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# The trends of burns epidemiology in a tropical regional burns centre



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## ABSTRACT

**Introduction:** Singapore General Hospital (SGH) is a regional burns centre in Southeast Asia and is the only dedicated burns facility providing specialized burns care in Singapore.

**Methods:** A cohort study was performed for burns patients admitted to SGH from 2011 to 2013. We compared our data with earlier studies and observed the trends of burns epidemiology in Singapore. Results were analyzed using the SPSS programme.

**Results:** 655 patients were admitted during this study period, a 35.9% increase from 2003 to 2005.

Scalding by water and flame injury remain the top causes of burns and the mean extent of burn is 9.5%. TBSA correlates with the incidence of burn infection, bacteremia and mortality. Patients with  $\geq 20\%$  TBSA are at a higher risk of bacteremia, and  $\geq 34\%$  TBSA is a predictor of mortality.

4.9% ( $n = 32$ ) of our patients developed bacteremia. Bacteremia was associated with a surgical duration of  $\geq 80$  min. Patients with bacteremia incurred longer hospitalization, and had higher mortality rates.

Overall mortality rate of our burns patients has decreased from 4.5% to 2.7% ( $n = 18$ ). Key factors of mortality include inhalational injury, bacteremia and  $\geq 20\%$  TBSA.

**Conclusion:** This is a large epidemiology study of a tropical region burns centre. A total of 655 burns cases over a 3-year period were analyzed. We analysed the key factors associated with adverse outcomes including burns infection, bacteremia and mortality, factors associated with mortality, and discussed strategies on the optimization of burns care.

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### 1. Introduction

The Burns Centre at the Singapore General Hospital (SGH) is a regional tertiary burns centre in Southeast Asia and is the only dedicated facility for specialized burns management in Singapore, serving 5 million residents. There have been previous analyses of the epidemiology of patients at SGH [1-5]. In our last study, we conducted a multivariate analysis of burns admissions at SGH from 2003 to 2005 [5]. On the background of a rapidly increasing Singaporean and Southeast Asian population, we now present our centre's burns epidemiology from 2011 to 2013.

### 2. Materials and methods

A prospective cohort study was performed for all burns patients admitted to SGH from 1 January 2011 to 31 December 2013. Data was retrieved from SGH's electronic medical records, and compared to our previous study [5] to analyse the trends of burns epidemiology at our centre.

We studied the patient demographics, burns profile, and resource allocation including bed and surgical interventions. We divided our patients into 5 groups according to extent of burns (<10%; between 10 and <20%; 20 and <30%; 30 and <40% and ≥40% TBSA) and sub-analysed each groups' impact on various key markers of statistical importance to our centre. We also investigated the key factors associated with adverse outcomes including burns infection, bacteremia and mortality.

Results were analysed using the SPSS programme. Results with *p* < 0.05 were considered statistically significant.

### 3. Results

#### 3.1. Admissions

From 2011 to 2013, there were 655 burns admissions to SGH, which is a 35.9% increase from 482 admissions between the study period of 2003 to 2005 [5]. The mean annual admission has increased from 161 to 218. This increase in admissions draws parallels with the growth in Singapore's population, which has increased 31% from 4,114,826 in 2003 to 5,399,162 in 2013 [6].

#### 3.2. Burns patient profile

In line with Singapore's ageing population, the mean age of our burns patients has increased from 35.0 to 42.6 (S.D. ± 17.5) years old. Our patient population consists of mainly adults. Only 5.6% (n = 37) of our patients were under 21 years old as most pediatric patients get admitted to the nearby Kerdang Kerbau Women's and Children's Hospital. We have included this subgroup of patients in our study as majority were teenagers - mean and median age is 17 and 18 years respectively. The male: female ratio has reduced from 1.9: 1 to 1.5: 1.

With the influx of foreign workers in Singapore, the proportion of foreigners has also increased from 34% to

38.7% (n = 254). Our foreign patients have a mean age of 35.5 (S.D. ± 14.6) years old, and a male: female ratio of 2.4: 1.

#### 3.3. Source of referral

60% (n = 393) of our patients were admitted from the SGH Department of Emergency Medicine (DEM), 16% (n = 102) were admitted via our burns clinic, 15% (n = 98) were transferred from other tertiary hospitals, and 9% (n = 62) were transferred from overseas.

Cases were referred from other local hospitals for multiple reasons - 60.2% (n = 59) of these cases required surgical intervention, 6.1% (n = 6) had inhalational injury and 12.2% (n = 12) had chemical burns. Cases referred from overseas had statistically significant larger mean TBSA of 20.9% (S.D. ± 19.9) compared to 8.4% (S.D. ± 13.0) locally (Table 1).

#### 3.4. Time to treatment

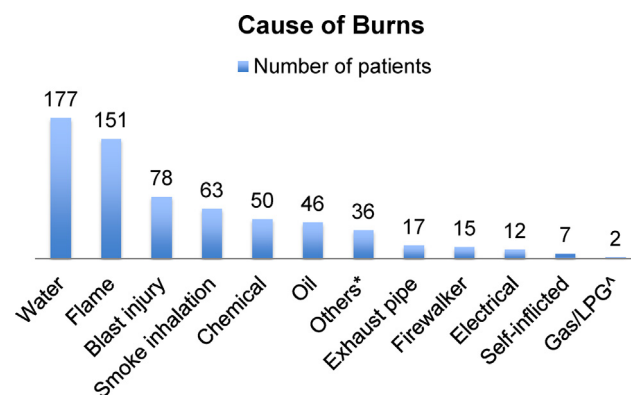
The time interval from injury to admission has remained relatively constant. With an efficient transportation infrastructure and an integrated healthcare system, most of our local patients are admitted on the day of injury. The mean time to admission was 3.6 (S.D. ± 12.6) days and a median of less than 24 h from the day of injury. Over the years, the mean time from injury to surgery has decreased from 7.3 to 6.5 (S.D. ± 10.8) days.

#### 3.5. Cause of burns

Scalding by water (27.0%) and flame injuries (23.0%) remain the top causes for burns in our patients (11.9%) (Chart 1).

**Table 1 - Burn sizes according to referral sources.**

Source of referral	SGH DEM (n = 393)	Other local hospitals (n = 98)	Burns Clinic (n = 102)	Overseas (n = 62)
Average TBSA (%)	8.9	9.1	4.8	20.9



**Chart 1 - Cause of Burns.**

\*Examples of burns classified under "Others" include molten plastic and hot surfaces.

^ Liquefied petroleum gas (LPG).

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