

# Paediatric burns in a rural South African district hospital

Mickey Chopra, Helen Kettle, David Wilkinson, Susy Stirling

*Objectives.* To describe the epidemiology, clinical features, management and outcome of children with burns admitted to a rural district hospital.

*Design.* A retrospective analysis of the case notes of consecutive cases of paediatric burns.

*Setting.* Hlabisa Hospital, KwaZulu-Natal — a 450-bed rural district hospital serving approximately 200 000 people.

*Subjects.* All cases of paediatric burns (age < 12 years) admitted to Hlabisa Hospital in 1994.

*Main outcome measures.* Number of admissions, month of admission, age, sex, time to presentation, site of burn, complications, number of surgical procedures, adherence to management protocol and outcome.

*Results.* One hundred and forty-nine children presented to the outpatient department in 1994 and 88 (59%) were admitted. The median age of those admitted was 36 months with 66 (75%) aged less than 5 years; 42 (48%) were boys. Thirty-nine children (44%) were admitted during the four winter months of May to August. The average interval from the time of the burn to presentation at hospital was 42 hours (range 1 - 120). Sixty-eight burns (77%) were due to hot fluid or food burning the legs, trunk or arms. There was a high level of morbidity. Nineteen (22%) children developed wound infections, 5 (6%) developed contractures and 20 (23%) required a total of 32 surgical procedures. There was 1 death. Burns were responsible for more paediatric patient days spent in hospital than any condition other than malnutrition, and a longer length of stay was associated with delay in presentation. Children presenting within 24 hours of the burn had a mean length of stay of 12.8 days, compared with 25.2 days ( $P = 0.03$ ) for children presenting 24 hours or more after the burn. Twenty of the 22 children who stayed for longer than 3 weeks or who required transfer were judged to have been managed inadequately in at

---

Hlabisa Hospital and Centre for Epidemiological Research in Southern Africa, Medical Research Council, Hlabisa, KwaZulu-Natal

Mickey Chopra, BSc, BM, DCH

David Wilkinson, BSc, MB ChB, Dip PEC, DTM&H, DCH, MSc (Epi)

Susy Stirling, MB ChB, DCH

Department of Medicine, Edinburgh University, Edinburgh, UK

Helen Kettle, MA (Cantab), MB ChB



least one respect compared with 3 of 48 who were discharged within 2 weeks or not transferred ( $P < 0.001$ ).

**Conclusion.** This study shows that paediatric burns are an important cause of morbidity and contribute significantly to inpatient stay in this rural setting. The lengthy delay from time of burn to presentation at hospital is of serious concern and our results show that this delay is associated with increased hospital stay. As most burns were due to spillage of hot fluids or food there seems to be significant potential for preventive interventions. Community-based studies would help to estimate the true incidence of burns and would contribute to an understanding of the reasons for delay in presentation. The information gathered is being used to inform the development of a burns prevention programme.

*S Afr Med J* 1997; 87: 600-603.

Burns in children are increasingly recognised as an important cause of morbidity and mortality in developing countries.<sup>1</sup> In Nigeria, burns in children accounted for one-third of accidental injury admissions at a tertiary hospital.<sup>2</sup> In its review of accidental child deaths in South Africa, the Child Accident Prevention Centre found that 3% of paediatric deaths were due to burns.<sup>3</sup> However, this excluded the ex-homelands where the proportion is likely to be higher because of the greater use of fires and relatively small amount of traffic. It also does not reflect the significant morbidity and disability associated with burns. The cost of treating burns can also be substantial; over a 7-year period in a district hospital in Ethiopia the cost of treating burns was estimated at more than US \$86 000.<sup>4</sup>

Despite its possible significance as a public health problem, very little information about the epidemiology, clinical features and outcome of paediatric burns in rural South Africa is available. It is therefore important to quantify and describe the problem if effective public health interventions are to be carried out.

