ORIGINAL ARTICLE

The Bradford Burn Study: the epidemiology of burns presenting to an inner city emergency department

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Objective: The Bradford Burn Study prospectively reviewed all burn attendances at a single emergency department in the UK over a 1 year period. The study reviewed the epidemiology, demographics and outcomes of all patients entered into the study.

Design and setting: A 12 month prospective study of burn injuries attending an inner city emergency department serving a population of 1 million people.

Results: 460 patients were enrolled into the study. Average patient age was 22.7 years, male: female ratio was 1:1.4, and children <10 years of age accounted for 36% of the case mix. Asian patients accounted for 41% of all attendances; 85% of the cases in the study were accidental in nature, with scalds accounting for 52% of the injuries. Final outcomes were as follows: 54% of patients were reviewed by the emergency department physicians and only one of these patients ultimately needed skin grafting; 19% had follow-up by their primary care physicians; 12% were reviewed by plastic surgeons, and 5% were admitted; of those patients admitted, 16% needed surgery; only 12 patients (3%) were admitted to specialised burn units.

Conclusions: Emergency departments manage patients with burns well, and referrals to plastic surgery departments are appropriate. The majority of burns can be prevented by addressing educational issues and vulnerable sections of the population.

Burns are a common injury presenting to the emergency department (ED). Studies have shown that burn injuries account for 0.96–1.4% of all attendances to EDs.[1] The majority of patients attend the ED to seek initial medical assessment and treatment. Previous studies looking at burn epidemiology have been limited for a variety of reasons including retrospective data collection, limited study periods leading to small populations, and because they looked at the management of burns that require the services of specialist secondary and tertiary centres.[2–4] Although burns are a common cause of injury worldwide, and a review of the literature indicates this, the findings from these studies cannot be extrapolated to the UK setting because of differences in social and healthcare provision.[5–7]

The Bradford Burn Study was a prospective study carried out over a 12 month period and reviewed patients who had sustained a burn injury attending the ED at the Bradford Royal Infirmary (BRI).

The ED at the BRI serves a population of approximately 1 million and has approximately 115 000 new attendances per annum, making it one of the busiest EDs in the UK.

We set out to characterise the epidemiology, demographics and outcomes of all burn injuries attending the ED at the BRI between March 2003 and March 2004.

Table 1 Guidelines for the referral of burn patients to plastic surgeons in the Bradford Burn Study

- Any partial thickness loss burn injury involving 10–20% of body surface area in individuals over 10 years of age
- Any partial thickness loss burn injury involving 5–10% of body surface area in individuals less than 10 years of age
- Burns involving the face, eyes, perineum, feet, hands and genitalia or those that may cause significant cosmetic impairment
- Burns involving the airways and those associated with inhalational injury
- Any full thickness burn more than 5% of burn surface area

PATIENTS AND METHODS

Data on patients attending the ED with any burn injury were collected on a standardised burn collection form. Doctors working in the ED were made aware of the study and filled in the forms as they attended to the patient. All new doctors working in the department were given instruction on how to fill in the data sheets; it was also ensured that they were able to assess burn depth and burn surface area. On a weekly basis the computerised patient attendance records of patients were checked to ensure that none of the burn patients were missed; ED notes were then located and the data forms were completed. Referral to the plastic surgeons was made using standard referral guidelines as per departmental guidelines (table 1).

In addition the regional burns units and the plastic surgery wards at the BRI were contacted on a regular basis to ensure rigorous and complete data capture.

All data were then fed into an Access (Microsoft Corp, Seattle, Washington, USA) database for analysis.

RESULTS

During the study period 460 patients were identified as having attended the ED with burn injuries; records were available for all patients.

