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Burns 32 (2006) 613–618

BURNS

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Characteristics of 1494 pediatric burn patients in Shanghai

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Accepted 15 December 2005

Abstract

To analyze the epidemiological characteristics of pediatric burn patients in Shanghai and to determine the targets for a pediatric burn prevention program, a retrospective review of all medical records of acute pediatric burn patients (age $\leq$ 14 years old) admitted to the Burn Center of the Ruijin Hospital between January 1980 and December 2002 was performed. Patient demographics, etiology of burn, mechanism of injury, extent and anatomical areas burned, number of operations, and length of hospital stay were recorded. A total of 1494 pediatric burn patients were admitted. Six hundred eighty-seven (46%) patients were from the migrant population (non-registered population of temporary workers from rural areas outside of Shanghai). Scalding was the main cause of pediatric burns in the age groups. Children 0–3-year-old were the most common victims of scalding, chemical burns, and contact burns. Domestic burns resulted in 1293 (86.5%) injuries followed by burns occurring while playing in public. The incidence of domestic burns has increased since the beginning of the study period, while the incidence of burns while playing in public has decreased. The median total body surface area was 4% for mild burns, 10% for moderate burns, and 18% for extensive burns. Predominant areas involved were the head, neck, anterior trunk, and right lower limb. Most children received conservative treatment, and their mean hospital stay was 16.1 $\pm$ 12.2 days. There were 17 (1.1%) deaths, mostly due to sepsis (82.4%). Migrant children are the majority of burn victims since 1996. The education of burn prevention should focus on the migrant population in an industrializing city.

Keywords: Pediatric burns; Epidemiology; Burn prevention

1. Introduction

Burns are the most frequent injury among pediatric patients [1]. The injury, the treatment, and the rehabilitation process affect children not only physiologically, but psychologically as well [2]. The poor prognosis due to scar contractures, deformities, and functional limitations makes their further life more difficult for victims. In addition, the long and painful scar treatment comes with significant financial burden for parents and society [2]. The objective of this study was to analyze the epidemiological characteristics of pediatric burns in Shanghai, the most populus city in China, and to establish the criteria for a pediatric burn prevention program. The Burn Center of the Ruijin Hospital, Shanghai Second Medical University, is the oldest burn center in China (established in 1958) and one of the largest burn centers in the world with 60 beds for acute burns and 10 beds for post-burn reconstructive surgery, and had 826 admissions in 2004. It serves a population of more than 13 million registered residents of Shanghai, and roughly 5 million migrant workers who have migrated from rural areas into Shanghai. There are 1.1 million children of registered residents in Shanghai but the precise number of children belonging to migrant families is not known. While the burn center admits patients from other provinces in China the vast majority of patients are from Shanghai city.

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0305-4179/$30.00
doi:10.1016/j.burns.2005.12.012

Table 1
Gender distribution by age groups

Age group (year)	Gender	Cases no. (%)	Total no. (%)
0–3	Male	577 (61.1)*	945 (63.3)†
	Female	368 (38.9)	
4–6	Male	203 (61.3)*	331 (22.1)
	Female	128 (38.7)	
7–14	Male	125 (61.3)*	218 (14.6)
	Female	93 (38.7)	

* $p < 0.01$ when genders are compared in each age group.
† $p < 0.01$ when compared to other age groups.

2. Materials and methods

All medical records of acute pediatric burn patients (age $\leq$ 14 years old) admitted to the Burn Center of the Ruijin Hospital between January 1980 and December 2002 were reviewed retrospectively. Patient demographics, etiology of burn, mechanism of injury, extent and anatomical areas burned, number of operations, and length of hospital stay were recorded. Information was entered into a database established by one of the authors (MG) from the Ross Tilley Burn Center of the Sunnybrook & Women's College Health Sciences Centre, Toronto, Ont., Canada, and statistical analysis using Student's *t*-test and the Chi-square test was performed with the SAS software. Figures are expressed as averages $\pm$ standard deviation and ranges.

According to the standards formulated by the Chinese Burn Association, the severity of a pediatric burn was classified in four grades: mild (<6% TBSA), moderate (6–15% TBSA), extensive (16–25% TBSA), and critical (>25% TBSA or third degree wound >5% BSA).

3. Results

3.1. Age and gender

A total of 1494 acute pediatric burn patients were admitted during the study period. The average age was 3.5 $\pm$ 2.9 years with range of 4 days to 14 years. There were 905 males and 589 females, representing a male to female ratio of 1.5:1. The ratio of males to females in China was 1.1:1.0 in 2000 [3]. Males had a higher rate of admission than females throughout the age groups (Table 1) and the three time periods (1980–1987, 1988–1995, and 1996–2002, Table 2). Among the age groups, the highest incidence (63.3%) appeared in the 0–3 years group (Table 1). There was no statistical difference in the incidence of burns across the time periods examined (Table 2).

Table 2
Gender distribution by time periods

Period	Gender	Cases no. (%)	Total no. (%)
1980–1987	Male	254 (59.6)*	426 (28.5)
	Female	172 (40.4)	
1988–1995	Male	359 (61.0)*	589 (39.4)
	Female	230 (39.0)	
1996–2002	Male	292 (61.0)*	479 (32.1)
	Female	187 (39.0)	

* $p < 0.01$ when genders compared in each period.

Table 3
Population distribution by age groups

Age group (year)	Local population no. (%)	Migrant population no. (%)	Total no. (%)
0–3	510 (54.0)	435 (46.0)	945 (63.3)*
4–6	185 (55.9)	146 (44.1)	331 (22.2)
7–14	112 (51.4)	106 (48.6)	218 (14.6)
All patients	807 (54.0)	687 (46.0)	1494 (100.0)

* $p < 0.01$ when compared to other age groups.

3.2. Residents and migrants

From 1980 to 2002, 807 (54%) of the 1494 pediatric burn patients admitted to our Burn Center were from the local population, while 687 (46%) cases were from the migrant population (Table 3). Pediatric burns occurred significantly more in the 0–3 years age group in both local and migrant populations (Table 3). There was a significant increase in the number of pediatric burns occurring in the migrant population from 1988–1995 to 1996–2002 (Table 4). The proportion of all pediatric burns occurring in the migrant population rose from 30.0% to 64.3% during this period. In 2002, migrant pediatric burn patients had risen to 92% of the total pediatric burns. The coinciding population increase in the migrant population in Shanghai does not fully account for this increase.

3.3. Mechanisms and causes of burns

Scalding caused 84.3% of all pediatric burns (Table 5). The proportion of burns caused by scalds decreased from 91.2% in the 0–3 years age group to 63.8% in 7–14 years age group (Table 6). 0–3-year-old children were the most common victims of scalding (68.5%), chemical burns, and contact burns (47.6%), compared with other age groups (Table 6). Scalds were more common during 1988–1995 and 1996–2002 than during 1980–1987 (Table 7). Flames (16%

Table 4
Population distribution by time periods

Time period	Local population no. (%)	Migrant population no. (%)	Total no. (%)
1980–1987	271 (63.6)	155 (36.4)	426 (28.5)
1988–1995	365 (70.0)	224 (30.0)	589 (39.4)
1996–2002	171 (35.7)	308 (64.3)*	479 (32.1)
All Periods	807 (54.0)	687 (46.0)	1494 (100.0)

* $p < 0.01$ between geographic regions.