The outcome of burns is greatly influenced by the quality of care that patients receive. Burns treated at Hlabisa Hospital should be managed in accordance with a burns protocol included in the *Hlabisa Hospital Standing Orders and Management Guidelines* (unpublished). This is based on Bloch's *The Burns Handbook*<sup>5</sup> and King's *Primary Surgery*.<sup>6</sup> The protocol emphasises 'four pillars of care': (i) that children with more than 10% burns should receive intravenous fluids; (ii) that all children should receive a high-protein diet plus vitamins and trace elements; (iii) careful wound care; and (iv) skin grafting. In addition, antibiotics should not be given unless there are signs of systemic infection or a pathogen is cultured from the burn (we use ampicillin and cloxacillin until sensitivity results are available). We also emphasise the importance of adequate analgesia with regular paracetamol and opiates prescribed on an as required basis. Tetanus toxoid is given unless there is documented evidence of complete previous immunisation.

The aim of this study was to describe the epidemiology, clinical features, management and outcome of paediatric burns admitted to Hlabisa Hospital. The study was undertaken to start the process of understanding the

aetiology of burns in our setting and to inform the development of a burns intervention programme.

## Methods

### Setting

Hlabisa is situated in northern Kwazulu-Natal, South Africa. The summers are hot and often wet, while winters are cool and dry. The population of about 200 000 is predominantly black, living in rural areas with little electricity, and reliant upon firewood and paraffin for cooking fuel. The traditional diet consists of 'mealie-meal' porridge, which is a corn-based porridge that requires prolonged boiling and cooking in large open-mouthed cast-iron pots. This is usually done in open fireplaces in the middle of the kraal or main hut.

The health district is served by 8 residential clinics; these are serviced by regular transport to the 450-bed district hospital, which is staffed by general duty medical officers. In 1994 there were 29 000 outpatient attendances and 10 000 admissions.

### Subjects

Children with burns are seen in the outpatient department by the attending medical officer and primary health care nurse. Patients with the following are admitted: burns to the face, hands or perineum; full-thickness burns; burns covering more than 10% of body surface area; and infected burns that cannot be managed on an outpatient basis.

The outpatient department register and the ward admission registers were searched retrospectively for a diagnosis of burns. All relevant information was extracted from patient records and entered into a computerised database.

### Patient management

Patient management was assessed independently by two investigators (M C and H K). Four specific categories were assessed: analgesia (judged according to the severity of the wound), fluid replacement, antibiotic therapy and timing of skin grafting (judged according to the protocol).

### Statistical analysis

Data capture and analysis were by means of Epi-Info version 6.02 (Centers for Disease Control, Atlanta, USA). Continuous data, e.g. age, delay in presentation, were compared by the non-parametric Kruskal-Wallis test. Comparison of categorical data was by the chi-square test.

## Results

In 1994, 149 children presented to the outpatient department with a diagnosis of burns and 88 (59%) were admitted. These constituted 7% of all paediatric admissions. There was a seasonal variation, with 39 (44%) children admitted in the four winter months of May to August. The following analysis refers to admissions only.

The median age was 36 months and 66 children (75%) were less than 5 years old; 42 children (48%) were boys.



The average interval from burn to presentation at hospital was 42 hours (range 1 - 120). The 47 patients who presented to hospital within 24 hours had a shorter inpatient stay (mean 12.8 days) than the 41 patients who presented more than 24 hours after their injury (mean 25.2 days;  $P = 0.03$ ).

There were several different causes of burn (Fig. 1), but 68 burns (77%) were due to spillage of hot fluid or food.

