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Pediatric burns in military hospitals of China from 2001 to 2007: A retrospective study

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ABSTRACT

Background: Childhood burns are a global health problem. To date, no epidemiological study with a large sample size of hospitalized pediatric burn patients from the Chinese mainland has been conducted. This study retrospectively analyzed pediatric burn cases to identify the characteristics of pediatric burns and their risk factors in China.

Methods: Data for pediatric burn inpatients younger than 14 years were retrieved from the Chinese Trauma Databank (CTDB). The epidemiological characteristics of pediatric burns and risk factors for mortality were analyzed.

Results: A total of 61,068 cases were included in the study. Children under 3 years old were at the highest risk of injury. Scalds were the commonest burns (87.59%). Flame burns occurred more in winter, and electrical burns occurred mainly in July and August. Age, etiology, depth of injury, total body surface area (TBSA), site of injury, and outcome were correlated with length of hospital stay. Risk factors for pediatric burn mortality included being male, having third degree burns, ≥30% TBSA, and having multi-site burns.

Conclusion: The results showed the epidemiological characteristics of pediatric burns in China, which differ from those reported for other countries and regions. These characteristics can be used to develop measures to prevent pediatric burns.

1. Introduction

Burns in children are the world's most prominent type of traumatic injury, and they severely endanger the life and health of children. In developing countries, burns are the third leading cause of death in children after road traffic injuries and drowning [1]. The after-effects of burns not only handicap the patient and leave psychological trauma, but they also impose a huge economic burden on the victim's family and society.

In mainland China, previous studies of pediatric burns were based on a small sample size [2], focused on a province or city [3,4], or were limited to a specific type of burn [4,5], and

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epidemiological studies with a large sample size covering the whole area were extremely rare. Chinese military hospitals were the first medical institutions in China to conduct studies of burns and their treatment. Over half of China's Burn Research Centers have been established in military hospitals, and the majority of military hospitals have specialized burn departments or medical professionals who specialize in burn treatment. In addition, the military health system hosts an annual burn conference and annual training courses on burn treatment to improve the skills of military professionals and to communicate among hospitals and physicians regarding diagnostic and treatment technologies for burns. Based on the estimation of prevalence of hospitalized burns from 2000 to 2005 [6], military hospitals treated more than 30% of total pediatric burns in mainland China.

The goal of this study was to retrospectively investigate all pediatric burn cases between 2001 and 2007 from military hospitals distributed around China to identify the characteristics of pediatric burns and their risk factors.

2. Materials and methods

2.1. Participants

Pediatric burn patients admitted to military hospitals between 2001 and 2007 were recruited retrospectively from the ''No. 1 Military Medical Project'' information system, which is part of the Chinese Trauma Databank (CTDB). The ''No. 1 Military Medical Project'' information system was designed and promoted by the Information Center of the Medical Department under the Ministry of General Logistics of the Chinese People's Liberation Army (PLA). It has the largest user group in China, covers 210 military hospitals and 100 civilian hospitals, and is the most used hospital information system. The CTDB was founded by the State Key Trauma Laboratory, Burns and Combined Injury Department 4, Institute of Surgery Research, Daping Hospital affiliated with the Third Military Medical University. The purpose of the database is to help all domestic medical institutions collect trauma care data in order to facilitate the research, prevention, and clinical treatment of trauma. The system works as follows: Patient information is recorded into the ''No. 1 Military Medical Project'' information system by professional medical staff on a regular basis. The State Key Trauma Laboratory, Burns, and Combined Injury Department then extracts data about burns from the ''No. 1 Military Medical Project'' information system and imports it to the CTDB.

Informed consent was obtained from all participants whose hospital information was included in the CTDB. The study, including the consent procedure, was approved by the Ethics Committee of the Third Affiliated Hospital of the Third Military Medical University.

2.2. Inclusion and exclusion criteria

Children over 15 years old are classified as teenagers in China, so the participants of this study were children under 14 years old. From 1 January 2001 to 31 December 2007, patients aged 0–14 years (including 14 years) with the admission diagnosis of burns (ICD-9 coded 940–949) were included in the study. Outpatients, patients in the Emergency Department, and children with a main diagnosis of injuries or diseases other than burns were excluded.

2.3. Data collection

For each patient, gender, age, time of burn, etiology of burn, burn sites, burn area (total body surface area, TBSA), depth of burn, length of hospital stay, outcome, and other epidemiological data were collected from the database. The ''Chinese rule of nines'' was used to easily calculate the body surface area of the burn by dividing the full body surface area into eleven sections of 9% each; this practice was first adopted after the 1970 National Burns Conference in China. As an example, if a 4-year-old child presented with burns of the head and neck (9% + (12 − age)% = 17%) and both arms (9%*2 = 18%), this would involve 35% of the body. Pediatric burns were divided into five categories according to the causes: scalds, flame burns, contact burns (with hot non-aqueous substances), chemical burns, and electrical burns. Eight burn site categories were used: head, face, neck, trunk, upper limbs, lower limbs, organs (including eyes, respiratory tract, and digestive tract), and multi-sites. Although inhalation burns have unique features in terms of illness and treatment, very few cases of pediatric inhalation burns were present in the database; thus, inhalation burns were not listed separately and were instead grouped with organs burns.

2.4. Statistical methods

SPSS 19.0 was used for statistical analysis. The mean ± SD (or median) or frequency (percentage) were used for statistical comparisons. Comparisons among groups were analyzed using the Kruskal–Wallis H test or the Mann–Whitney U test for quantitative data or the Chi-square test for categorical data. Linear regression analysis was used to estimate correlations between various characteristics and length of hospital stay, and logistic regression analysis was used to analyze risk factors for death. $P < 0.05$ was considered to be statistically significant.

3. Results

3.1. General characteristics

A total of 172,256 burn patients were admitted to military hospitals in China from 1 January 2001 to 31 December 2007. Of these, 61,068 were pediatric patients aged 0–14 years (35.45%); their mean age was 3.39 ± 3.11 years (median 2.17 years). Among the 61,068 participants, males accounted for 63.84% (38,988), and females accounted for 36.16% (22,080); the male to female ratio was 1.77:1. The mean length of hospital stay was 11.52 ± 12.28 days, and the mortality rate was 0.30% (182) (Table 1).

3.2. Temporal distribution

The prevalence of pediatric burns for inpatients increased over the years of this study, but the mean prevalence was