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# PROFILE OF CARE GIVEN TO BURN INJURED PATIENTS DURING THE FIRST 48 HOURS IN THE PRINCESS MARINA HOSPITAL (BOTSWANA)

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Research report submitted to the Faculty of Health Sciences, University of the Witwatersrand in partial fulfilment of the requirements for the degree of Master of Science in Nursing

# DECLARATION

I, Kefalotse Dithole, hereby declare that this research report is my own work. It is submitted for the degree of Master of Science (Nursing) in the University of the Witwatersrand, Johannesburg. It has not been submitted or presented before for any degree at any other University.



14-09-99

**Kefalotse Dithole** **Date**

**Johannesburg**

# DEDICATION

To my husband, Mokgweetsi, whose unfailing patience, understanding, support and sacrifice has fostered its genesis.

To my children, Lindiwe and Tabitha, for their endless love, motivation and understanding.

To my parents, Sennana and Bolekane, for the nurturing that allowed this research to take form and shape and my mother-in-law, Goitsemodimo, for her unfailing support.

To my brothers, sisters, friends and in-laws, in appreciation of their help, encouragement and enthusiasm over many years.

# ABSTRACT

Burns are a problem throughout the world and in most cases the victims are children and young adults. Monitoring of the patient's physiological parameters collected adequately through health history and skilful physical assessment are important in arriving at meaningful decisions when managing burn injured patients.

The study aimed at describing what health care providers do in order to manage burn injured patients during the first 48 hours post burn injury. A descriptive survey using a checklist was used to obtain data. The population consisted of all records of patients admitted to and/or treated for burn injury over a one year period in the Princess Marina hospital in Gaborone. The records of 76 burn injured patients were selected. Computer analysis, after data was coded, was utilized. Narrative and descriptive statistics were used to present the information from the checklist.

The study showed that important information on health history and physical assessment was omitted and this resulted in inadequate management of burn injured patients. The major findings were as follows:

Very few (8%) of patients with burns were weighed or weight estimated on admission. The use of the rule of nine in adults and the Lund and Browder chart for children were not used for estimation of the extent of burn injury yet burn injury was classified according to degree and percentage of total body surface area. Fluid was not adequately replaced as a fluid formula was not used. Few patients (10%)had complications at the end of the first 48 hours and only one patient died.

The findings of this study indicated that fluid formulas were not used and the extent of the burn injury was not estimated using the rule of nine or the Lund and Browder chart. The health history and physical assessment was not adequately done.

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# CHAPTER 1

## 1.1 INTRODUCTION

In this chapter the researcher discusses the background of the study, statement of the problem, significance of the study, the purpose of the study, study objectives and operational definitions.

## 1.2 BACKGROUND OF THE STUDY

Burns are generally a neglected surgical problem in Southern Africa and this is so since most hospitals manage burns in general surgical wards (Dementriades, 1990). Also different institutions use multiplicity of treatment in burn managemnet, for instance, the use of everything from disinfectants to antiseptics (Demetriades, 1990; Bloch, 1997.

Burn injury affects all organ systems and in most cases, the incidence, duration and magnitude of burn shock is proportional to the extent of burn and reach a plateau at 50-60% of total body surface area (TBSA) involvement. Post-traumaic stress disorder develops in up to 30% of patients with serious burns (Sheridan, Hinson, Nackal, Blaquiere, Daley, Querzoil, Spezzafaro, Lybarger, Martyn, Szytelbein & Tompkins, 1997). An ineffective and inconsistent approach to pain management in burn injured patients contributes to stress to health care providers as well as patients.

According to Shaw, Anderson, Hayward and Parkhouse (1995) major burns include a burn injury greater than 15% of the total body surface area in an adult under 50 years and greater than 10% of total body surface area in a child and an adult over 50 years. Special areas such as the perineum, the face, hands, arms and eyes cannot be ignored as they are very delicate and need special attention. The severity of burn injury varies in Botswana just like anywhere in the world. It varies from mild sunburn requiring no treatment to major burns such as full thickness burns whose management requires extensive resources of modern burn management (O'connor & Lewis, 1990; Botswana Health Statistics, 1996) In the Chris Hani Baragwanath hospital, patients with superficial partial thickness burns and first degree burns are not hospitalized and those with partial thickness burns over 20% TBSA and full thickness burns are admitted to hospital or burn units. Since a burn is a unique injury, a large percentage of each burn patient's day and staff's time is spent in activities related to burn management (O'connor et al., 1990). Burn injury has severe implications especially if it involves more than 20% of the total body surface area (Bloch, 1997).

Burns are painful surgical wounds and adequate knowledge of treatment modalities can make the difference in obtaining the best possible outcome. A study conducted by Irwin, Reid and Mclean (1993) indicated that the immediate care given at accident and emergency departments is not accurately done. And it is usually said that casualty officers are unable to assess burns accurately and fail to give adequate and correct treatment (Irwin *et al.*,1993).

Proper assessment and monitoring of the patient after burn injury is important in the management of burns. Renz & Sherman (1993), when studying management problems specific to scald-abused child, state that burn wounds exposed to faecal streams (buttocks) should be examined carefully and frequently for signs of infection, especially for patients with diarrhoea.

Monitoring of haemodynamic and oxygenation parameters during the first 24 hours is important in burn management. A study by Schultz, Werba and Wolrab (1997) indicated that right ventricular function is severely compromised, evidenced by increased end diastolic pressure and decreased ejection resistance. Assessment of ventilation is helpful in the management of severely burn-injured patients particularly with concomitant inhalation injury. This can be helpful to avoid missed inhalation injuries.

According to Demling (1993), smoke inhalation is defined in terms of the period after injury. The early stage (0-36 hours) is a critical period due to airway oedema, broncho constriction and respiratory distress, which result because of carbon monoxide poisoning.

Although there are advances in burn care, focusing on the initial resuscitation period in order to significantly improve morbidity and mortality, remains imperative. The management of burns requires highly demanding areas of nursing care and a wide range of nursing skills (O'connor et al., 1990). In Botswana, there are about ten burn trained nurses and the rest of the nursing

staff nursing burn injured patients are registered nurses and enrolled nurses with or without experience in burn management (Government Establishment Register, 1996). These nurses do not only nurse patients with burns, but they are responsible for other surgical patients in the surgical wards. The country has only two (2) intensive care units, each with six bed, which cater for other critical patients besides those with major burn injury. But the first 48 hours after a burn require aggressive medical and nursing management to assure survival and minimize complications (Walter, 1993).

## 1.3 STATEMENT OF THE PROBLEM

Burns are generally a problem worldwide and Botswana is not an exception. More than 2 2731 patients are treated and/or admitted with superficial, partial thickness and full thickness burns of a varying degree of TBSA (Health Statistics, 1996). A great number of these patients are seen in the accident and emergency departments and the local primary clinics, treated and released. These patients together constitute a large group who by the nature of their injury are first seen by enrolled nurses, registered nurses or junior medical staff (O'connor et al, 1990). Furthermore, initial attempts at resuscitation are imprecise. If the initial assessment is inadequate or inaccurate, and if referral to a better care is done inappropriately or delayed, the resuscitation phase of burn management will be inadequately done resulting in the development of complications that can be avoided (O'connor et al, 1990).

According to the Health Statistics (1996) the Princess Marina hospital admitted about 2 040 patients of varying extent and depth of burn injury and about 200 died. The hospital has only three (3) burn specialized nurses and three (3) nurses specialized in accident and emergency care (Princess Marina Bulletin, 1997). This means that burn injured patients are managed by nurses with little or without burn experience and who are not interested in burn management.

A burn injury places the individual at risk of morbidity and mortality due to loss of the body's defence (Byers & Flynn, 1996). It is therefore important to have a good number of health care providers who will make good assessment and manage burn injured patients adequately during the first 24-48 hours post-injury as this period is critical to the patient's survival.

Adequate nutrition is essential for health and therefore the nutritional status of patients in hospitals has been a concern and an acceptable and unnecessary high incidence of malnutrition has been reported in hospitals (Verity, 1996).

Also health care providers do not know the systemic manifestations of burn injuries and have poor assessment skills. Therefore, injury due to inhalation may be missed or misinterpreted resulting in high morbidity and mortality.

Although many factors determine the final outcome of the patient after a burn, appropriate management is the first step towards satisfactory recovery (Mackersie & Karagianes, 1990). The aim of the study was to determine if

health care practice is congruent with the current body of published research findings. The researcher therefore set out to determine what health care providers do when managing burn injured patients during the first 48 hours post-burn.

The research questions were:

* What did health care providers include in the physical assessment of burn-injured patient?
* What measures did they execute in the management of major burn injuries including pain management, fluid replacement, burn wound care, feeding, respiratory, renal and circulatory care?
* What complications developed within the first 48 hours?

## 1.4 SIGNIFICANCE OF THE STUDY

Literature reviewed included the management of burn patients in developed countries. Little research has been done in developing countries. The available studies investigated one or two parameters of burn management; and in Botswana no study to date has been done on burn management. The findings of this study would enable development of a protocol for burn-injured patients in Botswana. Adherence to predetermined burn care guidelines will produce the most optimal result in the survival and return to function of patients

(Schillar, 1996). The results could also assist with improvement of care where there are deficits in both referral and district hospitals in the country.

## 1.5 THE PURPOSE OF THE STUDY

The purpose of the study was to describe what health care providers do in order to manage burn-injured patients during the first 48 hours post burn injury. The study attempted to describe the health history and physical assessment of burn-injured patients as well as determining the immediate and subsequent care of these patients.

## 1.6 STUDY OBJECTIVES

The objectives of this study were to:

* determine the health history recorded by health care providers on burn-injured patients.
* describe the physical assessment done on the burn-injured patient.
* determine the immediate and subsequent care including fluid replacement, pain control, dietary requirement, respiratory, circulatory, renal and burn wound management.
* identify the complications that occurred during the first 48 hours post burn injury.

## 1.7 OPERATIONAL DEFINITIONS

**Profile of Care:** description of the sum total of health care given to burn-injured patients during the first 48 hours after injury.

**Burn-injured patient**: a patient admitted to and/or treated in a hospital as an in-patient, who sustained injury resulting in tissue loss or damage due to thermal, electrical and/or radiation sources.

**Health care provider:** any health professional i.e. doctors, nurse and other allied professionals that render care to burn-injured patients.

**Immediate care:** the care given to the burn-injured patient from the time of arrival at the hospital until the end of the twelve hours of admission.

**Subsequent care:** care given to the burn-injured patient from twelve (12) hours until the end of 48 hours of admission.

**Resuscitation measures:** interventions carried out for the treatment of burn-injured patients during the first 48 hours.

**Management:** medical and nursing care given to burn-injured patients during the first 48 hours.

## 1.8 LIMITATIONS

* The study was conducted in the Princess Marina hospital only, so the results could not be generalised.
* Lack of available studies on the management of burns was a limitation and this made comparison with other studies difficult.
* The accuracy of assessment of burn injury by health care providers may be questioned especially since accurate estimation of burn depths are dependent on experience (Irwin *et al.*, 1993).

## 1.9 SUMMARY

Burns are unique, painful injuries and in most cases burn injured patients are managed by junior medical officers with little or no experience in burns. In order to manage it effectively there must be good assessment and monitoring measures in order to prevent complications. In this chapter, the researcher discussed the background of the study, statement of the problem, the significance of the study, as well as the purpose and objectives of the study. The study variables have been defined.