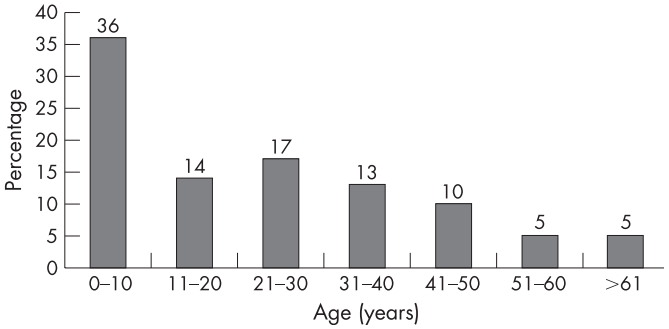

Figure 1 Age distribution of patients in the Bradford Burn Study.

Patient age and sex, ethnicity and occupation

The male to female ratio was 271:189 (1.41:1.0). Figure 1 demonstrates the age distribution of the patients recruited into the study; the majority of the patients fell into the <10 years bracket, and the mean age of attendance was 22.7 years. The average age of the children was 5 years; the largest group of children were the 1-year-olds.

The largest proportion of the study sample (212 (46%)) were classified as children or students, and the second largest group were semi-skilled workers (54 (12%)). The majority of injuries fell into two main groups: accidental injuries accounted for 390 (85%), and 13% were work related.

In terms of ethnicity, white patients sustained 57.1% of burns compared with 40.8% in patients of Asian origin.

Monthly variation, time of injury and delay to presentation

Burn attendances also followed a monthly variation (fig 2), with a peak incidence in the month of November coinciding with the annual firework display season.

There were 460 burns in the 1 year period which correlated to just over one case per day. Fifty per cent of the burns presented between 16.00 and midnight, and 42% presented between 08.00 and 16.00; 49% of patients presented within the first hour after sustaining their injuries, the majority (88%) presenting within 24 h.

Causes of burns

More than half the injuries (52%) were caused by hot water and steam, while 23% were contact burns, and a further 16% were due to flame or fire exposure. Figure 3 shows the different mechanisms of burn injury in the study.

Of all the scald injuries, 56% occurred in the kitchen; carrying and preparing hot tea, coffee or milk accounted for nearly all these injuries.

Burn location, severity and systems involvement

During the study period there were only seven individuals who had sustained more than 15% burns. Sixty-five per cent of patients had sustained between 1–5% burns; most burns (86%) were classified as partial thickness, full thickness burns were present in 3% of patients, and 5% of patients had both partial and full thickness burns.

Burns most commonly occurred on the wrist and hand (36%), upper limb (21%), lower limb (16%), and face, head and neck (9%); 11% of patients had multiple injury sites. While 98% of patients sustained no other injuries, there were three ophthalmic injuries, two associated pulmonary injuries (one of which required intubation and ventilation), and one patient sustained orthopaedic injuries.

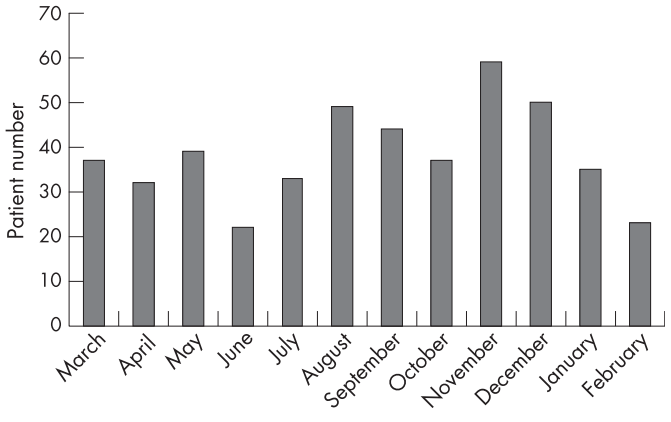

Figure 2 Monthly burn attendances during the Bradford Burn Study.

Pre-hospital first aid and analgesia

There were a wide range of first aid measures used by the injured. These ranged from irrigation with cold water (51%) through to no first aid at all (29%). Our study also revealed the use of topical application of toothpaste (4%) as being a popular pre-hospital measure (fig 4).

