

## Epidemiology and mortality of burns in a general hospital of Eastern Sri Lanka

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### Abstract

This 2-year prospective study examined the epidemiology and mortality of 345 patients admitted with burn injuries. Sixty-four percent of all burns were accidental in nature and at least 25% were self-inflicted. The rest were due to assaults or had a doubtful cause. The median age was 22 years. Forty-one percent of the accidents were due to the fall of a homemade kerosene bottle lamp. The main cause was flames, followed by scalds. Females outnumbered males in all categories of burns except cases of assault, and suffered from a higher mortality. Most at risk of accidental burns were children between 1 and 4 years, who suffered primarily from scalds. Self-inflicted burns were most common among women aged 20–29 years. The overall median total body surface area (TBSA) burned was 16%. Self-inflicted and 'doubtful' burns were much more extensive and more often fatal than accidental ones. The overall mortality rate was 27%. Burns involving more than 50% of the body surface area were invariably fatal. Mortality was highest in the elderly and in the 20–29 years age group. Burns were the first single cause of mortality in the surgical wards. The case is made for the establishment of more Burns Units.

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### 1. Introduction

Batticaloa General Hospital, in the Eastern Province of Sri Lanka, is a tertiary care facility serving the whole of Batticaloa district (half-million population, mostly rural) and part of Ampara district. Ethnic Tamils (Hindus and Christians) are in majority (74%), while ethnic Muslims represent 25% of the population.

Since 1987, due to the absence of national surgeons and in relation to the conflict that has affected this part of the island, surgery in Batticaloa has relied overwhelmingly on the presence of Médecins Sans Frontières (MSF) surgeons assisted by Sri Lankan junior doctors. MSF is a private, independent, non-profit organisation relying on volunteer health professionals to provide medical aid to populations in crisis.

Other hospitals are treating minor burns, but this is the only referral hospital for severe burns in the area. Burn patients are admitted to the general surgical wards. The

country's only burn centre in the capital city is an 8 h drive away, and patients are not transferred to that facility.

The continuous audit whose results are reported here was set up in 1999 with the objective of finding the incidence, cause and outcome of burns in this hospital, in order to better address the problem.

### 2. Method

This study was prospective and covered 2 years (1st July 1999 to 30th June 2001). Data for all patients admitted with burns were recorded on a standardised form.

The total body surface area (TBSA) burned was estimated by the rule of 9 for adults and the Lund and Browder's charts for children. The depth of burn and the presence of other severity factors were also noted.

We have classified as self-inflicted those cases acknowledged by patient or relatives during the course of hospitalisation. Doubtful cases were those where the distribution of the burns or the behaviour of the patient or her relatives suggested that they were not accidental. In order to determine district burn mortality, inquiries were made from other hospitals.

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### 3. Results

During the 2-year period studied, 345 patients (222 females and 123 males) were admitted to our hospital with burn injuries. Two hundred and fifty-eight of them (75%) were from Batticaloa district, 68 (20%) from Ampara district, 2 from other districts and 17 were unspecified.

Analysis of the circumstances showed that 221 burns (64%) were accidental in nature, 87 (25%) self-inflicted, 12 (3.5%) followed an assault and 25 (7.5%) were of doubtful origin (allegedly accidental but thought to be self-inflicted or due to violence).

Ninety-one (41%) of the accidental burns were due to the fall of a kerosene bottle lamp and 61 (28%) were scalds, which affected mostly young children. Falls into an unprotected fire, cooking accidents, or attempts by the husband to rescue his wife attempting suicide (suicide-related burns) were less common (Fig. 1).

As far as the type of burn was concerned, 65% of the accidents were due to flames, 28% were scalds, 3% electrical and 2% were contact burns (7 accidents were otherwise unspecified).

Flames caused all self-inflicted and doubtful burns. Eight (67%) of the assaults were inflicted by flames and four (33%) by acid. Three hundred and thirty-two (96%) of the burns happened in the home, 13 (4%) outdoors. Only two of the accidental burns were occupational in nature, all the others were domestic burns. Three patients were epileptics who got burned during a fit. None of the burns was war-related.

Age distribution appears in Fig. 2. The median age for all burns was 22 years. Accidental burns affected patients between 25 days and 80 years of age, were commonest (32%) among children of under 5 years and had a median age of 12 years. The age of patients with self-inflicted burns ranged from 15 to 50 years and had a median of 27 years.

Sex distribution is shown in Fig. 3. The male-to-female ratio was particularly low in the self-harm group (0.26) and in the 'doubtful' group (0.25).

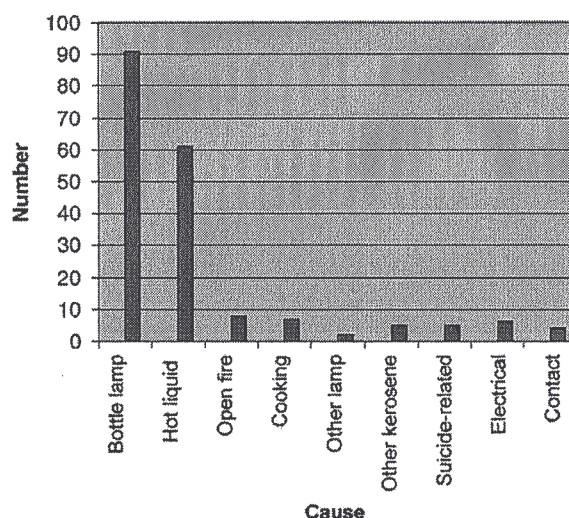


Fig. 1. Cause of accidental burns.

