



Setting up a Modified Burns Unit in the Chingola Mine Hospital of Zambia

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Abstract

A study of burns in an industrial region in Zambia in which we studied burn patients coming to Nchanga South hospital to see the cause of burns and our success in managing them in a setting without a burns unit. The study was from 2003 to 2008 of admitted adult burn patients. Side wards were used to isolate all those admitted with burns. The linen used was washed, ironed and autoclaved. The burn wounds were soaked with saline and cleaned twice daily. The patients were then covered with plastic sheets. Prophylactic antibiotics were not routinely used. The number of visitors to the wards was restricted. Outcome was deemed to be good if the wound healed within three weeks but poor if it took more than three weeks or had severe contractures, or resulted in death. Infection was only recorded if it was severe. There were 55 patients admitted for burns, five females and fifty males. Mean age was 36 years. 68% were burned at work and 32% at home, the most common burns at work were electrical followed by chemical ones of which burns with Sulphuric acid were commonest. In the domestic environment hot water was the commonest cause. Complications were most commonly seen in electrical burns. 72% of our patients had a favorable outcome. In those who had burns of 40% body surface area and above only 40% survived.

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Adults burns occurred more in males, mostly at work. The most common cause of injury was electrical burns which caused significant morbidity and mortality but patients with chemical burns tended to stay longer. The patients with 40% or more burned body surface area had a higher rate of complications and death.

Keywords: Burns; males; electrical; Chingola; Keloids.

1. Introductions

Chingola with a population of more than 200,000 people sits at a strategic position where the routes to the new mining areas in the North western Zambia and the Copper belt province pass. The town has two hospitals; the Nchanga North General hospital being run by the Government of the Republic of Zambia and the Nchanga South hospital a private hospital being run by the Konkola Copper Mines Plc. The latter is the premier hospital in the area which provides medical care for the employees of Konkola copper mines and their dependants. Several mining companies developing or running mines in this area namely Lumwana and Kansanshi mining companies in Solwezi, Chambishi metals company, a cobalt producing mine about twenty minutes drive from Chingola, access medical services with the Nchanga South hospital. In addition the power distribution companies namely Zambia Electricity Supply Company and the Copper belt Energy Corporation and many industries that are dependant on the mining activities in the region, also accesses medical services from the KCM hospital, thus the number of patients being admitted to the Nchanga South hospital has increased in the recent years.

During the period of study there was an upturn in the economy of this region as a result of the good copper prices on the world market and we saw an increase in industrial activity in the region with all sorts of industries coming in to support the mining activities. This was a good development for our region but there wares negative effects as well, such as accidents of all sorts including burns and indeed as a consequence we began seeing increased admissions to our hospital and a lot more burn patients than before.

1.1 Objectives

We set up a modified burns unit in the Chingola mine hospital of Zambia and wanted to see the outcome result when the burns patients were managed in this modified burns unit. We decided to look at the burn patients coming to our hospital so that we may learn what was causing the burns particularly in the mine industry of the region.

1.2 Patients and Methods

This study was carried out from January 2003 to January 2008, a period of five years. All the burn patients admitted to the Nchanga south hospital surgical wards were included in the study. The Chingola Mine hospital did not have a standard burns unit. The side wards were used to isolate all those who came in with burns.

The linen used on our burns patients were washed, ironed and autoclaved like theatre linen. The patient burn wounds were cleaned twice daily and soaked with saline. The wounds were covered with plastic sheets. We

found that commercial cellophane were expensive so we started using the soft variety of the commercial bin lining plastics (see figures 1, 2and 3). Prophylactic antibiotics were **not routinely used.**



Figure 1



Figure 2



Figure 3

The number of visitors to the side wards was restricted to the spouse or one parent in case of a minor. Outcome was deemed to be good if the wound healed within three weeks and there was normal post burn scarring with minimal Hypertrophic scars, contractures or disability. It was deemed poor if there was delay in wound healing of more than three weeks, or had severe contractures, or resulted death. Infection was only recorded if it was severe shown by systemic signs and symptoms. Superficial wound infections were not considered in this study.

1.3. The constraints

The limitations of the study were twofold. Firstly it was very difficult to control patients' relatives who persisted to visit their burns victims in the ward. Some forced their way in despite our Security Guards at the doors. We suspect that some of these visitors could have brought infections that had infected our patients.

Our second constraint was the acquisition of commercial bin lining plastics. Although it was less expensive comparing to the commercial cellophane which were expensive, our patients found it costly. So we had to make our hospital pay extra more to acquire the commercial bin lining plastics.

2. Results

2.1 The Burns patients admitted

There were 55 patients admitted with burns during the period of study, fifty were males and only five were females.

2.2 Age Distribution

The youngest was 13 years old and the oldest was 56 years. The mean age was 36 years

Table 1: Age Distribution

Age range	11-20	21-30	31-40	41-50	51-60
Patients N	05	16	20	14	05

2.3 The Female and Male Burn Patients

There were only five females. All the women were in the 31 to 40 year group. They were all burned in domestic circumstances from hot water. They all had a good outcome.

There were fifty males admitted with burns. We had full records in 27 patients and there were incomplete records in 23 patients. These were analyzed as follows:

2.4 Body Surface area burned

Table 2: Body surface area burned in the males

% Body burned	1-9	10-19	20-29	30-39	40-49	50-59	60+
No. of Patients N (%)	32(64)	02(04)	03(06)	03(06)	06(12)	01(02)	03(06)

2.5 Place of Burn Incidence

There were sixteen male patients (32%) who were burned in Domestic circumstances (all were hot water burns except for one who was burned in a house fire). There were 34(68%) male patients; all had burns sustained at work.

2.6 Cause of Burn

2.7 Body Part Burned

Seven patients had burns distributed to the whole body, three of whom were treated locally and four were evacuated to RSA where they were treated in Burns units. Among the seven patients who had burns distributed to the whole body, three were treated locally and they all died. Of the four who were evacuated to the republic

of South Africa (RSA), only one was saved the rest died.

Table 3: Cause of burn

Cause of Burn	Sulphuric acid	Electrical	Hot water	ire	Molten Metal	Hot Oil	Lime	Unknown Chemical
Patients N(%)	8(16)	21(42)	15(30)	2(4)	1(2)	1(2)	1(2)	2(4)

Table 4: Body Part Burned

Body part	Head	Face	Neck	Upper limbs	Chest	Back	Abdomen	Lower limbs	Whole body distribution
Patients N(%)	8(16)	14(28)	12(24)	26(52)	10(20)	09(18)	09(18)	15(30)	7(14)

Table 5: Outcome

Outcome	Good	Severe contractures	Serious Infection	Hypertrophic Scars	Corneal opacity	Delayed healing	Keloids	Died
Patients N(%)	36(72)	03(6)	09(18)	01(2)	01(2)	01(2)	02(4)	06(12)

2.8 Hospital Stay

We had records of hospital stay in 46 male patients, in four patients there was no record of how long they stayed. Among those whose hospital stay was recorded. The shortest stay was one day and the longest was seventy days. Average stay was 14 days.

2.9 Cause of Deaths

Six patients died as a result of burns during the study: Four were due to electrical burns sustained at work, one was burned in a house in a domestic environment and one was burned when he fell into a lime pit at work. All these had Surface buns of more than 40%.

3. Conclusion and Recommendation

3.1 Conclusion

Thirty years ago about 9,000 people in the United States died each year from burn injuries in fact patients whose burns covered more than 20 percent of their bodies almost always died. This was because facilities which specialized in the treatment of burns or were rare, most people with these injuries were treated in regular

hospitals [1]. This is where we are in our region and the whole country in Zambia today.

Nowadays however the scenario has changed, the number of burn fatalities in the United States has declined dramatically, to about 4,500 a year [1].

Now, people with burns covering 90 percent of their bodies can survive, although they often have permanent impairments and more than 50 percent of burn patients are treated in specialized burn centers, and most hospitals have trauma teams that care exclusively for patients with traumatic injuries including burns. We work in a situation where we do not have a burns unit, where the general surgeon still handles all the burns clearly the outcome will not compare with the specialist units. However the results show that we got some good results.

Table 6: Hospital Stay

Length of stay	1wk	2wks	3wks	4wks	5wks	6wks	7wks	8wks	9wks+	No record
Patients N(%)	19	15	06	02	01	00	00	01	02	04

Table 7: Cause of burn Vs Hospital stay

Cause of Burn	Sulphuric acid	Electrical	Hot water	Fire	Molten Metal	Hot Oil	Lime	Unknown Chemical
No.of patients N(%)	08(16)	21(42)	15(30)	02(4)	01(2)	1(2)	1(2)	02(4)
Average Hospital Stay (Days)	24	09	09	14	65	15	04	09

Epidemiologically the real figures in Africa are hard to come by but in countries of the West like USA the following pertains: Approximately 2.4 million burn injuries are reported per year. Approximately 650,000 of the injuries are treated by medical professionals; 75,000 are hospitalized. Of those hospitalized, 20,000 have major burns involving at least 25% of their total body surface. Between 8,000 and 12,000 of patients with burns die, and approximately one million will sustain substantial or permanent disabilities resulting from their burn injury [5]. Burns are a leading cause of unintentional death in the United States, exceeded in numbers only by automobile crashes and falls. Figures in the developing world are not known and the picture is most likely worse.

In our situation most of our patients were young healthy individuals, we had only five patients (See table I) that were older citizens this was an advantage for us in that the age of the patient is important because small children and senior citizens usually have more severe reactions to burns and different healing processes. Burn injuries in adults in our setting seem to be a male dominated hazard in that we had only five women coming in with burns compared with the fifty admissions in males. The reason is that most of the workers in the industries where our patients came from were male, indeed it can be said that the mining industry has from time immemorial been a male dominated industry. But this scenario is not universal for example in chemical burns, Mannan et al report

that injuries with caustic chemicals worldwide are more likely to occur against women. and that adults and children are nearly equally exposed to chemical burns [3,5]. In our study there was not a single woman who came in with chemical burns.

Table 8: Cause of burn Vs Outcome

	Sulphuric acid	Electrical	Hot water	Fire	Molten Metal	Hot Oil	Lime	Unknown Chemical
Good	05	15	14	01	0	00	00	01
Severe infection	00	04	01	01	01	00	01	01
Contracture	00	02	00	00	01	00	00	00
Keloids	02	00	00	00	00	00	00	00
Hypertrophic scar	00	00	00	00	00	01	00	00
Delayed Healing	01	00	00	00	00	00	00	00
Died	00	04	00	01	00	00	01	
No. of patients N(%)	08(16)	21(42)	15(30)	02(4)	01(2)	01(2)	01(2)	02(4)

Table 9: Percentage Burn surface area Vs Outcome (n=27)

% Burns	Good	Keloids	contractures	Hypertro Scars	Delayed healing	Infection	Death	Total
0-9	08	01	00	00	00	00	00	09
10-19	01	01	00	00	00	00	00	02
20-29	01	00	00	01	01	00	00	03
30-39	02	00	01	00	00	00	00	03
40-49	02	00	02	00	00	02	02	06
50-59	00	00	00	00	00	01	01	01
60+	00	00	00	00	00	03	03	03
Total	14	02	03	01	01	06	06	27

In terms of where our patients got burned, 68% of our male patients sustained the burns at the work environment and all our female patients sustained theirs in the domestic environment [5]. There were, however, males who got burned at home; this group comprised 32%.

The commonest cause of burns was electricity (42%) followed by hot water (30%), chemical burns at 20% came third of which Sulphuric acid was the commonest (16%). This was not surprising because there are a large number of industrial and commercial products being used in the mining industry which contain potentially toxic concentrations of acids, bases, or other chemicals that can cause burns[4,6]. The single most cause burns in the domestic environment was hot water. Only one victim case was not occasioned by hot water in this group- the victim was burned in a house fire.

We assumed that the superficially burned patients were 32(64%); the body surface areas burned were less than 10%. In those patients who had body surface area burns of between 10 and 39 % were eight.

Severe burns of body surface area of 40% and above were recorded in 10(20 %) of the patients. The seven of these patients had the extensive burns. Four were evacuated to Burns units abroad, three were cared for locally because of financial constraints however the outcome in the two groups was the same: Only one of the four who went abroad could be saved and the three died. In our situation none of our three patients survived.

Generally, in our care, patients with body surface area burns of 40% and above the mortality was 60%. Our friends in the western world talk of being able to salvage those with 90% body surface area burns [1, 2]

In more than half of the male patients the most commonly burned body parts were upper limbs(52%) followed by lower limbs in 30% of the cases. Seven of our patients had extensive burns covering the whole body and all but one of these died.

Electrical burns were not only the commonest cause of admission for burns, but also had the highest number of complications the patients from these burns stayed nine days on average suggesting that most of these burns were superficial but some of the electrical burns were extensive and led to a higher mortality and morbidity. Electrical burns contributed four of the six patients who died, they died of severe infection, and two of the electrical burns patients developed severe contractures. Burns caused by Sulphuric acid on average healed after three weeks these, of course, were deep burns [4].The patient with molten metal burns stayed longest.

4. Conclusion

We conclude that most of the burns in adults in our area occur in males and at the place of work. Most of our patients had a good outcome (72%) but 9 of the patients had life threatening infections.

Six of our patients died and all these were in the more than 40% body surface area burns group.

The most common cause of injury was electrical burns which caused significant morbidity and mortality but patients with chemical burns tended to stay more than three weeks on average

The patients with 40% or more burned body surface area had a higher rate of complications and death.

In our care only 40% of patients with burned surface area of 40% and above survived the burns and 60% died. In this group who survived, only two patients had a good outcome ,two went on to develop severe contractures and six developed life threatening infection.

In terms of hospital stay, most of our patients stayed two weeks or less, It is known that the outcomes for burn patients have improved dramatically over the past 20 years, yet burns still cause substantial morbidity and mortality [7]. Proper evaluation and management, coupled with appropriate early referral to a specialist, it greatly helps in reducing suffering and optimizing results. But in the Zambian situation we do not have any burns units, we are still way back.

4. Recommendations

The care of burns patients in the modified burns unit in the Chingola mine hospital of Zambia seemed to manage and care for our patients and saved them from long stay in the hospital. We recommend that other hospital centers in Zambia or any African center can apply this method and save many patients.

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