Interestingly, 88% of patients did not take any analgesia before attending the ED; only 10% of the study population took a proprietary analgesic before review in the ED.

Patient outcome

After the initial assessment and treatment, patients were channelled to different follow up facilities depending on the severity of injury, and consideration of patient's clinical requirements.

Figure 5 shows the various destinations of the patients. The majority (54%) were reviewed in the ED clinic which is run by senior physicians. Seven per cent were admitted to the plastic surgery unit on the day they attended the ED, one patient was admitted to the intensive care unit at the BRI, and 12 patients were transferred to specialised burn units. Approximately 20% were discharged for review of their injuries by their primary care practitioners.

Ninety-eight per cent of patients who attended the ED review clinic were discharged without complication, four patients were referred to the plastic surgery review clinics for wound review, and only one patient of the 250 who attended the ED clinics received a skin graft. All patients referred to the plastics dressings clinics were managed without need for surgical intervention. The four patients who were referred to the plastic dressings clinic were not included in the figures attending the ED review clinic. Of the patients admitted to the plastic surgery unit for treatment, 16% required surgery; the remainder were treated by dressings.

DISCUSSION

Resource allocation, prevention programmes and public awareness for a particular health issue can only be achieved if robust epidemiological and demographic data are available.

The Bradford Burn Study is the first prospective study reviewing burn injured patients over a 1 year period and to do so with addressing the final outcomes of all patients who entered the study. It has resulted in a large database of information which can be used to review the demographics and the epidemiology of burn injuries, and to look at ways of improving the care of burn injured patients.[1 3 4]

There have been several studies looking at the epidemiology of burn injuries. A large number of publications have focused primarily on those patients who attend specialist burns units. These studies do not take into account the vast majority of burn injuries that occur, and those that are managed by EDs and local plastic surgery units.

Those studies that have looked at the latter group of patients are retrospective studies conducted over short periods of time and with small sample populations, which focused on uncertain outcome measures if any at all.[2 7]

We have shown that the attendance rates of burns are similar to other studies carried out in the UK. As with other studies males do present with more burn related injuries than females. Though there were a large number of children injured in the study population, the most common group to be injured were males between 21–50 years of age, which correlates with the work carried out by Wilkinson.[1]

The Bradford Burn Study does highlight the prevalence of burn injuries among the Asian population, which accounts for approximately 10% of the population of Bradford. The majority of this population is of Pakistani origin. What surprised us was

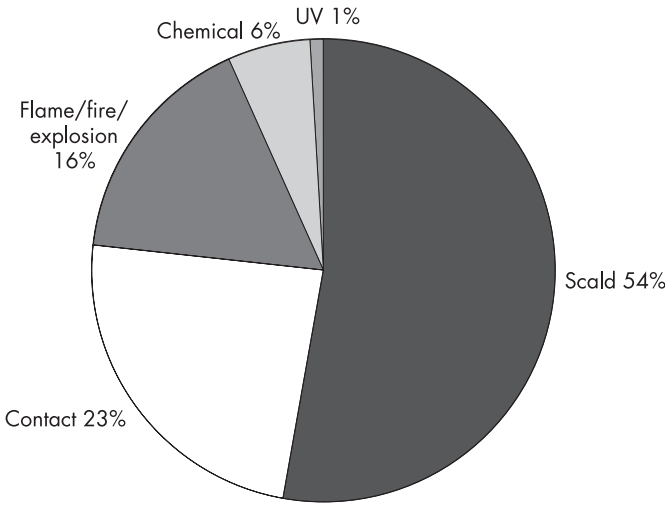

Figure 3 Mechanism of burn injury during the Bradford Burn Study.

that despite being 10% of the population of the city, they accounted for 41% of the patients injured by burns—this is the first study to highlight this situation. Males were still more likely to sustain burns than females, and children under 10 years of age accounted for 48% of the cases, compared with 28% in the non-Asian population. In the Asian population 87% of burns occurred in the home compared with 61% of the non-Asian population.