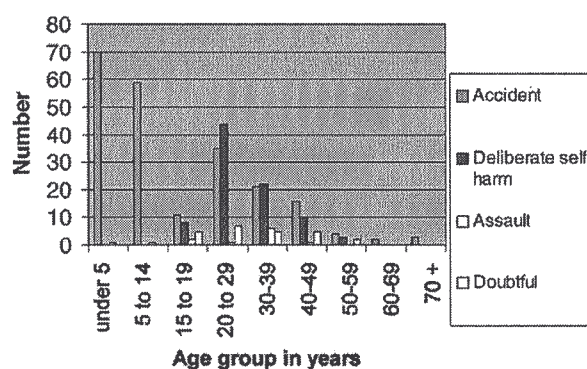


Fig. 2. Age distribution according to circumstances.

The same ethnic Tamil/Muslim ratio (4.4) was found for accidental burns and deliberate self-harm burns.

The distribution per total body surface area (TBSA) burned is shown in Fig. 4 and its relationship with the

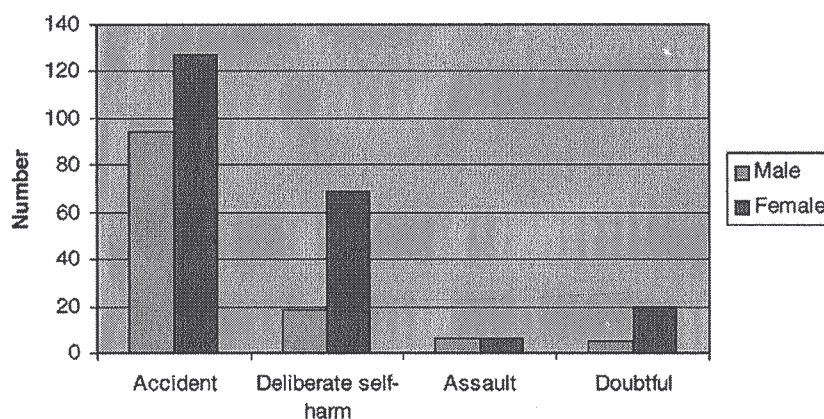


Fig. 3. Sex ratio of burns.



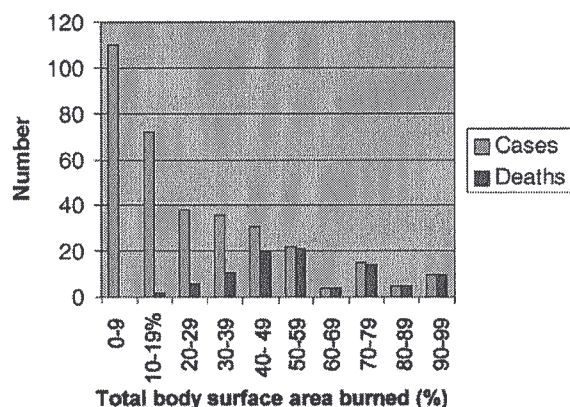


Fig. 4. Number of cases and mortality per body surface area burned.

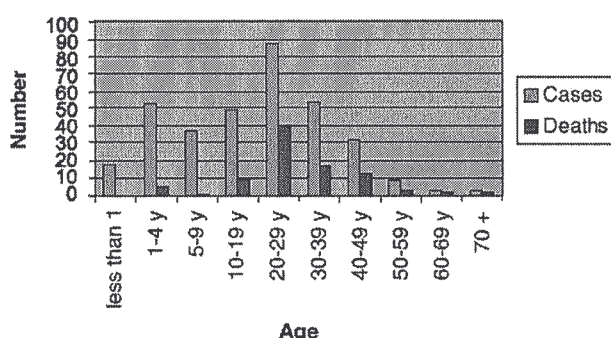


Fig. 5. Mortality according to age.

cause of burn in Table 1. The median TBSA burned for all ages and all causes was 16%. Ninety-three patients (72 women and 21 men) died of their burns, yielding an overall mortality rate of 27%. Female mortality was 32% and male mortality was 17%. Sixty-eight of the fatalities were from Batticaloa district, yielding an annual burns mortality rate of 6.8/100,000 person-years for this district.

Mortality in relation to the circumstances of the burn is shown in Table 1. Relationship with burn surface area is shown in Fig. 4 and with age in Fig. 5. During the period studied, burns accounted for 40% of all the deaths in the surgical wards. It was the first single surgical cause of death.

The mean number of days between admission and death was 6, ranging from a few hours to 60 days (Fig. 6).