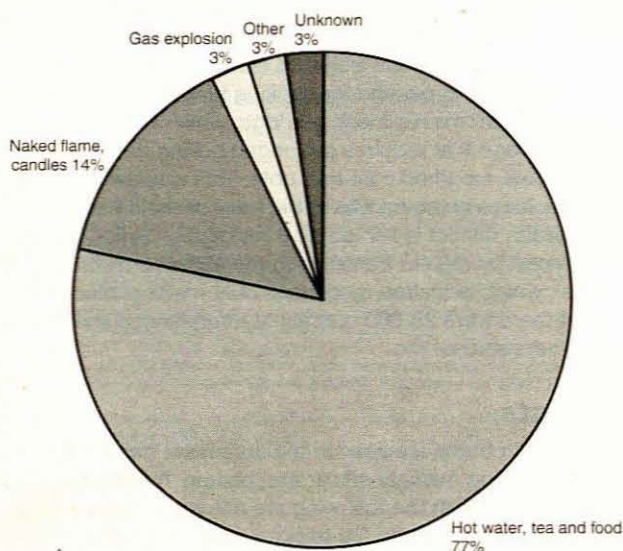


Fig. 1. Causes of burns.

Seventy-four children (84%) sustained superficial or partial-thickness burns, and 14 (16%) sustained full-thickness burns. Seventy-one children (80%) sustained burns on less than 10% of body surface area, 12 (14%) on between 10 and 20% and 5 (6%) on more than 20%.

The lower limbs were the most common site involved (Table I) and 37 children (42%) were burnt at more than one site. The site of the burn was not significantly related to complications, surgery or length of stay ( $P > 0.05$ ).

Table I. Predominant site of burn

	No.	%
Lower limbs	30	34
Trunk	19	21.6
Arms	13	14.8
Face	8	9.1
Hand	7	8
Groin	5	5.7
Head/neck	4	4.5
Not recorded	2	2.3
Total	88	100

Nineteen children (22%) developed wound infections. Five (6%) went on to develop contractures. Twenty children (23%) required a total of 32 surgical procedures: there were 19 skin grafts, 10 wound debridements and 3 contracture releases.

Thirty-six children (41%) were prescribed inadequate or no analgesia, 14 (16%) did not receive adequate amounts of

fluid, 16 (19%) were given antibiotics inappropriately, and 1 child was grafted too early, i.e. between days 2 and 11 after the burn.

All 14 children who stayed in hospital for more than 21 days and 6 of the 8 who were transferred to more sophisticated facilities were judged to have been inadequately managed in at least one respect. By comparison, only 3 of the 48 (6%) who were discharged within 2 weeks or not transferred were inadequately managed ( $P < 0.001$ ).

Seventy-nine patients (90%) were discharged from hospital and 8 (9%) required transfer to a tertiary hospital. A 6-month-old child who presented with a 25% burn died the day after admission. The 88 patients spent a total of 1 606 days in hospital, with a mean length of stay of 18.3 days (range 1 - 131). In terms of paediatric patient-days, only admissions with malnutrition exceeded this.

## Discussion

This study shows that burns are a significant cause of morbidity in children living in this rural area, with several children requiring lengthy hospital stay and some needing multiple surgical procedures. The most important finding was that significant delay in presentation to hospital for care was associated with prolonged hospital stay. There were several reasons for delay in presentation; these included self-treatment at home, consultation with traditional healers and transport costs. This can lead to prolonged hospital stay as the child may only be brought to hospital once the wound has become infected. Delay also results in deeper wounds and increased healing time.

Even though burns accounted for only 7% of all paediatric admissions, they were responsible for the second largest number of patient days spent in the paediatric ward. The prolonged stay was associated with late presentation and many of these children had infected burns that required intensive nursing and surgery. This heavy morbidity is reflected in the comments of the medical staff working on these wards who report that most of their time is spent caring for children with burns.

The number of admissions reported is higher than in other series from Africa. Onuba and Udiodiok<sup>7</sup> reported 87 children over a 2-year period at a tertiary referral centre in Nigeria and Courtright *et al.*<sup>4</sup> reported 151 cases over a 7-year period in a district hospital in Ethiopia. These differences may reflect different access to services, different types and size of population served, different admission criteria or different incidence of burns.

