in burn units in Germany, Austria and Switzerland. We concentrate on crucial, burn-specific aspects of airway management, fluid resuscitation, TBSA assessment, preservation and monitoring of body temperature, treatment of burn wounds, microbiological surveillance and infection control.

2. Material and methods

Based on the first part of our study which focused on an (infra-) structural evaluation, a second survey aiming at comparing burn specific treatment concepts was developed. The questionnaire consisted of 57 multiple-choice questions with an option to provide additional specifications. It was sent to the heads of 22 level-one burn centers in Germany, Austria and Switzerland with request for participation. All centers that did not respond within eight weeks were additionally contacted via email or phone. The completed forms were returned by mail, fax or email.

The questionnaire was thematically structured into five parts. First, routine participation of staff members in standardized course concepts for trauma care, e.g., ATLS® or burn-specific training courses like *Advanced Burn Life Support*® (ABLS®) or *Emergency Management of the Severe Burn Course*® (EMSB®) was evaluated. Second, diagnostics and treatment principles at time of admission to the burn room were investigated sorted by main aspects of burn trauma management. Diagnostic and therapeutic measures included airway management, bronchoscopy, chest X-ray, indication and tools for orotracheal intubation and tracheostomy as well as treatment of inhalation injury. In terms of volume resuscitation, the questionnaire included techniques to determine the burned total body surface area (TBSA), formulas to calculate fluid demand, usage of colloidal fluids and usage of intravenous and intra-arterial catheters. Further questions dealt with escharotomy, measures for temperature preservation and screening for microbiological contamination. Last, principles of scalded wound area treatment were surveyed in detail including decontamination, type of topical treatment and wound dressings, and usage of enzymatic debridement or temporary synthetic epidermal substitutes.

3. Results

Seventeen completed questionnaires (77%) were returned and could be included in the evaluation. Two centers rejected participation (9%) in the survey due to potential conflict of interest with local data protection provisions and three centers did not reply (14%) despite multiple requests.

Out of all 17 included centers, 15 (88%) reported application of a produced SOP for the initial treatment of burn victims. In detail, the SOPs were based on the national "*Guideline Thermal and Chemical Injury*" [7] in nine centers (53%) and on the national "*Guideline on Treatment of Patients with Severe and Multiple Injuries*" [9] in ten centers (59%). *Advanced Trauma Life Support*® (ATLS®) was mentioned by seven centers (41%) to be the routine training concept for staff members, while ABLS® and EMSB® were detected to be irrelevant for produced SOPs and training.

A certified ATLS® course was completed by seven out of 17 heads of department (41%) as well as by 21 out of 70 senior physicians (30%) and by 56 out of 199 resident physicians (28%) in the participating departments. Eight out of 276 physicians (3%) reported to be certified ALTS® instructors. Both the EMSB® and the ABLS® course were attended by four of 276 physicians (1%) of the evaluated burn centers.

Fifteen centers (88%) reported to admit patients with concomitant injuries to the trauma bay, while two centers (12%) mentioned to treat patients with suspected or approved