#### 4. Discussion

The injury rate for Batticaloa district of 258/1,000,000 person-years is conservative, knowing that some minor burns were treated in other hospitals. The burns mortality rate is more accurate as we know that no other burn deaths have occurred in other hospitals.

Most burn victims were children who sustained accidental, relatively minor burns, and spent a short time in hospital. Admissions were quite liberal and even patients with minor burns easily got admitted through the outpatient department, explaining the 32% patients with less than 10% TBSA burned.

But the hospital also cared for victims of extensive burns who, in contrast, require an intensive initial resuscitation, multiple surgical procedures and dressings: 25% of the patients had burns of over 40% TBSA. Durations of stay for these patients stretch into months, placing great demands on the limited resources. Predictably, in a General Hospital with no special facilities to care for burns, the outcome of such severe injuries is poor. The proportion of cases that died according to age had a bimodal distribution, with high rates in the elderly (66% in the 60 years and above group) and in the 20–29 years age group (46%). Seventy-seven percent of burn fatalities affected women. The over-representation of deliberate self-harm, with their extensive burns, accounts for the excess mortality in the latter age group and also among women. Due to local beliefs that blood donation is harmful, blood is always in short supply and this is an obstacle to early burn wound excision and grafting. Burns involving more than 50% of the TBSA were invariably fatal (one patient who was expected to die was taken from hospital by relatives shortly before her inevitable death). The cut-off point seems to be 40% TBSA burned, with a 30% mortality rate in the 30–39% TBSA burned group, compared with a 65% mortality rate in the 40–49% TBSA burned group.

The overall mortality was lower than that reported from eastern and western India and Iran [1–3], but our hospital comparatively had a smaller proportion of massive burns. Conversely, our mortality was higher than that reported in a Burns Unit in Malawi [4] and Pakistan [5] but our

Table 1  
Compared total body surface area (TBSA) burned and mortality according to the cause of burn

| Cause                                 | Median TBSA burned (%) | Range TBSA burned (%) | Number of deaths and mortality rates |
|---------------------------------------|------------------------|-----------------------|--------------------------------------|
| Accident ( <i>N</i> = 221)            | 10                     | 1–72                  | 12 (5)                               |
| Deliberate self-harm ( <i>N</i> = 87) | 48                     | 8–95                  | 61 (70)                              |
| Doubtful ( <i>N</i> = 25)             | 45                     | 5–90                  | 16 (64)                              |
| Assault ( <i>N</i> = 12)              | 23.5                   | 1–98                  | 4 (33)                               |
| All burns ( <i>N</i> = 345)           | 16                     | 1–98                  | 93 (27)                              |

The values in parentheses are percentages.

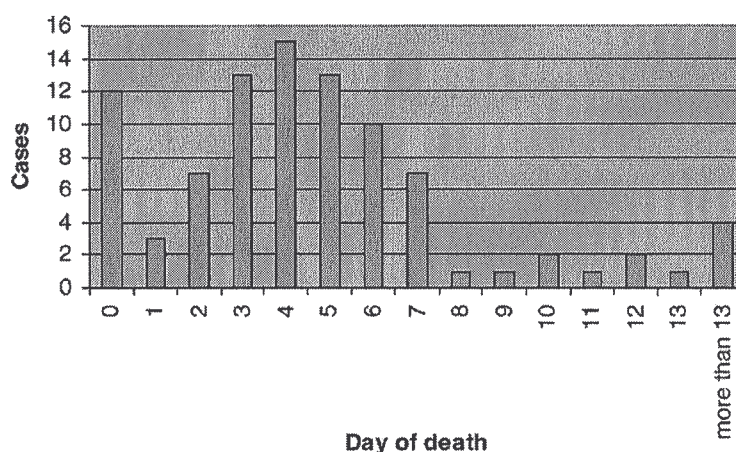


Fig. 6. Number of days between admission and death.

patients, although unselected, had more extensive burns. Our outcomes were similar to those of an Angolan Burn Unit [6] and a Nepalese Regional Hospital [7], which both had many more minor burns. The fact that many of the severe burns are self-inflicted or of 'doubtful' cause is a matter of grave concern and has been studied separately [8].

Females outnumbered males in all categories of burns except those following assault. The excess of females was most marked among those committing self-harm and in the 'doubtful' group. Burns by assault, distressing as they were, never reached the scale described in India [9].

As in other parts of Sri Lanka, makeshift kerosene bottle lamps proved very hazardous: the flame is exposed; they are unstable and topple easily. It is the only source of light in many homes without electricity and they are also used in other homes during the frequent power cuts.

## 5. Conclusion

This study confirmed the occurrence of burn injuries as a significant health problem in this part of Sri Lanka as in many other countries [10]. Prevention should focus on the promotion of safer lamps, ideally with a protective glass around the flame. Failing that, the cheap lamps promoted by the Safe Bottle lamp project are a great improvement on the improvised devices. On account of the problems faced in nursing burn victims in general surgical wards, and the practical impossibility of safely transferring critically ill patients over long distances, the establishment of some Burns Units in the periphery of the country should be given due consideration by the Health Authorities.

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