As with most other studies, scalds are the most common cause of burn injury and most commonly occur in the kitchen. This fact has been recognised and programmes focused on the prevention of scald related injuries and safety in kitchens are well established.[8 9]

The lack of effective pre-hospital first aid administration and minimal use of pre-hospital analgesia only further emphasises the need for some simple strategies which could be highlighted in a public awareness programme.[10] The use of remedies such as putting toothpaste on burns, practised exclusively in the Asian population, indicates an area where further educational strategies are required. There is no evidence in the literature to support the use of toothpaste in these circumstances, although anecdotally it appears to reduce the pain from minor burns.

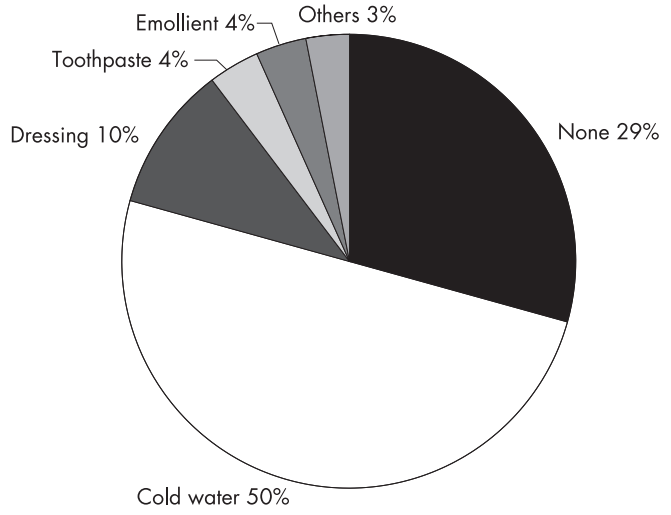

Figure 4 Pre-hospital remedies by patients in the Bradford Burn Study.

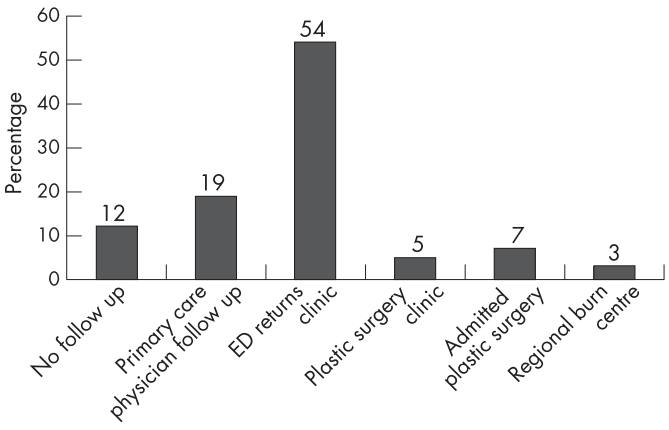

Figure 5 Outcome of patients in the Bradford Burn Study.

The study demonstrated that the majority of patients attending EDs can be managed effectively without the need for referral to plastic surgery services. In Bradford, this situation has resulted from consultant led burns clinics and a close working relationship between both the ED and the plastic surgery department. Most burns can be managed conservatively without the requirement of skin grafting; education of nurses and junior medical staff about burn assessment and management will continue to improve management in this field further. Major burns should require the involvement of plastic surgeons at an early stage, as they will play a role in the subsequent management of these patients.

The adage that ''prevention is better than cure'' rings particularly true in the case of patients who have sustained burns, the majority of which are accidental in nature. As this study highlights, if we are to reduce the impact of burn injuries as a cause of morbidity, more work needs to be done to educate individuals on how to prevent burns occurring in the first place, and on effective pre-hospital treatments, especially among those in the Asian community.

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