Some authors<sup>8,9</sup> report flame to be the commonest cause of burn, but in this series hot fluid or food was the most frequent cause. This may reflect the rural nature of the population with relatively fewer households storing gas or paraffin. Unlike in the Nigerian series, there was no female preponderance,<sup>7</sup> but the age range was similar to previous studies,<sup>10-12</sup> with most cases occurring in the 12 - 48-month age group.

As this analysis was retrospective the association between non-adherence to the management protocol and length of stay could not be fully explored, and interpretation should be cautious. However, it is of concern that a



significant number of patients were not managed according to the protocol; the importance of adequate analgesia and fluid management needs to be re-emphasised.

A recent local study has highlighted the limited time many mothers have for child care and how this is often left to older siblings or grandparents.<sup>13</sup> Children are thus both victims and carers. School health education represents an opportunity to emphasise both burn prevention strategies and first aid. We have started a 'Child-to-Child' programme which recognises the role that many children play in child care.<sup>14</sup> In this programme the children are themselves asked to identify the important causes of burns and to design posters and health promotion messages that may reduce the incidence.

The series reported here is hospital-based and therefore underestimates the true burden of disease in the community. Forjuoh *et al.*<sup>15</sup> have described a rapid epidemiological method for determining the prevalence and incidence of burns in the community by using burn scars as a proxy measure. Such a community survey would be useful to clarify this issue.

If health education and prevention interventions are to be a success there is a need for further research to assess present knowledge and practice and to determine the extent to which the latter needs to be modified. Interventions should target not just mothers but schoolchildren and grandparents. Our study has highlighted burns as an important cause of paediatric morbidity and a major source of hospital expenditure. This has led us to examine our management critically and to initiate interventions aimed at reducing the incidence and severity of paediatric burns.

#### REFERENCES

1. Manciaux M, Romer CJ. Accidents in children, adolescents and young adults: A major public health problem. *World Health Stat Q* 1986; **39**: 227-231.
2. Onuba O. Pattern of burns injury in Nigerian children. *Trop Doct* 1988; **18**: 106-108.
3. UNICEF. Children and women in South Africa: a situational analysis. Pretoria: UNICEF, 1993.
4. Courtright P, Haile D, Kohis E. The epidemiology of burns in rural Ethiopia. *J Epidemiol Comm Health* 1993; **47**: 19-22.
5. Bloch C. *The Burns Handbook*. Cape Town: Monica Fairall Communications, 1987.
6. King M. *Primary Surgery*. Vol. 2. Oxford: Oxford Medical Publications, 1992.
7. Onuba O, Udoidio E. The problems and prevention of burns in developing countries. *Burns* 1987; **13**: 382-385.
8. Darko DF, Wachtel TL, Ward HW, *et al.* Aetiological data on hospitalised burns patients. *Burns* 1986; **12**: 391.
9. Lyngdorf P. Epidemiology of severe burns. *Burns* 1986; **12**: 491.
10. Laditan AAO. Accidental scalds and burns in infancy and childhood. *J Trop Pediatr* 1987; **33**: 199-202.
11. Cheng JCY, Leung KS, Lam ZC-L, Leung PC. An analysis of 1 704 burn injuries in Hong Kong children. *Burns* 1990; **16**: 182-184.
12. Lindblad BE, Terkelsen CJ. Domestic burns among children. *Burns* 1990; **16**: 254-256.
13. Chopra M, Ross F. *Qualitative Study of the Causes of Malnutrition in a Rural Area of South Africa. Report for the World Bank Participatory Poverty Assessment*. Pretoria: World Bank, 1996.
14. Chopra M, Herbert C. Making the links between health and education in rural KwaZulu-Natal. Paper delivered at School Health Conference, University of the Western Cape, 20 - 22 Jan 1996.
15. Forjuoh SN, Keyl PM, Diener-West M, Smith GS, Guyer B. Prevalence and age-specific incidence of burns in Ghanaian children. *J Trop Pediatr* 1995; **41**: 273-277.