# CHAPTER 2

## LITERATURE REVIEW

### 2.1 INTRODUCTION

In this chapter, literature from library searches and interlibrary loans on topics related to burns, was reviewed under the pathophysiology of burns and the management of burn injured persons. Since the aim of burn management is to provide quality care for each child or adult; taking into account the physiological alteration, effective assessment skills and good decision making at the appropriate time with good intervention is imperative. It is therefore important for health care providers to be conversant with the pathophysiological changes after a burn injury (Byers & Flynn, 1996).

### 2.2 PATHOPHYSIOLOGY AFTER BURN INJURY

There are two (2) major phases of burn injury (Burgess, 1991; Muchart. 1995). These phases are the Ebb/Low outflow phase and the flow phase. Most changes after burn injury are seen on patients who sustained more than 30-60% of total body surface area (TBSA) (Thelan, Davie, Urden & Lough, 1994; Byers & Flynn, 1996).

### 2.2.1 Low Outflow/Ebb Phase

This phase occurs during the first 24 hours. Immediately after a burn injury, there is an increase in capillary hydrostatic pressure in the injured tissues, subsequent to the destruction of microvasculature. Later, due to an increase in capillary permeability, fluid leak occurs from the vascular system into the interstitium (Muchart, 1995; Byers & Flynn, 1996). Due to large spaces between the capillary epithelium, water and electrolytes especially sodium will shift into the interstitium. As fluid slowly shift from the vascular system into the interstitial spaces, there will be oedema around the burn wound and around non-burnt tissues, resulting in decreased circulating fluid volume. Oedema in non burnt sites occurs because loss of protein reduces colloid osmotic pressure levels (Walter, 1993; Dance, 1995; Byers & Flynn, 1996).

Burn shock causes a decrease in circulatory blood volume of up to 50%, resulting in decreased tissue perfusion and an imbalance of oxygen consumption and delivery to vital organs. Ischaemia and hypoxia of these organs develop and so too multiple organ failure (Thelan et al, 1994; Muchart, 1995, Byers & Flynn, 1996). The capillary integrity begins to be restored after 24-36 hours post injury. Fluid loss stops as the hydrostatic pressures stabilize, microvasculature integrity improves and interstitial spaces close up (Dance 1995; Byers & Flynn, 1996).

### 2.2.2 Flow Phase

This phase starts between 24-36 hours after burn injury when capillary integrity re-establishes, epithelial spaces close and shock resolves. During this phase, fluid, electrolytes and proteins begin to move back into the intravascular space, thus improving perfusion to vital organs (Thelan et al, 1994; Byers & Flynn; 1996).

As tissue perfusion improves, there will be increased glomerular filtration rate and an improved urine output. During this period the physiological stress responses will continue creating a hyperdynamic and hypermetabolic state which peaks at 7-17 days after burn injury (Byers & Flynn, 1996). The patient will present with hyperthermia, increased oxygen consumption, fat breakdown, increased corticosteroids and hyperglycaemia (Thelan et al, 1994; Murchart, 1995; Verity, 1996; Byers & Flynn, 1996).

### 2.2.3 Physiological Changes After Burn Injury

The changes will be discussed according to the systems affected, starting with the system where the impact starts.

#### 2.2.3.1 Integumentary changes

Direct thermal injury causes stimulation of the vasoactive substances, activation of platelets and inflammatory process. All these result in thrombosis of the

intradermal vessels, vasodilatation, fluid loss and pain (Thelan et al, 1994 Dance, 1995; Byers & Flynn, 1996). Oedema from insensible fluid loss from the site of injury, occurs due to loss of capillary integrity and the effects of vasodilator substances or mediators like prostaglandin (Thelan et al, 1994; Byers & Flynn, 1996).

Depending on the extent of thermal injury, damage or exposure of the sensory nerve endings, may result in loss of sensation, particularly in full thickness burns. Partial thickness burns result in preserved nerve endings and so the patient presents with severe pain. Since the skin acts as a protective barrier, its loss or damage places the individual at increased risk of infection (Burgess, 1991; Thelan et al, 1994; Byers & Flynn, 1996).

#### 2.2.3.2 Cardiovascular changes

Changes that occur in the cardiovascular system within the first 24 hours after burn injury include an increased microvascular permeability at the site, resulting in oedema formation (Dance, 1995; Byers & Flynn, 1996). In cases of inhalation injury, there will be increased fluid loss into the bronchial mucosa, causing enormous fluid loss from the intravascular space (Burgess, 1991; Leong, 1995; Dance, 1995; Byers & Flynn, 1996). During burn shock, there will be cardiovascular compensation in an attempt to increase blood volume. This will result in sympathetic nervous system (SNS) activation and catecholamines release which will cause tachycardia and vasoconstriction (Burgess, 1991, Thelan et al, 1994; Byers & Flynn, 1996). Activation of the SNS will improve

blood pressure (BP) and cardiac output (CO) and so signs of compensated shock will appear. (Thelan et al, 1994; Dance 1995, Byers & Flynn, 1996).

Moreover, immediately after an injury the inflammatory process begins, resulting in the vascular system undergoing changes and cellular activity. Vessels change in order to attempt to protect the patient from excessive blood loss and reduce invasion of bacteria on the wound. (Burgess, 1991, Dance, 1995; Byers & Flynn,1996).

Also a decreased cardiac output results, due to myocardial depressant factor, poor myocardial perfusion, acidosis, right ventricular failure and hypothermia (Thelan et al, 1994; Byers & Flynn, 1996). A decreased venous return will result in decreased preload which will also cause low cardiac refilling pressures like central venous pressure (CVP), pulmonary artery pressure (PAP) and pulmonary capillary wedge pressure (PCWP), which will alternately further compromise the cardiac output as the myocardium stretches and contractility decreases (Thelan et al, 1994, Byers & Flynn, 1996).

#### 2.2.3.3 Respiratory changes

Stress mediators such as catecholamines, thromboxane and serotonin are released after a burn injury, causing contraction of smooth muscles including the alveoli (Thelan et al, 1994, Byers & Flynn, 1996). These mediators also cause decreased lung compliance and decreased oxygen tension, even in patients who did not sustain inhalation injury. This also arises from poor lung

perfusion following hypovolaemia (Burgess, 1991; Faldmo & Kravitz, 1993; Thelan et al, 1994; Byers & Flynn, 1996).

Injury in an enclosed space will result in oxygen depletion as combustion of synthetic materials generate concentration of hydrogen chloride, hydrogen cyanide, carbon dioxide and esters (Cioffi & Rue, 1991). Carbon monoxide is said to have 200-fold greater affinity to haemoglobin (Hb) than oxygen. Therefore in case of inhalation injury, carbon monoxide binds with Hb and this leads to decreased oxygen saturation and oxygenation (Cioffi & Rue, 1991; Thelan et al, 1994; Byers & Flynn, 1996).

Stress response to the pulmonary system causes bronchial blood vessel permeability, which results in oedema and airway obstruction. The lungs will be susceptible to more fluid accumulation leading to pneumonia and atelectasis (Cioffi & Rue, 1991, Demling, 1993).

#### 2.2.3.4 Cellular metabolic changes

Metabolic responses are activated by the sympathetic nervous system after burn injury, causing stimulation of the anterior pituitary gland to secrete adenocorticotrophic hormones, which also stimulate adrenal cortex to secrete glucocorticoids. The glucocorticoids will then cause a rise in blood glucose levels. The adrenal medulla will release norepinephrine and epinephrine, which will initiate hypermetabolism, perfusion imbalance, insulin resistance and retention. (Bhagwanjee, 1993; Byers & Flynn, 1996).

As fluid shifts, aerobic metabolism is decreased due to a decrease in ATPase to energize the sodium-potassium pump. This decreased cell energy leads to a decrease in potassium, magnesium and phosphates in the cells (Madaree & Kimble, 1993; Bhagwanjee, 1993; Gallapsy, 1994, Thelan et al, 1994, Byers & Flynn, 1996,).

#### 2.2.3.5 Immunological changes

Changes on the immune system following major burn are not fully understood. It is thought to be due to the release of histamine, serotonin, complement factors, prostaglandins, endotoxins, catecholamines and oxygen free radicals (Madaree et al, 1993; Thelan et al, 1994; Dance, 1995, Byers & Flynn, 1996). Due to inflammatory mediators, the basal metabolic rate increases due to increased oxygen and carbon dioxide production and catabolism of muscle proteins, if inadequate calories are given. Within 24 hours, the granulocytes are believed to start phagocytosis. These cause an elevated white blood cell count (Thelan et al, 1994, Dance, 1995). The neutrophils get impaired together with the reticulo-endothelial system and T- helper cells activity and this would compromise wound healing and put the patient at risk of infection (Burgess, 1991; Gallapsy, 1994; Thelan et al, 1994, Byers & Flynn, 1996).

#### 2.2.3.6 Neurological changes

Although patients experience pain differently, the extent of burn injury reflects the extent of pain that a patient is experiencing. Partial thickness burn injured patients experience severe pain throughout the injury period since the nerve

endings are exposed and damaged. Full thickness burn injury still exposes patients to painful experience but not as bad as compared to partial thickness burns. The nerve endings in full thickness may be completely burnt and/or exposed on the wound edges (Faldmo & Kravitz, 1993; Thelan et al, 1994; Byers & Flynn, 1996).

#### 2.2.3.7 Gastrointestinal changes

Stress response causes increased catabolism which will lead to increased gastric acidity and will cause stress ulcers (Curlings' Ulcers) especially if feeding is not started early or preventive measures like the use of anti-acids are not implemented (Faldmo & Kravitz, 1993; Thelan et al, 1994, Byers & Flynn, 1996).

Decreased tissue perfusion causes decreased peristalsis, which results in gastro-colic stasis or paralytic ileus which may limit enteral feeding (Burgess, 1991; Dance, 1995; Thelan et al, 1994; Byers & Flynn, 1996).

#### 2.2.3.8 Renal changes

Impairment of the renal function occurs due to haemoglobinuria, myoglobinuria, hypo-perfusion and hypovolaemia, which lead to stimulation of the SNS. The sympathetic stimulation acts on the juxtaglomerular cells, which then release renin, which will be converted to angiotensin I, by a converting enzyme to angiotensin II. Angiotensin II causes vasoconstriction and the release of aldosterone and antidiuretic hormone, which will cause water and sodium

retention. Vasoconstriction will also increase blood pressure which will help to counteract the burn shock. The patient will then present with oliguria due to water retention (Thelan et al, 1994; Verity, 1996, Byers & Flynn, 1996).

## 2.3 SIGNS AND SYMPTOMS

The clinical manifestations of burn injury include airway obstruction, stridor tachycardia, wheezes, cough, singed nasal passages, hoarseness of the voice; all these are signs of inhalation injury (Ellis et al, 1990; Dance, 1995). Other signs include generalized oedema in case of burns of more than 40% TBSA, or a localized oedema for superficial burn or partial thickness burn of 1-10% TBSA (Thelan et al, 1994). The rest of signs and symptoms are discussed under the pathophysiological changes according to the systems involved.

## 2.4 BURN MANAGEMENT

Effective management of acute burns requires a collaborative approach among health care providers. These health care providers must have a special interest in burns, as a burn injury is a painful surgical problem that requires both physical and psychosocial care. Management of burn shock resuscitation focuses on establishing the airway, supportive systemic circulation and prevention of complications (Faldmo & Kravitz, 1993).

### 2.4.1 Immediate Care

The primary survey is done just like in other trauma patients. The patient is assessed for airway, breathing, circulation and immobilization of the cervical spine (Burgess 1991, Shaw et al, 1995). On admission it is important to perform cardio-pulmonary resuscitation on patients with electrical burns due to potential passage of current through the heart or respiratory system (Walter, 1993; Thelan et al, 1994).

The patient is either intubated, tracheostomy performed for those who require prolonged ventilation or given oxygen 60-100% per mask/nasal cannula depending on the patient's condition. An endotracheal tube must be in situ until the 3rd day as reintubation is often difficult due to oedema (Burgess, 1991; Clioff, 1991; Dance, 1995; Shaw et al, 1995). A study by Caruso, Al-Kasspooles, Matthews, Weiland and Schiller (1997) looked into the rationale for early percutaneous tracheostomy in patients with burns. This study showed that if the operation was done early, it would improve pulmonary function in burnt patients.

Prevention of complications such as hypothermia and infection are ensured by keeping the room warm, giving warm fluids, maintaining surgical asepsis and covering the wound according to prescription (Ellis & Rylah, 1990, Dance, 1995, Shaw et al, 1995). Vital signs are monitored according to the patient's condition.

The secondary survey consists of a thorough examination from head to toe to detect other potential life threatening injuries. A detailed history is collected in order to determine the cause of injury, time of injury and past medical history (Lowry & Gill, 1992; Shaw et al, 1995). The baseline laboratory tests, chest X-ray and other types of investigations to exclude other injuries and an ECG are performed in order to monitor the patient's condition (Leong, 1995).

#### 2.4.1.1 Airway management

Burn injured patients are at risk of inhalatin injury (Ellis et al, 1990). The definitive diagnosis of inhalation injury is based on the relevant history and physical examination (Ellis et al, 1990; Mashigo, 1997). The injury is suspected if the patient's history indicates that the victim was in an enclosed space, age of the patient, location and size of burns (Thelan et al, 1994; Dance, 1995; Mashigo, 1997). Signs of inhalation injury include cough, hoarseness of the voice, carbonaceous sputum, singed nasal and facial hair, confusion and varying levels of consciousness (Ellis et al, 1990; Cioff et al, 1991; Thelan et al, 1994; Mashigo, 1997).

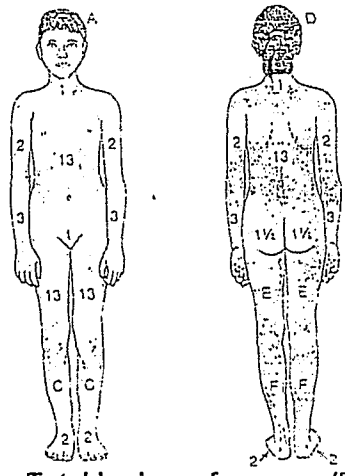
Inhalation injury is managed by maintenance of tissue oxygenation and this is achieved by giving oxygen at 60-100% at 10L/min by tight mask or cannula (Thelan et al, 1994; Mashigo, 1997) If the saturation is poor, the patient is intubated, ventilated and paralysed during the first 24-36 hours before oedema develops (Manktelow, 1990; Mashigo, 1997). Carboxyhaemoglobin levels are obtained and a close observation of impaired oxygenation is done, such as

tachypnoea, agitation, anxiety, stridor and wheezing (Thelan et al, 1994; Dance, 1995). The monitoring of serial arterial blood gases, oxygen saturation by the use of pulse oximetry and chest X-ray is done (Schmollgruber, 1997).

### 2.4.1.2 Fluid management

Adequate and appropriate fluid replacement is very important during shock resuscitation. Depending on medical prescription, a central line may be put up to monitor the haemodyamic status. Some prefer peripheral venous lines since central lines predispose the already compromised patient to a high risk of infection (Lakhoo, 1995).

Fluid must be given after estimation of the depth of burn injury. The commonest methods for estimating the degree of the severity of burn surface area are the Wallace's rule of nine for adults and the Lund and Browder diagram for children (Lakhoo, 1995, Leong, 1995).




| | Age (years) | | | |
|---|---|---|---|---|
| | <1 | 1 | 5 | 10 |
| A/D Head | 10 | 9 | 7 | 6 |
| B / E Thigh | 3 | 3 | 4 | 5 |
| C / F Leg | 2 | 3 | 3 | 3 |

**Figure 2.1. Total body surface area (%) according to age** (adopted from Lakhoo, 1995).

For small surface area, the patient's palm of the hand is taken to be 1% of TBSA (Muchart 1993, Lakhoo, 1995).

In order to prevent hypovolaemia, aggressive fluid replacement should be started as soon as possible, taking into consideration the time of injury, not the arrival of the patient at the hospital, as the patient might have lost a lot of fluid before being seen (Muchart, 1993; Lakhoo, 1995).

The most commonly used formula for fluid replacement is the Parkland formula (Thelan et al, 1994; Byers & Flynn, 1996), The formula is: 4ml/kg/% TBSA of Ringers lactate in 24 hours for the inhalation injury x 2mls for inhalation injury (Leong, 1995, Mashigo, 1997). During the first eight hours after burn injury, half (50%) of the calculated amount of fluid is administered; 25% is then given during the second eight hours and the remaining 25% during the third eight hours. The amount of fluid determined by close monitoring of the urine output (Faldmo & Kravitz, 1993; Thelan et al, 1994; Leong, 1995). A decrease in urine output of less than 30-50mls/hour in adults and 1ml/kg/hour for a child indicates acute renal failure (Burgess, 1991; Thelan et al, 1994). Under- resuscitation and over-resuscitation must be avoided as they can lead to complications. Under-resuscitation causes inadequate oxygen perfusion and over-resuscitation will led to pulmonary oedema and wound oedema (Thelan et al, 1994). There are several formulae available to estimate fluid replacement, but no one is more important than the other. However, it is more essential to note that these formulae are only guidelines and they must be adopted and be used

on an individual basis (Muchart 1995). In less severe patients, oral fluids are given unless not tolerated or when there is evidence of paralytic ileus (Burgess, 1991).

Knowledge of fluid composition is important before choosing the type of fluid solution(s) for burn management (Muchart, 1995). A pure crystalloid formula (solution) that may be supplemented with iso-osmotic or hyperosmotic solutions must be considered (Muchart, 1995, Leong, 1995). Isotonic/colloid solution causes massive oedema and increased extracellular fluid volume because fluid will continue to shift into the interstitial space and so aggravating fluid retention (Leong, 1995). This is supported by a study by Byers and Flynn (1996) who indicated that the patient developed massive oedema due to the administration of normal saline.

Iso-osmotic solutions like Ringer's lactate or plasmolyte-L are solutions of choice in fluid replacement, since they resemble the intravascular and interstitial fluid electrolytes (Muchart, 1995; Bhagwanjee, 1993).

**Table 2.1: Composition of resuscitation fluid**

| | Na | K | Cl | Lactate | Ca | Osm | COP | pH |
|---|---|---|---|---|---|---|---|---|
| Ringer's Lactate | 130 | 5.4 | 108 | 29 | 0 | 270 | 0 | 6.0 |
| Plasmalyte-L | 131 | 5.0 | 108 | 29 | 0 | 274 | 0 | 6.5 |
| Haemaccel | 145 | 5.1 | 145 | 0 | 6.0 | 300 | 27 | 7.3 |
| Dextran 70 | 154 | 0 | 154 | 0 | 0 | 308 | 75 | 5.5 |
| Herastarch | | | | | | | | |
| 6% | 154 | 0 | 154 | 0 | 0 | 308 | 31 | 6.5 |
| 10% | 154 | 0 | 154 | 0 | 0 | 308 | 68 | 6.5 |

(Electrolyte concentrations are in mmol/litre:Osmol = Osmolarity in milliosmoles/litre: COP= Colloid oncotic pressure in mmHg).

(Adopted from Muchart, 1995)

It is important to carefully choose fluid solution/formula, which will prevent fluid overload. Monitoring of the patient during fluid replacement cannot be over emphasised.

Davies, Evan and McGonigle (1994) investigated the incidence of acute renal failure in burn injured patients. The study indicated that renal failure is not common during the early phase but since fluid replacement is higher in burns than in non burn patients, there is a need to replace fluid loss because there is increased metabolic rate due to hypercatabolism.

### 2.4.1.3 Nutritional need

Feeds must be started as early as possible after burn injury (Leong 1995, Verity, 1996) as burn injury causes increased metabolic rate due to stress response. Early feeding is therefore important as nutrition provides energy, facilitate normal body function like maintaining optimum brain function, maintain temperature, body mass, muscle strength and formation of new body components (Verity, 1996). Energy needs for a burn patient are calculated based on the patient's age, gender, weight and extent of burn injury (Clarke, Wittpenn, Mcleod, Candlish, Guernsey, Weleff, Zuker, 1990; Verity, 1996).

Inadequate nutrients during critical stage make patients suffer mucosal atrophy, loss of body tissue, skeletal muscle atrophy and weakness, immuno-suppression and delayed wound healing and this can be even worse in an already compromised burn injured patient (Thelan et al, 1994; Muchart, 1995; Verity, 1996). A study by Sarma and Sarma (1994) indicated that the cause of gastric bleeding is delayed feeding after burn injury.

In patients who cannot tolerate oral feeds, enteral feeding must be started if not, then parental feeding with high protein must be used e.g. isotec. (Lowry and Gill, 1992). Gastrointestinal activity resumes to normal within 24 to 48 hours (Thelan et al, 1994).

#### 2.4.1.4 Pain management

Sedatives and analgesics are necessary in the management of burn injury, as burns are painful surgical problem. Sedatives are restricted to dressing and debridement (Leong 1995). Valoron (tilidine) dropper per year of age is given 4 hourly or as necessary to children or Vallergan (Trimeprazine) 4mg per kilogram dose 4 - 6 hours for minor burns. For major burns, morphine sulphate 0.1-.2 mg per kg as bolus or 20mg/kg/hour as infusion during acute stage for both adults and children (Thelan et al, 1994; Shaw et at, 1995; Lakhoo, 1995; Byers & Flynn, 1996).

A study by Marvin, Carrougher, Bayley, Knighton, Rutan and Weber (1992) concluded that since patients with burns undergo a lot of dressing changes, they require analgesics and anxiolytic drugs before procedures. It may be necessary to assess the intensity of pain. Another study by Sheridan, et al (1997) investigated the development of a paediatric burn pain and anxiety management program. The study indicated that the choice of drugs would depend on the institutional familiarity and availability of drugs.

#### 2.4.1.5 Laboratory monitoring

The initial laboratory studies done include haemotocrit, electrolytes, blood urea nitrogen, urinalysis, full blood count, prothrombin time and partial prothrombin time for all patients who sustained electric burns or those with pre-existing cardiac diseases (Demling, 1993; Thelan et al, 1994).

### 2.4.1.6 Wound management

While managing a burn patient, the health care provider must bear in mind that burn wound care includes prevention and control of infection, preservation of viable tissue, maintenance of function and timely closure of all open wounds (Walter, 1993).

Agents used for cleaning the wound before application of topical dressings include povidine Iodine (Betadine 1%), sodium hypochlorite (Clorox) and sterile water or normal saline solutions. Povidine Iodine may be applied 8-10 hours before surgical excision as it dries and toughen the eschar and is effective against gram positive organisms (Mashigo, 1997, Bloch, 1997).

**Table 2.2 Examples of Topical Dressing Agents**

| DRUG | USE |
|---|---|
| NEOMYCIN OINTMENT | Partial thickness burns of the face since it's easy to apply and it's painless (Bloch, 1997) |
| SILVER NITRATE 0.5% solution | Excellent antibacterial spectrum but poorly penetrates and it's messy (Walter, 1993) |
| 1% SILVER SULFADIAZINE (Flamazine or Silvadene) | Broad-spectrum antimicrobial, which is very effective, comfortable and easily applied (Baker, 1996; Bloch, 1997) |
| MAFENIDE ACETATE/Sulfamycin | Penetrates eschar freely and effective against gram negative organisms (Walter, 1993) |
| ACRIFLAVINE, EMULSION, EUSOL | Still been used although they are not effective especially against gram negative bacteria (Bloch, 1997) |

#### 2.4.1.6.1 Dressings

##### 2.4.1.6.1.1 First dressing

Partial thickness burns are treated with transparent, occlusive dressings (Mashigo, 1997). This is supported by a study by Bauling, (1995) which showed that omniderm can be used as a skin graft in partial thickness burns as long as the position of the dressing is maintained.

Full thickness burns are dressed with topical dressings and escharatomy performed for circumferential burns greater than 40% TBSA (Shaw et al, 1995; Baker, 1996; Mashigo, 1997).

##### 2.4.1.6.1.2 Second dressing

The wound is assessed to exclude any abnormalities and the depth of wound as the exact estimation may be done after three days (Burgess, 1991, Shaw et al, 1995, Mashigo, 1997).

The type of dressings, that is whether open or closed will depend on the doctor's discretion after assessing the patients condition and the type of microbial drug to use (Mashigo, 1997; Sheridan, et al 1997).

### 2.4.1.7 Surgical management

In order to prevent infection and promote wound healing, it is important to perform early debridement and wound cover (Walter 1993; Bloch, 1997). Wound excision is done as early as 1-5 days of injury as the wound would still be clean (Walter 1993; Thelan et al, 1994; Bloch, 1997).

New substances available for wound cover if skin is not available include.

#### 2.4.1.7.1 Artificial covering

These include biosynthetic dressings such as biobrane, opsite, Omniderm, elastomesh, iruxol negu, intrasite, burnshield and granuflex (Thelan et al, 1994; Mashigo, 1997; Bloch, 1997).

#### 2.4.1.7.2 Biological skin substitutes

These include homograft (allograft) xenograft, synthetic skin dressings such as duoderm and autografts (Thelan et al, 1994, Mashigo, 1997).

### 2.4.2 Subsequent Care

The subsequent care of the burn injured patients is the same as the care provided during the immediate care except where the patient has completely recovered from the burn shock.

## 2.5 SUMMARY

After a thorough literature review, the researcher, in this chapter, discussed the pathophysiological changes after burn injury according to systems. It had been found that most changes occur after a burn injury of 30 - 60% of TBSA. The monitoring techniques used in burn management and the management of a patient after burns including fluid replacement, nutritional need, pain and wound management was discussed.

# CHAPTER 3

## METHODOLOGY

### 3.1 INTRODUCTION

This chapter describes the research design, which includes how data were collected and where the study was conducted. The population and sample of the study and data collection instrument are also explained. Validity and reliability are discussed, as well as ethical considerations before conducting the study.

### 3.2 RESEARCH DESIGN

A descriptive survey was used to collect data on the profile of care given to burn-injured patients during the first 48 hours post-injury. The survey was chosen since it is designed to obtain information regarding the prevalence and distribution of variables within a population. The information was collected to describe people's actions (Polit & Hungler, 1993). This was appropriate for the purpose of this study since the researcher wanted to determine the actions of nurses and doctors during the management of burn injured patients.

## 3.3 THE SETTING

The study was conducted in the Princess Marina Hospital, which is a 483-bedded referral hospital for the Southern part of Botswana and a district hospital for Gaborone, the capital city. The hospital caters for 2/3 of the whole population. The majority of burn-injured patients are admitted to the general wards, where they are taken care of by general nurses, enrolled nurses and general physicians and some patients with major burn injury are admitted in the intensive care unit, which also caters for other critically ill patients..

## 3.4 POPULATION AND SAMPLE

The population consisted of all records of patients admitted to and/or treated in the Princess Marina hospital for burn injury over a one-year period. The researcher reviewed all records of patients admitted and/treated for burns between 01 January 1997 to 31 December 1997. A total of 147 records were identified from the admission registers and from the records department. Out of a total of 147 records, 76 records were selected.

Exclusion criteria were:

* records of burn injured patients who were treated for/admitted with septic burns;
* records of patients admitted after 48 hours of burn injury;

* records of patients admitted with burns less than 10% total body surface area (TBSA).

## 3.5 DATA COLLECTION

A retrospective record review was used to collect data. A self-constructed check list (Appendix A) was used to record data from patients' hospital records from 01 January 1997 to 31 December 1997. Data were collected during the period of November 1998 to December 1998. The patients' records were reviewed in the hospital records department.

The researcher examined all records of patients from the time of admission until the first 48 hours after burn injury. The focus of data collection was on the history collected on burn injured patients, the physical examination carried out on these patients, the management by nurses and doctors during the immediate care period i.e. first 12 hours after burn and during subsequent care i.e. 12-48 hours after burn injury. Documents were perused in order to identify what health care providers did in the management of burn injured patients during the first 48 hours post-injury. This is an acceptable form of data collection "*as quality care is regarded as the management by any health care practitioner of a clearly definable episode of illnesses ... the judgement of the quality of these activities may be made either by direct observation or an overview of recorded information that allows the evaluator to reconstruct the*

*activities occurring between the patient and the practitioner*" (McCloskey & Grace, 1994).

## 3.6 DATA COLLECTION INSTRUMENT

The checklist was constructed based on available literature, to record the collected information from patients' records. The checklist was divided into the following:

* health history on admission after burn injury;
* physical examination carried out on the burn injured patients on admission;
* management of the burn injured patients by health care providers during the immediate care and subsequent care according to body systems;
* patients' outcomes after 48 hours.

The data was collected in the above sequence as indicated in the checklist (Appendix A)

## 3.7 VALIDITY AND RELIABILITY

The checklist was developed based on the available recent literature and the use of the Chris Hani Baragwanath basic burn protocol/standardized procedure

for burn care. The tool was given to two (2) experts in the burn unit at Chris Hani Baragwanath Hospital to assess for content validity. The researcher personally collected the data and so consistency in data collection was assured.

## 3.8 PILOT STUDY

A pilot study was done at Princess Marina hospital (Botswana) on five (5) records from the general surgical wards, of patients admitted in 1997. The purpose of the study was to determine clarity of categories and characteristics included in the checklist and to ensure that the tool would measure what it was supposed to. The pilot study indicated that 95% of the data needed for this research, would be extracted from the patients' records. Some adjustments and corrections were made to correct shortcomings in the checklist and to refine it before conducting the research. Additional items made on the checklist were as follows:

**B. Physical Assessment**

| | | Yes | No | Action |
|---|---|---|---|---|
| 1. | Vital signs checked | | | |
| | Temperature | | | |
| | . Pulse | | | |
| | Lower extremity pulse | | | |
| | Respiration | | | |
| | Blood pressure | | | |

## 3.9 ETHICAL CONSIDERATIONS

Approval to conduct the study was obtained from:

* The Committee for Research on Human subjects from the University of the Witwatersrand, protocol number M980605 (Appendix B) and from the Post Graduate Committee;
* The Ethics Committee of the Princess Marina Hospital (Appendix C)
* Permission to conduct a study in the Princess Marina Hospital was obtained from the:
  - Office of the President, Botswana (Appendix D);
  - Ministry of Health, Botswana (Appendix E);
  - Superintendent of the Princess Marina Hospital (Appendix F);

Anonymity and confidentiality were maintained. The researcher used numbers on the checklist rather than patients' names or hospital numbers. Health care providers' names were not recorded. After completion of data collection, the checklists were kept under lock and key and destroyed after data analysis. The researcher was the only investigator; no research assistants were used. Data was collected in a private room in the records department.

## 3.10 SUMMARY

A descriptive survey using a checklist was utilized on records of patients admitted to and treated in the Princess Marina Hospital for burn injury over a one year period. A pilot study was done and changes indicated were made. Permission was obtained to conduct research from the appropriate authorities.

# CHAPTER 4

## PRESENTATION OF FINDINGS

### 4.1 INTRODUCTION

Computer analysis, using Epidemiology Information 6 System was utilized after data was coded. The data was entered once and checks were made for wild codes. Narrative and descriptive statistics were used to present the interpretation of the overall checklist answers. A descriptive statistics uses frequency distributions which help to eliminate a great deal of drudgery in quantitative data analysis and they instead focus on the actual statistical findings of the study (Polit & Hungler, 1993). Percentages were rounded up to the nearest whole number. Chi square was applied to ascertain whether the results obtained differed significantly ($p < 0.05$). This chapter presents the findings in relation to health history, physical assessment, management and patient outcomes.

### 4.2 HEALTH HISTORY

#### 4.2.1 Sex

More than half (58%) of patients admitted and treated for burn injuries were males and females constituted 42% of the sample.

**Table 4.1 Sex distribution of the sample (n = 76)**

| Sex | f | % |
|---|---|---|
| Male | 44 | 58 |
| Female | 32 | 42 |
| TOTAL | 76 | 100 |

### 4.2.2 Age

Thirty-one patients (41%) were between the ages of 1-10 years and twenty-one (28%) were between 21-30 years and a small number (4%) was between 41-50 years.

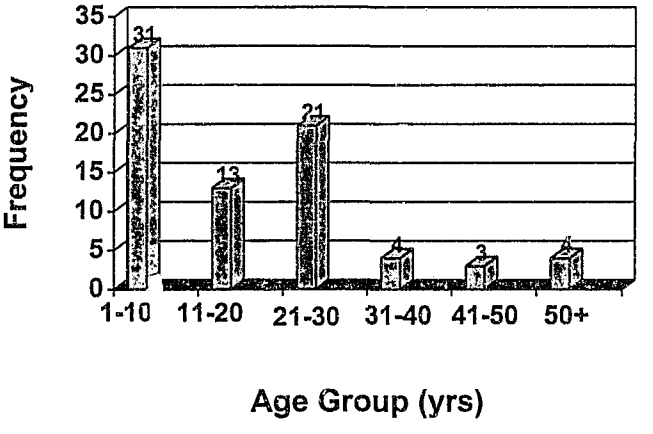



**Figure 4.1: Age distribution of the sample (n = 76)**

### 4.2.3 Patient Weighed on Admission

The vast majority of patients (92%) admitted with burns were not weighed on admission. Only 8% of patients were weighed.

### 4.2.4 Time of Injury and Admission

The time of injury and the time of admission of patients were documented in 84% of records. The remainder was not documented.

### 4.2.5 Predisposing Factors to Burn Injury

The predisposing factors were situations or circumstances which led to the cause of injury. More than half (68%) of patients admitted with burns sustained burn injury accidentally. Other factors included assaults in 4% of patients and epileptic fits in the remaining 4% of patients. Thirteen percent (13%) of patients were not assessed for predisposing factors.

**Table 4.2: Predisposing factors of the sample (n = 76)**

| PREDISPOSING FACTORS | f | % |
|---|---|---|
| Suicidal tendencies | 8 | 11 |
| Accident | 52 | 68 |
| Other | 6 | 8 |
| Not recorded | 10 | 13 |
| **TOTAL** | **76** | **100** |

### 4.2.6 Past Medical History

The majority (97%) of patients admitted were not assessed for allergies nor medication they had taken. Twenty-six per cent (26%) were assessed for their immunization status particularly tetanus and 29% were assessed for any pre-existing medical condition.

### 4.2.7 Method of Burn

Method of burn included any agent which caused the burn injury. Table 4.3 indicates that flames from paraffin and petrol were the main cause of burns (46%), followed by hot liquid (43%). Burns caused by metal were not common (1%).

**Table 4.3 Method of burn agent distribution of the sample (n = 76)**

| Agent | f | % |
|---|---|---|
| Hot liquid | 33 | 43 |
| Iron/Metal | 1 | 1 |
| Solid | 3 | 4 |
| Steam | 0 | 0 |
| Flame/Paraffin/Petrol | 35 | 46 |
| Lightning | 2 | 3 |
| Electricity | 2 | 3 |
| **TOTAL** | **76** | **100** |

#### 4.2.7.1 Location where burn injury occurred

Figure 4.2 indicates that 70 patients (92%) admitted with burns sustained burn injury while at home and of these patients, 52 (74%) were indoors, while 18 (26%) were outdoors. Only 8% of patients sustained burns out-doors at the place of employment.

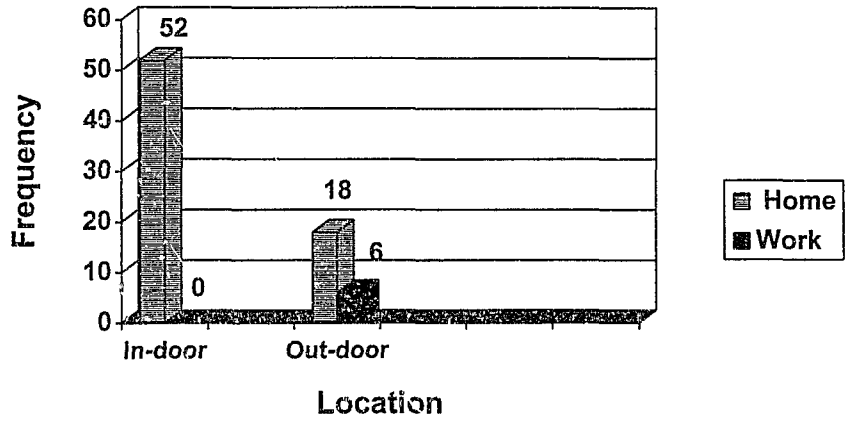



**Figure 4.2: Location where burn injury occurred (n = 76)**

### 4.2.8 Brief Description of Events of Injury

The researcher wanted to determine whether the admitting health care provider assessed how the patient sustained the burn injury. On analysis of data, most patients (80%) were assessed on how they sustained the burn injury. The remainder were not assessed for a brief description of events of injury.

## 4.3 PHYSICAL ASSESSMENT

### 4.3.1 Vital Signs

Temperature, pulse and respiration are normally done as a routine procedure. Analysis of patients' records indicated that the majority of patients'

temperatures (97%), pulse (95%), no patient was assessed for lower extremity pulse, respiration (91%) and level of consciousness (90%) were assessed. Forty-nine percent (49%) of patients' blood pressures were not assessed. Only 7% of patients had their oxygen saturation assessed and a small percentage (3%) of patients were assessed for CVP.

### 4.3.2 Smoke Inhalation Assessment

Over half (55%) of the patients were assessed for smoke inhalation and 45% of patients were not assessed for smoke inhalation.

### 4.3.3 Extent of TBSA (%) of burns

Figure 4.3 shows that of the patients admitted with burns, 45 (59%) sustained burn injury between 10-25% of TBSA, followed by 20 (25%) patients with TBSA involvement between 26-40% and 8 (11%) patients sustained burn injury of 56% and above. Only 4% of patients sustained a burn injury between 41-55% of TBSA.

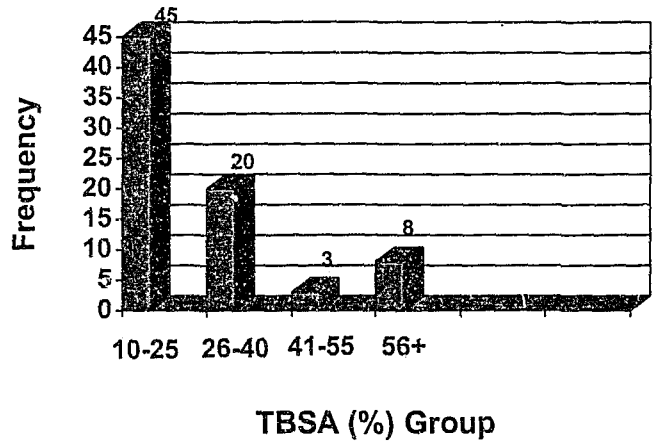



**Figure 4.3: Distribution of extent of TBSA % of burns (n = 76)**

### 4.3.4 Depth of Wounds

Figure 4.4 below reveals that 26 patients (34%) sustained mixed ($1^0$, $2^0$ & $3^0$) burn injury followed by those who sustained first degree burns (32%). Only four patients (5%) sustained 3rd degree burns.

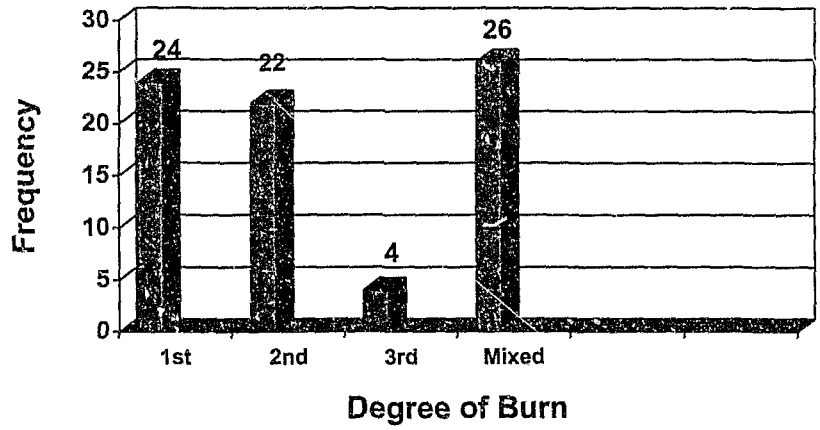



**Figure 4.4: Depth of wound expressed in degrees (n = 76)**

### 4.3.5 Sensation

The majority of patients (94%) were assessed for presence of sensation and a small percentage (6%) of patients were not recorded whether they were assessed or not.

### 4.3.6 Pain Assessment

The majority (83%) of patients were assessed for pain. Assessment of pain was recorded as having been assessed if the nurse indicated whether the patient complained or not complained of pain and not recorded was considered if the nurse did not indicate anything.

### 4.3.7 Skin Condition

Patients' records were reviewed for recording of any oedema, blister formations and redness. More than half (54%) of patients' skin conditions were not assessed.

### 4.3.8 Investigations

Various tests and investigations were done. X-rays were done on six (6) patients. Of all the patients admitted, 46% had their blood taken for Full Blood

Count (FBC). Haemoglobin was assessed in 49% of patients. Urinalysis was done on 46% of patients and urea and electrolytes were assessed on 38% of patients. No patient had a Blood Urea Nitrogen (BUN) and blood glucose done. Only 1% of patients had Prothrombin Time (PT) and Partial Thromboplastin Time (PTT) done. The percentage of patients admitted who had blood taken for cross-matching and grouping was 7%. Electrocardiography (ECG) was done on 3% of patients and Arterial Blood Gas (ABG) was done on 1% of patients. Other tests which were done, included Erythrocyte Sedimentation Rate (ESR) and liver function tests; these were done on 23% of patients.

**Table 4.4 Types of Investigations done**

| INVESTIGATIONS | f | % |
|---|---|---|
| X-ray | 6 | 8 |
| FBC | 35 | 46 |
| HB | 37 | 49 |
| Urinalysis | 35 | 46 |
| Urea & Electrolytes | 29 | 38 |
| BUN | 0 | 0 |
| PT & PTT | 1 | 1 |
| Grouping & X-match | 5 | 7 |
| ECG | 2 | 3 |
| Blood glucose | 0 | 0 |
| ABG | 1 | 1 |
| Others | 18 | 23 |

## 4.4 IMMEDIATE CARE

This is the care given to burn-injured patients from the time of arrival at the hospital until the end of the first 12 hours of admission.

### 4.4.1 Respiratory Management

From the data analysis, 25% of patients needed airway support and 74% did not need assistance while in 1% of cases it was not recorded. Of those who needed airway support, oxygen was administered per face mask and the percentage of oxygen was not specified.

### 4.4.2 Vital Signs

The records indicated that temperature, pulse and respiration were monitored. All patients (100%) had their temperatures assessed and the majority of them (91%) were assessed 4 hourly. Eighty-seven percent (87%) had their pulse assessed; in 91% of patients it was done 4 hourly. Most patients (91%) had their respiration assessed 4 hourly. Blood pressure was assessed on half of the patients (50%) and in 87% of cases it was assessed 4 hourly.

### 4.4.3 Circulatory Management

There were patients who were given oral and IV fluids at the same time. Fifty (66%) patients were given fluids through peripheral intravenous lines. The majority (83%) of patients admitted were monitored for intake and output and only 14% of patients were not monitored for intake and output. In a small percentage (3%) it was not recorded whether fluid was monitored or not. In 67% (51) of patients admitted, the daily fluid requirement was not calculated.

#### 4.4.3.1 Type of fluid

Of all the patients admitted, 57% were given oral fluids. Thirteen percent (13%) of patients were given IV Ringers Lactate only and 4% of patients were given dextrose 5%, normal saline and haemacel.

**Table 4.5 Types of fluids used**

| TYPE | f | % |
|---|---|---|
| Normal saline | 9 | 12 |
| Ringers/Lactate & Dextrose 5% | 6 | 8 |
| Dextrose 5%/Saline & Maintelyte | 6 | 8 |
| Ringers/Lactate & Normal Saline | 8 | 11 |
| Ringers/Lactate | 10 | 13 |
| Dextrose 5%/Normal Saline & Haemacel | 3 | 4 |
| ½ strength Darrows/Dextrose | 8 | 11 |
| Oral fluids | 43 | 57 |

### 4.4.4 Renal Management

A high percentage (86%) of patients admitted with burns maintained their own urinary function. Fourteen percent (14%) of patients had urinary/condom catheters inserted. Of the 14% with catheters, only 9% had their urine output measured. The majority (83%) were asked if they passed urine normally. Only 3% of patients were not recorded whether they passed urine normally or by catheter. Of all patients admitted, 73% were assessed for the frequency of passing urine twice a day and only 11% were assessed 2 hourly.

### 4.4.5 Wound Care

Burn wounds were either left open, closed or a combination of both. After admission, 32% of patients with burn injuries had their burn wounds left open. Those with closed wound dressings were 43% and 22% of patients had combined dressings. Only 3% of patients had not been recorded whether burn wounds were closed or open. More than half (59%) of patients had their dressings changed daily and only 8% had their dressings changed twice a day. The remainder was not recorded as to how often the dressings were changed.

Analysis of data indicated that 79% of burn injured patients had silver sulfadiazine applied on their wounds, 7% had betadine application and only 3% of patients had Vaseline gauze applied on their wounds. Eleven percent (11%) of records did not indicate which topical dressing was used.

### 4.4.6 Gastrointestinal Management

The majority of patients (86%) were fed orally and 11% fed per nasogastric tubes. Only 3% of records did not indicate how patients had their feeds. No patient was given a feed parenterally. The majority (93%) of patients had their feeds within 12 hours of admission. Seventy-nine percent (79%) of patients' intake and output was monitored. Other constituted 14% of patients; the percentage for high protein diet patients was 4% and for normal diet was 8%. Type of feeds was not recorded in 2% of the patients.

### 4.4.7 Pain Control

Most patients (83%) were assessed for pain. Panado was the most commonly used analgesic in 55% of burn injured patients, followed by Pethidine (20%). Three percent of patients were given valium and only 1% of patients was given morphine and Panado.

**Table 4.6 Analgesics/anxiolytic given to patients (n = 76)**

| Type | f | % |
|---|---|---|
| Panado | 42 | 55 |
| Morphine | 0 | 0 |
| Pethidine | 15 | 20 |
| Valium | 2 | 3 |
| Panado & Morphine | 1 | 1 |
| Panado & Pethidine | 10 | 13 |
| Not recorded | 6 | 8 |
| **TOTAL** | **76** | **100** |

### 4.4.8 Treatment

Only 39% of burn injured patients were given antibiotics. Ampicillin was the commonest antibiotic administered in 33% of burn patients, followed by cloxacillin (27%). Gentamycin was given to three patients (10%).

**Table 4.7 Type of antibiotics given (n = 30)**

| ANTIBIOTICS | f | % |
|---|---|---|
| Ampicillin | 10 | 33 |
| Ampicillin & Amoryl | 2 | 7 |
| Chloramphenicol | 2 | 7 |
| Cloxacillin | 8 | 27 |
| Ampicillin and X-pen | 5 | 16 |
| Gentamycin | 3 | 10 |
| **TOTAL** | **30** | **100** |

Half (50%) of patients' records did not indicate whether tetanus toxoid was given or not; 46% of patients were given tetanus toxoid and only 4% of patients were not given tetanus toxoid.

## 4.5 SUBSEQUENT CARE

This is the care given to burn-injured patients from 12 hours until the end of 48 hours of admission.

### 4.5.1 Vital Signs

Patients with burns had their vital signs monitored. Temperature, pulse and respiration were well monitored (94%) and were mostly (98%) assessed 4 hourly. Of the 43% of patients who were assessed for BP, 69% were assessed 4 hourly. The majority (87%) of patients were assessed for oxygen saturation and only 13% of patients had their level of consciousness assessed.

### 4.5.2 Respiratory Management

Most patients (69%) maintained their own airway. Eighteen percent (18%) needed assistance and of these 84% were given oxygen per face mask. The remaining 16% of patients were not recorded. More than half (55%) of patients were not assessed for any auscultatory abnormalities. No patient was X-rayed.

### 4.5.3 Circulatory Management

There were patients who were given oral and IV fluids at the same time. Of the patients admitted, 69% were given intravenous fluid via peripheral lines and 3% of patients had intravenous lines inserted centrally. Most patients (76%) admitted were monitored for intake and output and 20% of patients were not monitored for intake and output. In 4% of cases it was not recorded whether fluid was monitored or not. Daily fluid requirement was not calculated in 94% of patients.

#### 4.5.3.1 Fluids given

Water and juice, given orally, were the most commonly used fluid in 86% of patients. Ringers Lactate constituted 46% of IV fluids given and normal saline and dextrose were given in 40% of patients. Only 5% of patients were given a combination of normal saline, dextrose and haemacel.

### 4.5.4 Renal Management

Urinary/condom catheters were inserted in 13% of patients and 87% maintained their own renal function. Urine output was monitored in 76% of patients and the frequency of assessing urine output was twice a day in 57% of patients and 35% were assessed 2 hourly. Eight percent (8%) of records did not indicate how often urine output was monitored.

### 4.5.5 Gastrointestinal Management

The majority (86%) of patients were given feeds orally and 14% were given per nasogastric tube. Most patients (86%) were given fluids (water and juice), 8% of patients were given normal diet and 6% were given high protein diet.

### 4.5.6 Skin Assessment

Burn injured patients' skin condition i.e. whether it had oedema and blisters or redness, was assessed. Oedema was reported in 26% of patients and in 74% of patients the skin condition was not recorded.

### 4.5.7 Pain Control

Analysis of data indicated that the majority (96%) of patients were assessed for pain during subsequent care. Only 4% of patients were not assessed for pain. Most patients (62%) were given Panado only followed by Panado and Pethidine (25%) and only 8% of patients were given Pethidine only. Four percent (4%) of patients were given ketamine before escharatomy.

### 4.5.8 Wound Care

The majority (91%) of patients' burn wounds were dressed daily and only 9% were dressed on alternative days; 78% of burn wounds were not closed and

23% were closed and only 7% of patients with both closed and opened (combined). The most commonly used solution for wound cleansing was normal saline (54%) followed by Savlon (28%). Betadine was used in 10% of patients and only 8% of records did not indicate the type of wound dressing solution used. Only 4% of patients had escharatomies performed.

A high percentage (95%) of patients with burn wounds were dressed with silver sulfadiazine and betadine was used in 5% of patients.

### 4.5.9 Investigations

Blood was taken in 3 patients (4%) for grouping, cross-matching and haemoglobin level and in 96% of patients no investigations were done.

### 4.5.10 Treatment

Antibiotics given during the immediate care were continued during the subsequent care. Analysis indicated that 41% of patients were given antibiotics. Antacids were not given to any patients. Most burn injured patients who were given antibiotics were given ampicillin (33%) and cloxacillin (27%). Only 5% of patients were given amoxycillin and ampicillin combined. Ten (10) patients were given vitamin supplements. Of those ten (10) patients, 20% were given B Complex and Ferrous sulphate, 10% of patients were given ferrous sulphate, B Complex and Folic acid, 50% were given multivitamins, B

Complex and Folic acid and the other 20% were given multivitamin and Ferrous sulphate.

### 4.5.11 Patient Outcomes

Out of 76 patients admitted and treated with burns, 16 (21%) patients had elevated temperatures and of these, 10% had infection. One patient developed renal failure.

#### 4.5.11.1 Disposition

The researcher wanted to determine where the patients were after 48 hours of admission. Seventy-three (96%) patients were still in the wards. Of the 96% patients in the wards, ten (14%) patients were admitted once in ICU. Two (2.7%) patients were transferred/discharged and only one (1.3%) patient died as a result of acute renal failure.

In this section chi square was used to determine whether there was any significant difference ($p < 0.05$) on items between immediate care and subsequent care provided to burn injured patients. Analysis indicated that the care provided during both periods did not differ significantly ($p = 0.00$).

## 4.6 SUMMARY

In this chapter the findings of the study were presented and interpreted using narrative and descriptive statistics. The data was presented as they appeared in the checklist. Tables and figures were used to present the data.

# CHAPTER 5

## DISCUSSION OF FINDINGS, CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

### 5.1 INTRODUCTION

In this section, the findings of the study are discussed under health history, physical assessment, immediate and subsequent care of burn injured patients. Conclusions were drawn from the findings and appropriate recommendations were made for new practice and future research.

### 5.2 DISCUSSION OF FINDINGS

#### 5.2.1 Health History

The study indicated that more than half (58%) of the patients who sustained burn injuries were males followed by females (42%). The most commonly affected age groups were between 1-10 years (41%), followed by the age group between 24-30 years (28%). The findings were similar to a study by Manktelow (1990) in which children between 0-15 years and males were mostly affected. But this was different from Sarma and Sarma (1994) in which adult females and male children were the commonest victims.

In this study, the source of burn agent was flames from paraffin, gas and petrol (46%), followed by hot liquids (43%). The findings were similar to a study by Sarma and Sarma (1994). The majority of burns occurred indoors, at home and very few (8%), at the place of work such as in a small industry. This as well, was similar to a study by Sarma and Sarma (1994).

Since the source of burn agent was flames from paraffin and gas, this reflects the lifestyle of Botswana in urban areas where cooking and lighting is done by gas and paraffin stoves. Most studies indicated that this is the case in developing countries (Manktelow, 1990; Sarma & Sarma, 1994). Suicidal tendencies were the second common predisposing factor. Nevertheless in this study the researcher did not find out why males commonly sustained burn injuries. A very small percentage (4%) of patients sustained burns during an epileptic fit. This was similar to the findings by Manktelow (1990) in which patients fall into fires during an epileptic fit thus sustaining flame burns.

The presence of allergies and the use of medication by burn injured patients were not assessed in the majority of patients (97%). Similarly, 74% of patients were not assessed for any pre-existing medical condition. This indicated that assessment of patients' past medical history was seriously neglected during the management of burn injury. This is not what current literature advocates for burn management. It is important to assess the past medical condition of the patient after burn injury since these patients do not do well with some pre-existing systemic changes such as in renal, cardiac and in diabetes (Faldmo &

Kravitz, 1993). It is vital to assess for these pre-existing conditions immediately on admission of burn injured patients.

It is also important to assess the patient for tetanus immunization status as a burn injury predisposes one to tetanus (Faldmo & Kravitz, 1993; Leong, 1995; Mashigo, 1997). In this study only 29% of patients were assessed for tetanus immunization status. This showed that patients' tetanus status was not determined and as such the tetanus immunization was not updated where it was necessary in the majority of patients.

### 5.2.2 Physical Assessment

It is imperative for health care providers to perform head-to-toe physical examination of the burn injured patient in order to augment the health history obtained from the patient or/and significant others. A thorough assessment would include assessment of the patient's level of consciousness (LOC). In this study, health care providers assessed LOC in 90% of patients and it was indicated that all patients were conscious and awake and the majority of these patients were in pain.

Smoke inhalation injury was assessed in more than half of the patients and oxygen saturation was not assessed in 93% of the patients. Since the majority of patients sustained burn injury in doors and many burns were caused by flames, it was vital for these health care providers to assess patients for smoke

inhalation and oxygen saturation. This would have enabled health care providers to identify any discrepancy in oxygen saturation and treated patients accordingly (Byers & Flynn, 1996). Nevertheless, since the majority of patients were conscious and alert, this might have made health care professionals less suspicious of smoke inhalation. Baseline studies that assist in the diagnosis of management of inhalation such as arterial blood gases and chest x-rays were not done in the majority of patients during the immediate and subsequent care. It is important to perform these investigations after burn injury in order for these investigations to serve as guidelines for the immediate care as well as for comparison during the subsequent care (Cioffi & Rue, 1991). However, no case of burn injured patients required mechanical ventilation.

The findings of the study indicated that central venous pressure (CVP) was assessed in only 3% of patients and 11% of patients sustained burns of 56% or more of TBSA. Moreover, the majority of patients' depth of burn injury was of mixed type ($1^0$, $2^0$ and $3^0$) and 29% had second degree burns. The majority of these patients' extent of burn injury was between 10-25% of TBSA. This study showed that the majority of patients were children between 1-10 years old. This age group sustained a burn injury greater than 10% of TBSA; hence children sustained major burns in this study. It was important for health care providers to assess patients' full blood count and urea and electrolytes in order to adequately assess the patient's condition and assure optimal functional recovery (Faldmo & Kravitz, 1993). Monitoring of CVP in severely burnt patients is important in order to monitor fluid replacement.

The rule of nine is used to calculate burnt TBSA in adults while the Lund and Browder's Scale is used to calculate the extent of burns in children (Mashigo, 1997). This study revealed that the extent of burn injury was classified according to percent of TBSA. This is not in line with current literature which advocates the use of classification of burn injury as superficial, partial thickness and full thickness (Brueck III, 1993; Muchart, 1993; Faldmo & Kravitz, 1993; Shaw et al, 1995; Mashigo, 1997). These types of classifications are more objective unlike the use of degrees, which were used in this study for classifying burn depth. The percent of TBSA must be used in combination with other types of classification like superficial and partial thickness in order to avoid too much subjectivity.

It is very important when managing fluid resuscitation to assess the extent and depth of burn area. TBSA of the burn area is calculated and used with fluid formulas for the estimation of fluid resuscitation (Burges, 1991; Thelan et al, 1994). Since the majority of patients who sustained burn injury were children, the Lund and Browder age versus area diagram should have been used in this study. The calculation provides the basis for determining fluid resuscitation (Burgess, 1991).

Health care providers in this study did not have a chart/body diagram to show the extent of burn injury of the patient. This diagram needs to be well written and be on the patient's chart/record.

It is important to assess patients for temperature pulse and respiration (TPR) and blood pressure on admission in order to determine the patient's status, and to rule out complications such as hypothermia, hypotension and hypoxia. The findings of this study indicated that health care providers assessed TPR well but blood pressure was not assessed in 49% of patients. It is also important to assess these parameters immediately after injury as they may deteriorate before initiation of fluids replacement or if fluid is inadequately replaced (Faldmo & Kravitz, 1993).

Besides the vital signs, the patient's skin condition needs to be assessed for oedema and blisters. As more oedema may impede blood circulation especially in circumferential burns. Blisters are not supposed to be punctured as they may act as physiological dressing (Walter, 1993). But the study revealed that more than half of the patients" skin conditions were not assessed for oedema, redness or any kind of appearance.

### 5.2.3 Immediate and Subsequent Care

There were no significant differences in the management of burn injured patients during these periods. The findings indicated that 25% of patients needed airway support and these patients were given oxygen per mask without the percentage of oxygen being specified.

Oxygen percentage must be specified since the administration of higher than normal oxygen concentration produces an over abundance of oxygen free radicals. These radicals are said to be responsible for the initial damage of the alveolar-capillary membrane and are toxic metabolites of oxygen metabolism (Thelan et al., 1994). From the history and physical assessment findings, the majority of patients sustained burns in-doors but oxygen saturation and arterial blood gases were not adequately assessed.

The patient's time of injury and time of admission must be assessed as well as the patient's weight on admission. This is necessary because fluid replacement must be calculated based on the time of injury , not the time of admission in the hospital and also the patient's weight (Walter, 1993; Faldmo & Kravitz, 1993). If the patient cannot be weighed at least weight estimation must be made. The findings of this study indicated that the majority of patients were not weighed on admission but the time of injury was estimated in the majority of patients. Fluid replacement was not calculated in most patients and this revealed that fluid replacement was not well maintained. It is important for health care providers to give patients fluids after estimating the weight and give fluids using a specific formula, as there are numerous formulae available to calculate fluid volume replacement but this was not the case in this study as health care providers did not follow any formula for fluid replacement.

The majority of patients were given fluids per peripheral intravenous lines and these findings were similar to the findings by Byers and Flynn (1996) in which

peripheral circulation was restored by peripheral lines. The findings of this study showed that intake and output were monitored in 83% and 76% of patients during the immediate and subsequent care periods respectively.

But since the majority of patients maintained their urinary function, they were only asked if they passed urine or not. This indicated that urine output was adequately monitored as urine was measured in the majority (84%) of patients. But it is important for health care providers not to rely on what patients tell them, they should monitor urine output hourly. This would provide them with baseline data that the more urine output, i.e. more than 30ml/hour, the more evidence that the patient is given enough fluids. Fluid replacement is adjusted according to urine output, making the quantity and quality of urine output an effective measure to evaluate adequate resuscitation.

Vital signs were monitored in the majority of patients and they were monitored four hourly. Patients in intensive care were monitored two hourly including urine output measurement. But the vital signs like blood pressure, are not reliable measures for gauging fluid resuscitation (Faldmo & Kravitz, 1993; Byers & Flynn, 1996).

Ringers lactate was the fluid of choice in this study and this is postulated by many studies as it resembles intravascular and interstitial fluid composition (Muchart, 1993; Fladmo & Kravitz, 1993). The rationale for using Ringer's lactate is that it is classified as an iso-osmotic fluid, thus it will replace interstitial

volume and the fluid will become electrochemically similar to the fluid in the extracellular compartments (Muchart, 1993; Thelan et al, 1994). Children were given ½ strength Darrows/Dextrose solution, Normal saline and dextrose 5% were also commonly used and they have been seen as useful in the management of burns especially if used interchangeably with Ringers lactate (Faldmo & Kravitz, 1993).

The majority of patients were given oral fluids despite the extent of burn injury. But according to the findings by Byers and Flynn (1996), the reabsorption rate in burn injured patients is decreased. It is important then to rule out paralytic ileus before giving oral fluid to burn injured patients. However, it is said to be advisable to give fluids orally especially for minor burns and to patients who tolerate fluids orally (Lakhoo, 1995; Byers & Flynn, 1996).

The majority of patients were given feeds early i.e. within the first 12 hours of admission. Most patients (86%) were given juice and water but only 8% of patients were given a normal diet i.e. diet given to every patient in the ward, and only 4% of the patients were given high protein diet, although in other cases it was not recorded as to what type of diet was given to patients. Burn injured patients have high metabolic rates due to high secretions of stressor hormones and since they need more proteins for building the burnt tissues. It is important to give patients with burn injuries high protein especially since the majority of patients were children and early adults (Mashigo, 1997). Patients who could not tolerate oral feeds were given milk, juice and water per

nasogastric tube, depending on the assessment of the health care providers. Not one patient was given antacid despite the massive physiological stressful situation they were in.

Pain is usually undertreated in burn patients as health care providers perceived pain differently due to cultural background (Mackersie & Karagianes, 1990). Burns are painful and due to several wound dressings, patients are always in pain. The findings of this study showed that the majority of patients were assessed for pain sensation and asked or observed for presence of pain. The findings were similar to those found by Byers and Flynn (1996). Most patients (55%) in the study were given Panado orally and it is a weak analgesic. Few (20%) patients were given Pethidine. Most literature advocates for the use of narcotics, sedatives and anxiolytic drugs for pain management. Since patients were either asked or observed if they experienced pain, this can lead to underestimation of pain by health care providers.

A delphi study by Marvin et al. (1982) indicated that anti-anxiety agents used in combination with analgesics are very useful in burn pain management. Most studies advocate for the use of narcotic analgesics and anxiolytic agents such as morphine, methidene, meperidine, diazepam and lorazepam (MacKersie et al., 1990; Marvin et al., 1992; Sheridan et al., 1997). The study indicated that patients undergoing procedural treatment like escharatomy were given ketamine and this was in line with current literature (Ellis et al., 1990).

According the Chris Hani Baragwanath basic burn protocol/standardized procedure for burn management, depending on the health care provider's observations, burn wounds may be left open, closed or combined. These three types of dressings were also used in this study. Dressings were mostly changed daily and this also depended on the observational skills of the health care provider. This was different from Chris Hani Baragwanath basic burn protocol or standardized procedure for burn management in which first dressings from admission, if a Burnshield is used, has to be changed after 24-36 hours and second dressings changed after 2-4 days. Silver sulfadiazine (flamazine) was the most used topical dressing antibiotic, which is what the current literature advocates as silver sulfadiazine is a broad spectrum antibiotic and protects the healing epithelium. Other topical dressings included betadine and vaseline gauze (Drueck III, 1993).

The use of systemic antibiotic is controversial in burn care management. Prophylactic antibiotics are found to be unnecessary unless indicated according to Drueck III (1993). The findings of this study indicated that 49% of patients were given systemic antibiotics. Ampicillin was the most commonly used antibiotic followed by cloxacillin. Few patients had elevated temperatures which could have been due to increased metabolic rate or otherwise but no investigations such as wound swabs were done. Therefore, systemic antibiotics were given for prophylactic purposes. Due to lowered resistance following burn injury, patients were given vitamin supplements, multivitamin, B complex and ferrous sulphate were the commonest vitamin supplements used.

Only 10% of patients admitted with burns had infections during the first 48 hours. One died and the cause was renal failure. According to a study by Davies, Evans and McGonigle (1994) renal failure commonly develops after 1-5 days and it usually follows multiple factors such as sepsis and multiple organ failure. This was in line with the study since the patient who developed renal failure had 75% of TBSA and he was an adult and died after 24 hours of burn injury.

## 5.3 CONCLUSION

Regular monitoring of the patient's physiological parameters and relating this to the clinical findings to arrive at a meaningful decision upon which to act is of utmost importance. Nursing and medical treatment depends on a soundness of the patient's assessment procedure for which baseline information should always be available. As it is through these skills that total patient care towards patient's satisfaction can be achieved, the following conclusions can be made from the findings:

* Burn injured patients were not assessed for allergies and pre-existing medical conditions on admission. It is important to assess for pre-existing conditions since a burn injury may aggravate the pre-existing condition such as renal failure or diabetes.
* Important factors under health history and physical assessment were left out by health care providers during burn management.

* The majority of burn injured patients were given Panado, and Panado is a weak analgesic for burn pain management. The patients' response to Panado needed to have been assessed.

* The majority of patients' TPR were monitored and this showed that vital signs were monitored very well. Blood pressure was not monitored in 49% of patients. The monitoring of blood pressure is vital in burn shock and fluid replacement management; hence it is a neglected aspect of care.

* Monitoring of oxygen saturation cannot be overemphasized in burn management. The administration of oxygen is required for all major burns until carbon monoxide toxicity has been excluded (Demling, 1993). It was important to monitor oxygen saturation in order to determine if oxygenation was maintained. Furthermore, the assessment and monitoring of laboratory tests such as electrolytes, blood gases and acid base together with blood pressure monitoring is vital in burn management. These tests should not be done once only, as they may be normal on admission but deteriorate later. If they are done only once, comparison during subsequent care would not be possible.

* The majority (92%) of burn injured patients were not weighed or weight estimated on admission. The use of a specific formula as a guide for fluid replacement was absent. Intake and output was monitored and urine was measured. All these parameters are crucial in burn management. Fluid replacement is based on the patient's

weight, monitoring of urine output and the use of a specific formula. In order to monitor if fluid is replaced adequately, the patient's urine output must be monitored hourly until when the health care provider is satisfied with the outcome. A good urine output indicates a good perfusion. It is imperative to monitor intake and output in burn injured patients especially during the burn shock period. Intake and output monitoring would assist in preventing fluid over or underload, which might aggravate the condition of the already compromised patient. All these parameters were adequately assessed.

* The study indicated that the extent of burn injury was not estimated using a body diagram/chart. The Lund and Browder's chart for children and the rule of nine for adults were not used to estimate the extent of burn injury. These diagrams assist in giving a good picture of the extent of burn injury. A pictorial diagram would remind the health care provider with the patient acquity of burn injury.

* Health care providers classified burn injury according to degrees only in this study. But recent literature advocates for the combination of other classifications such as superficial, partial and full thickness burns. The extent of burn injury cannot be estimated appropriately during the initial encounter with the patient. It is therefore important to estimate the extent of burn injury also after the second dressing.

The findings of this study were consistent with available literature. The findings showed that although some important aspects of burn management had been omitted, through the limited resources, health care providers did the best in the management of the burn injured patients during the first 48 hours.

## 5.4 RECOMMENDATIONS

### 5.4.1 For Practice

* Health history revealed that burn injured patients were mostly between the ages of 1-10 years. It is therefore imperative that burn prev ntion programs in order to sensitize the community be created. The wards where burns are managed should initiate burn prevention programs and organize a burn prevention day.
* Health care providers should use a standard formula for fluid replacement.
* There should be a standardized body diagram to estimate the extent of burn injury of the patients by all health care providers, including the nurses since they change the dressings. The extent of burn injury should be done according to superficial, partial thickness and full thickness.
* Patients' weight should be at least estimated on admission since the patient's weight is used in calculating fluid for replacement.

* There is a need to increase investment on educating nurses for burn management through seminars, workshops, ward conferences, an in-service education and to increase the number of nurses with burn care management..

* Since blood pressure was not monitored in more than half of the patients, there is a need to have at least one Dinamap in the surgical wards as it is a more reliable machine for monitoring vital signs even when applied over bandages as in the case of burn injury (Bainbridge et al., 1990).

* Burn injured patients should be given antacids as burn injured patients are exposed to a stressful situation.

* Health history should include assessn. nt of allergies, pre-existing medical conditions and medication taken before.

* Patients should be assessed and monitored for oxygen saturation as it will assist in detecting any deficiency in oxygenation.

* Urine output for major burns should be monitored hourly until the health care provider is satisfied with the urine output of 30ml per hour. Close monitoring of urine would help to ensure good perfusion to vital organs.

* There is a need to develop a burn protocol by which health care providers should adhere to while managing a burn injured patient.

### 5.4.2 For Research

* An observational study should be done on how burn wounds are dressed in order to ascertain better dressing techniques.
* A study on pain scoring after burn injury should be done especially since the study indicated that the majority of patients were given Panado orally. The patient's response to Panado after burn injury needs to be looked into as it is a weak analgesic.
* A study on the patients' outcome after burn injury should be done in order to determine if the care given during the first 48 hours contributed to the satisfactory patients recovery.

## 5.5 SUMMARY

The goal of this study was to determine if health care practice in burns care is similar with the current body of published research findings. Burn injured patients were assessed for health history, physical assessment and the immediate and subsequent care given to burn injured patients was determined. The findings of this study indicated that there is a lot which needs to be improved for the betterment of the patient's recovery, particularly in the area of fluid replacement.

The researcher therefore achieved the objectives of this study which were to:

* determine the health history recorded by health care providers on burn injured patients,
* describe the physical assessment done on the burn injured patient,
* determine the immediate and subsequent care including fluid replacement, pain control, dietary requirement, respiratory, circulatory, renal, and burn wound management,
* identify the complications that occur during the first 48 hours post burn injury.

A descriptive survey was used to attain the research objectives. Data was collected from 76 records of burn injured patients. Descriptive statistics were utilized to present the findings of the study. In this chapter the results were discussed, conclusions were drawn and appropriate recommendations were made for practice and future research.

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# APPENDIX A

## CHECKLIST

Number

**PROFILE OF CARE GIVEN TO BURN-INJURED PATIENTS DURING THE FIRST 48 HOURS IN THE PRINCESS MARINA HOSPITAL (BOTSWANA)**

**A. Healthy History**

1. Sex

| M | F |
|---|---|
| | |

2. Age _____

3. Patient weighed on admission

| Yes | No |
|---|---|
| | |

4. Date and Time of Admission _____

5. Date and Time of Burn _____

Not Recorded

| Yes | No |
|---|---|
| | |

6. Predisposing Factors

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Accidents | | | |
| - Suicidal tendencies | | | |

- Other _____

_____

7. Past Medical History Assessed

| | Yes | No |
|---|---|---|
| - Allergies | | |
| - Medication | | |
| - Immunization status (tetanus) | | |
| - Pre-existing medical condition | | |

- Other _____

_____

8. Method of Burn

(i) Agent:

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Hot liquid | | | |
| - Iron/metal | | | |
| - Solids | | | |
| - Steam | | | |
| - Flame (Paraffin/petrol) | | | |

- Other _____

_____

(ii) Location where burn occurred

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Place of employment | | | |
| • Indoor | | | |
| • Outdoor | | | |
| - Home | | | |
| • Indoor | | | |
| • Outdoor | | | |

- Other _____

Brief Description of events of injury

| Done | Not Done |
|---|---|
| | |

**B. Physical Assessement**

1. Vital Signs Checked

| | Yes | No | Action |
|---|---|---|---|
| - Temperature | | | |
| - Pulse | | | |
| - Lower extremity pulse | | | |
| - Respiration | | | |
| - Blood pressure | | | |

- Level of consciousness
  *Glasgow Coma Scale

| | |
|---|---|
| 13 - 15 | |
| 9 - 12 | |
| 6 - 8 | |
| 4 - 5 | |
| 3 | |

* Other _____

| | Yes | No |
|---|---|---|
| - $O_2$ | | |
| - CVO | | |

- Other _____

2. Smoke Inhalation Clinical Assessment Done

| Yes | No |
|---|---|
| | |

3. Extent of TBSA/% of Burns _____

4. Depth of Burn Wound:

| | |
|---|---|
| - Superficial burn/1st degree | |
| - Partial thickness/2nd degree | |
| - Full thickness/3rd degree | |
| - Mixed (all 3rd degree) | |

5. Sensation Checked

| Yes | No |
|---|---|
| | |

6. Pain Assessed

| Yes | No |
|---|---|
| | |

7. Skin Condition Assessed

| Yes | No |
|---|---|
| | |

8. Investigations:

| | Done | Not Done |
|---|---|---|
| - X-ray | | |
| - FBC | | |
| - HB | | |
| - Urinalysis | | |
| - Urea & electrolytes | | |
| - BUN | | |
| - PT & PTT | | |
| - Grouping & X-matching | | |
| - ECG | | |
| - Blood glucose | | |
| - ABG | | |

- Other _____

_____

## C. Immediate Care (< 12 Hours)

1. Respiratory Management

| | Yes | No | Not recorded |
|---|---|---|---|
| - Needs assistance | | | |
| $O_2$ therapy | | | |
| * endotracheal intubations | | | |
| * mechanical ventilation | | | |
| * tracheostomy | | | |
| * nasal cannula | | | |
| * face mask | | | |

- Other _____

_____

2. Vital Signs Checked

| | Yes | No | Frequency | Action |
|---|---|---|---|---|
| - Temperature | | | | |
| - Pulse | | | | |
| - Lower extremity pulse | | | | |
| - Respiratory | | | | |
| - Blood pressure | | | | |

3. Circulatory Management

| | Yes | No | Not Recorded |
|---|---|---|---|
| - IV lines | | | |
| * peripheral | | | |
| * central | | | |
| - Intake and output measured | | | |
| - Fluid requirement calculated | | | |
| - *Oral fluids given* | | | |

- Type of fluids _____

_____

4. Renal Management

| | Yes | No | Not Recorded | Action |
|---|---|---|---|---|
| - Passing urine normally | | | | |
| - Urinary catheter inserted | | | | |
| - Urine output measured | | | | |

*Frequency of checking urine output* _____

Other _____

_____

5. Wound Care

| | Done | Not Done | Not Recorded |
|---|---|---|---|
| - Shaving | | | |
| - Removal of loose dead tissue | | | |
| - Cleaned | | | |
| - Debridement | | | |
| - Escharotomy | | | |
| - Homograph | | | |
| - Xenograft | | | |

Other _____

_____

6. Dressings

(i) Type

- open
- closed
- combination

| Yes | No | Not Recorded |
|---|---|---|
| | | |
| | | |
| | | |

Frequency of dressing _____

Other _____

_____

(ii) Topical

- betadine
- silver nitrate
- silver sulfadiazine
- polysporin
- gentamycin
- analgesic

| Yes | Not Recorded |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

Other _____

_____

7. Gastrointestinal Management

- Feeds: parenteral
  iV fluids
  NG tube
  Nil per os
  Orally
- Started within 12 hours
- Vomiting observed
- Intake and output measured

| Yes | No | Not Recorded |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Other _____

_____

8. Pain Control

| Yes | No |
|---|---|
| | |

Pain Assessment Done

Analgesics given

- morphine
- pethedine
- valium
- panado
- frequency of giving

| Yes | No | Not Recorded |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Other _____

_____

9. Treatment

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Antibiotics | | | |
| - Tetanus toxoid | | | |
| - Type of antibiotic | | | |

Other _____

_____

**D. Subsequent Care (> 12 Hours ≤ 48 Hours)**

1. Vital Signs Monitored

| | Yes | No | Frequency |
|---|---|---|---|
| - temperature | | | |
| - pulse | | | |
| - respiration | | | |
| - blood pressure | | | |
| - $O_2$ saturation | | | |
| - level of consciousness | | | |

2. Respiratory Management

| | Yes | No | Not Recorded | Action |
|---|---|---|---|---|
| - Maintain own airway | | | | |
| - Airway support required | | | | |
| - $O_2$ therapy | | | | |
| * endotracheal intubation | | | | |
| * mechanical ventilation | | | | |
| * tracheotomy | | | | |
| * nasal cannula | | | | |
| * face mask | | | | |
| - Auscultatory abnormalities | | | | |
| - X-ray abnormalities | | | | |

Other _____

3. Circulatory Management

| | Yes | No | Not Recorded |
|---|---|---|---|
| - IV line present | | | |
| * peripheral | | | |
| * central | | | |

Type of fluid _____

Other _____

_____

4. Renal Management

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Passing urine normally | | | |
| - Urinary catheter in situ | | | |
| - Urine output measured | | | |

Frequency of monitoring output _____

Other _____

_____

5. