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Optimization of burn referrals

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ABSTRACT

Introduction: Correct estimation of the severity of burns is important to obtain the right treatment of the patient and to avoid over- and undertriage. In this study we aimed to assess how often the guidelines for referral of burn injured patients are met at the national burn centre (NBC), Denmark.

Methods: We included burn patients referred to the NBC in a three-months period. Patient records were systematically analyzed and compared with the national guidelines for referral of burn injured patients.

Results: A total of 97 burn injured patients were transferred for treatment at the NBC and the most common reason for referral was partial thickness burn exceeding 3% estimated area of burn (55% of the patients) while facial burns (32%) and inhalational injury (25%) were other common reasons. We found that 29 (30%) of the referrals were considered potentially unnecessary according to the guidelines. The overtriage was highest among patients suffering of burns due to scalding and these were mostly children below 2 years of age.

Conclusion: An overtriage of referred burn injured patient was found and 30% of the referred patients were treated as outpatients. A telemedicine solution may be useful in the evaluation of burn injured patients before transfer.

1. Introduction

Burns are ubiquitous and range from minor and uncomplicated to lethal cases. The majority of burns can be treated at local emergency departments, while others require highly specialized care [1–3]. Treatment of complicated burns is complex therefore specialized care is often centralized in dedicated burn centres. Burns can be difficult to evaluate by the non-specialist [4–6] and this might lead to overtriage, i.e. many patients, who could be treated locally, are needlessly transferred to burn centres. Patient transfer is time- and resource demanding and increases the risk of complications such as insufficient cooling of acute burns, hypothermia and airway compromise [7].

The Danish National Board of health has decided that in Denmark major burns should only be treated in one centre – the National Burn Center (NBC) in Copenhagen. The NBC is treating patients with burns according to a set of referral guidelines adapted from the European guidelines (Table 1). Patients suffering from burns according to the guidelines should be transported to the NBC after discussion with the doctor on duty.

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Table 1 – The current guidelines for referral to NBC and number of transferred patients in each group.

	Guidelines for referral	Number of burns fulfilling the guidelines
1	Partial thickness burn exceeding 3%	54
2	Full thickness burn exceeding 1%	16
3	Suspicion of inhalation injury	24
4	High-voltage burns	3
5	Circular full-thickness burns	7
6	Burn to the face	31
7	Burn over the major joint	6
8	Burn in the urogenital area	6
9	Suspicion of non-accidental injury	2
10	Cases of doubt	29

Current guidelines for referral of burn injured patients in Denmark to the National Burn Centre at Rigshospitalet, based on the European guidelines from 2007 and adapted to national use. The threshold for referral (3% dermal) is lower than the guidelines from comparable countries in order to avoid undertriage resulting in delayed treatment. The third column shows the number of transferred patients meeting the guidelines for transferral. Each of the 97 burn injured patients could fulfil several criteria in the guidelines.

In this study we aimed to evaluate how often the referral guidelines for burn injured patients are met – and in case of significant overtriage – to identify and describe the overtriaged subgroup in order to suggest how optimization can be achieved.

2. Methods

In Denmark, being a country of 5.5 million inhabitants, the estimated number of burn incidents is 12,000 per year. Around 3% of all patient contacts in the Danish emergency rooms are related to burns [8].

2.1. Data

A computerized search in hospital records was performed for the period 01 April 2011 until 31 June 2011 for patients with a burn-diagnose according to the International Classification of Diseases (ICD-10: DT20-DT32) admitted to the Trauma Centre at Rigshospitalet, Copenhagen. This period was chosen because it was found to be representative. Patient records were analyzed and categorized. Supplementary information about the burn was collected from the transferring hospital when needed. The following information was retrieved from the patients' records: age, gender, burn cause, burn type, initial estimation of injury, burn specialist's estimation of burn upon arrival, indication for referral, and mode of transportation. Every patient's data were then evaluated regarding whether the burn needed transferral according to the transferral guidelines. Unnecessary referral was classified as overtriage but only the first nine aspects of the guidelines were considered. We thereby excluded the transferral guideline 'cases of doubt'. Each patient could fulfil several criteria in the guidelines.

2.2. Referral of burn injured patients

When a patient is transferred to the NBC, the referring doctor contacts the doctor on duty at the NBC by telephone and the case is discussed. A junior registrar in plastic surgery with variable experience in burns is always on duty. Further a consultant in plastic surgery and an experienced burn surgeon is on call. According to the guidelines, the NBC has nationwide responsibility for major burns. Therefore, a request for referral of a burn injured patient to the NBC is not refused, if the doctors at the referring hospital find transferral indicated or are in doubt.

Image transfer of burns is not implemented in Denmark. Due to issues of data protection, it is not legal to transmit patient pictures by a personal mobile phone or via an unsecure network. We cannot exclude that illicit picture transmission by private smartphone is occasionally used – however this is not documented in patient files.

Patients referred by helicopter were evaluated in detail, and it was determined if air transport had been indicated.

2.3. Triage

Undertriage of patients is associated with worse outcomes and increased cost, while overtriage might overwhelm system resources and delay definitive care of patients [9]. In this study, overtriage is defined as burn injured patients who do not comply with the first nine aspects of the referral guidelines. Undertriage is defined as burn injured patient is not referred according to the guidelines – e.g. who they fulfil the guidelines for referral but has not been transferred to the NBC.

2.4. Statistics

Continuous data are reported as median with 5–95% range, proportions with 95% confidence interval. Data were compared using Mann–Whitney's Rank Sum Test.

2.5. Ethics

The study was approved by the Danish Data Protection Agency. According to Danish law, informed consent is not required for studies based on information in existing databases, already approved by the Danish Data Protection Agency.

3. Results

A total of 120 patients were registered in the 3-months period. Twenty-three patients were excluded (Fig. 1).

Ninety-seven patients were included in the study of which 70% were male and median age was 20 years (10 months–71 years). The most common reason for referral was partial thickness burn exceeding 3% estimated area of burn (EAB) (55% of the patients) while facial burns (32%) and inhalational injury (25%) were other common reasons. Thirty-six percent were burns due to scalding (Fig. 2).

Reasons for referral are shown in Table 1. We found that 29 (30%, 95% CI: 22–40%) of referrals were considered