

Changing Pattern of Burn Epidemiology and the Compliance Factor in Management at Ibadan

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A retrospective review of burn admissions into the Plastic Surgery Unit of University College Hospital, Ibadan over a period of four years is presented. One hundred and thirty-three cases were studied. Aetiology has shifted to predominantly dry heat in 77% while site of accident is moving from the home to the streets. Apart from being a reflection of major lapses in safety standards and a changing economic fortune, this shift has led to high morbidity and mortality indices that is, 35.4% overall mortality and LA50 = 53%. While advances in burn care in other parts of the world have led to markedly reduced mortality over the last 50 years, the lack of emphasis on tertiary health care in Nigeria has produced undesirable results. Because local patient care depends a lot on the individual patient's ability to provide materials, a compliance factor in prognostication as introduced in this study is expedient.

KEY WORDS: *Burn; epidemiology; compliance factor.*

The epidemiology of burns tends to vary with man's continued modification of his environment and mode of living¹. The health sector in Nigeria has witnessed a change from free health to nearly complete patient care system. Thus at present, most tertiary health centres operate a cash and carry system.

A reevaluation of burns morbidity and mortality within this mode of health care delivery in order to formulate rational preventive and managerial measures based on carefully conducted audit is overdue. The aim of this paper therefore is to highlight the changes observed in the management of burn patients seen within the same institution three decades ago as compared to those seen in the last four and a half years, and possibly relate the differences to a changing economy.

Patients and Method

A retrospective study of burn admission to the plastic surgery unit of University College Hospital, Ibadan, from January 1992 to May 1996 was carried out. The following information was obtained: age, sex, month of burning, place of accident, aetiology, region of body and extent of body burnt, as well as degree of burning. Analysis for mortality and compliance was carried out.

Patient's compliance with management was calculated as how much (in percentage) of the treatment and investigations (prescribed by the attending plastic surgery resident) was carried out. Take for example, a patient who was to have PCV, and electrolytes checked as well as have

antibiotics and anti-tetanus. If he was only able to afford a PCV check and obtain anti-tetanus, two things out of four, his compliance may be said to be 50%.

The adjusted compliance was calculated by multiplying the compliance obtained above by a factor which was the degree to which the attending doctor conformed to ideal management as carried out in burn units or centres, that is, where management is optimal. For example, if the above mentioned attending surgeon should have passed a nasogastric tube but failed to, the 50% obtained above should be multiplied by 4/5 (0.8) to give an adjusted compliance of 40%.

Results

Sex and Age:

Patients studied totalled 133, 70 (53%) of which were males and 63 (47%) were females. The mean age of the patients was 21.5 ± 15.6 and the range 0.8 to 65 years.

The age and sex distribution of 128 patients is shown in figure 1. Of these, 49 (38%) were under 15 years.

Season of the Year:

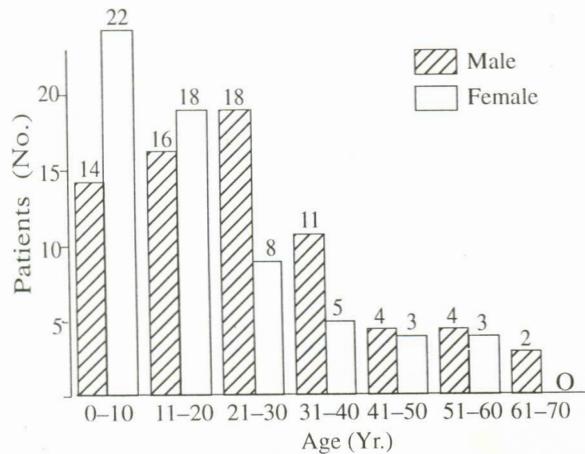
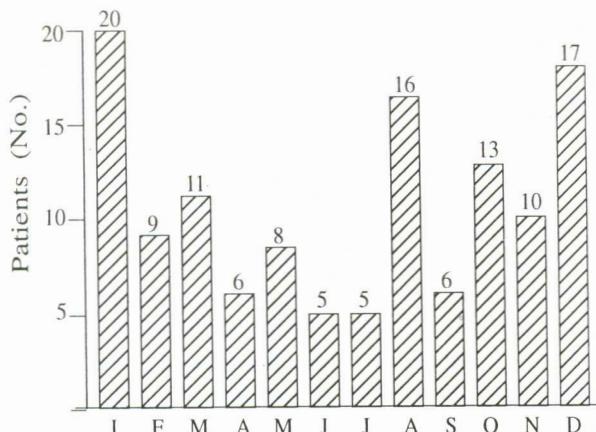
Most burns occurred in December/January. Least incidence was noted between April and July (Figure 2).

Place of Accident:

The home was the site of accident in 66% of cases while accidents occurred in the streets in 30% and at work in 4%.

Burn Aetiology:

Fire, often petrol flame, was the commonest cause of burn in 77%. Moist heat was the cause in 16%, while chemicals and electricity were the causes in 5% and 2% respectively. Moist heat became a more important factor in children under 15 years; being the cause in 42%. Dry heat from petrol and adulterated kerosene caused burn in the remaining 58% of these children.

**Fig. 1: Age and Sex Distribution****Fig. 2: Month of Injury****Region of body burnt:**

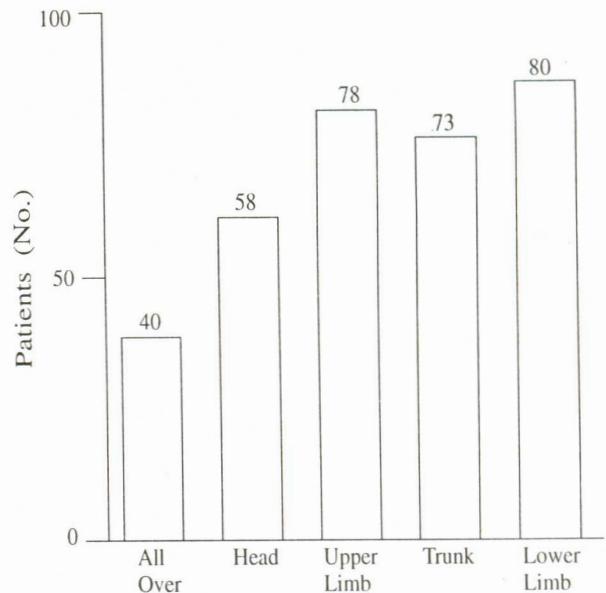
The lower limb was most commonly burnt region of the body, that is, in 80% of cases, while the head was involved in 58% being the least involved (Figure 3). Burn location in all regions of the body was noted in 40% of cases.

Extent:

Though the extent of body surface burnt ranged from one to 100%, the mean extent was $38 \pm 25\%$. More than 50% of the patients suffered burns of over 30% of body surface. (Table i).

Burn depth:

Most patients, 36%, suffered deep dermal burn as well as mixed partial with full thickness burn (36%). Few

**Fig. 3: Region of Body Burnt****Table i: Extent of Body Surface Burnt**

Extent	Cumulative %
1 - 10	14.5
11 - 20	35.5
21 - 30	49.2
31 - 40	62.9
41 - 50	71.0
51 - 60	79.0
61 - 70	86.3
71 - 80	91.1
81 - 90	98.4
91 - 100	100

Range = 1 - 100 Mean = 37.9 ± 25.4

people, 11%, sustained superficial partial thickness burn only while 18% suffered full thickness burn only (Figure 4)..

Morbidity:

Among patients that survived, the average hospital stay was 1.2 days per one percent extent of body surface burnt. Complications included shock, pulmonary complications, and wound infection in the acute phase; anaemia, cardiac failure, ileus, digital gangrene, urinary retention, tetanus, and pressure sore in the subacute phase; and problems of scarring, viz, dyschromia, scar hypertrophy, keloid, contractures in the chronic phases.

Mortality:

Overall mortality was 35.4%. Mean age of patients who died was 23. In those who survived, mean age was 13 years. The mean extent in those who died was 64% and in those who survived it was 23%.

In figure 5, mortality is related to extent of surface burn. Below 30% surface burn, mortality was 2%. Above 70%, mortality was 100%. The LA50 (extent of body surface burn that is associated with a 50% mortality) was 53%.

The Baux index (age + extent)² is related to mortality in figure 6. Mortality was 9.6% with an index of 0.50, and 100% with an index between 100 and 150.

Day of Death. (Table ii):

Death in patients with burn covering less than 60% body surface occurred after 10 days post burn. Over 80%

Table ii: Day of Death

Extent (%)	Average (post burn) day of death
40%	16
41 - 60	11
61 - 80	6
80	3

Table iii: Mortality Related to Compliance

Mortality with	Patient's compliance	Compliance (%)		
		90-100	50-90	50
		25	40	100
	Adjusted Compliance	0	50	44
	Crude Compliance (all compliance considered)		42	

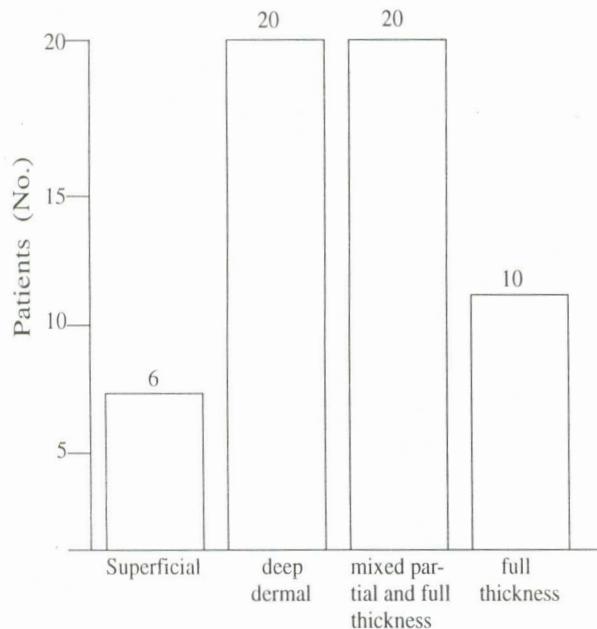


Fig. 4: Distribution by Burn Depth

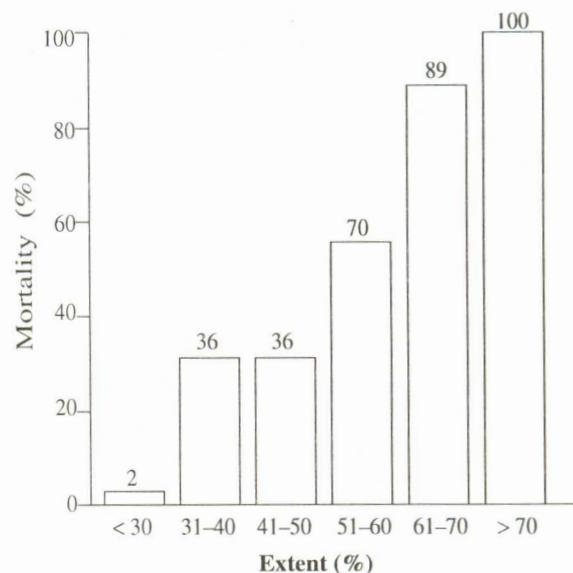


Fig. 5: Mortality Related to Extent of Surface Burnt

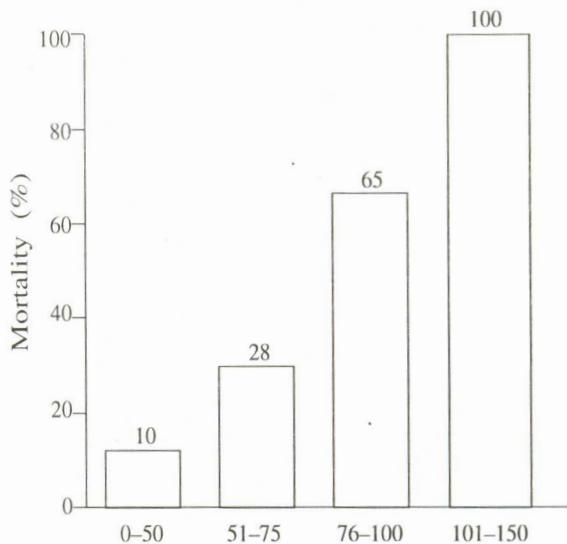


Fig. 6: Mortality Related to Baux Index

extent, death occurred in the average, three days after burn trauma.

Compliance of patients with 30-60% burn.

The average mortality in this group was 42%, while the mean compliance was 75%. (Table iii). The mortality was 25% among those that complied with management prescription by up to 90-100%. Mortality rose to 40% with a 50-90% compliance; while it became 100% with a compliance of less than 50%. With an adjusted compliance of 90-100%, mortality was zero.

Discussion

Results obtained from burn research must be interpreted carefully. The ultimate goal of all burn research is burn prevention and improved care. A change in burn

epidemiology in this institution may be observed by comparison of our statistics with those obtained from here 30 years ago. The incidence has increased from 230 over a 10-year period of 1957–1960³ to 133 over the four-year period of this study.

While 63% of patients were under 15 years old, 30 years ago, only 38% were within the same age group in this study. This means that majority of burn patients at the moment are adult. This figure varies from that reported by Sowemimo for Africa in 1993⁴ but is in agreement with a report from Spain⁵.

Although most accidents occurred at home, an unacceptable 30% occurred in the streets as a result of accidents involving vehicles some of which were recorded to be illegally lifting petrol in jerry cans in passenger buses. Most of such accidents were seen at the period of petrol crises. This increased the relative incidence of cases who suffered flame burns. Other causes of flame burn in Nigeria are unprotected fires, and explosions from adulteration of kerosine, a fuel used in many homes. Some children are still subjected to therapeutic flame burns of the feet as a native 'treatment' of convulsion.

The severity of burn injury in this study is reflected by the mean extent of body surface burn of 38%. In those who survived the average hospital stay of 1.2 days is comparable to that obtained by Sobel⁵. The mortality of 35% recorded in this study is much higher than the 18% recorded here 30 years ago² and 13.6% obtained in Lagos, 14 years ago¹. The difference may be attributed to the mechanism of injury in many cases of petrol burn and explosion in the present series which inflicts not only deep burn, but different forms of inhalation injury. However, there were only few cases above 50% body surface burn in both previous studies. The extent of total body surface burn associated with a 50% mortality of 53% is close to the 60% figure from Lagos.

The age of patient, depth of burn, and extent of surface burnt remain the most reliable predictors of prognosis. A 100% mortality noticed with a Baux index of 100–150 indicates that once the sum of the age and percent extent of body surface burn exceeds 100, there is a 100% chance of the patient dying. A 100% mortality was recorded in those with Baux index of 126–150 by Reig *et al*⁶.

Death in patients with burn covering less than 60% surface after 10 days post burn and at three days in patients with extent greater than 80% suggests the possibility of adequate fluid resuscitation to prevent death from burn shock in the first few days. In most instances problem of delay of grafting occasioned by inadequate theatre space, inadequate funds, erratic dressings, etc. are

responsible for death at the sub-acute phase. Early skin cover has been proved to be superior to delayed and secondary skin cover, in reducing morbidity and mortality in patients with severe burns. This was often not achieved in our cases.

Another factor responsible for the high mortality in this series which may also explain deaths at the sub-acute phase is the reduced availability of antibiotics and some other drugs and inability to investigate due to lack of funds. It is obvious from this study that when these factors are computed to show the degree to which the patients complied with management, the higher the compliance the better the prognosis. Thus while the mortality in the 30–60% burn was 42%, it would have been 25% with total compliance, 100% with a compliance of less than 50%, and 0% with ideal treatment. This means that judging from the level of care delivered, the mortality should have been 25% instead of 42% if everything was available to work with. However, if this level of care was improved with introduction of burn centre or at least a burn unit, no patient in this group would have died.

The incidence of burn in Ibadan has increased. Adults now suffer burn more than children. These adults are mainly in their prime of life. The cause and mechanism of injury is changing and this resulting in greater morbidity and mortality. The health care system is grossly unable to cope with the problem.

An improved funding of burn care coupled with establishment of burn units in at least five regions of the country is urgently indicated. Public enlightenment to put a stop to the habit of burning the feet to treat convulsion, stricter measures aimed at preventing and containing the menace of petrol fire, and the application of industrial safety laws, should reduce the incidence of burn in Nigeria.

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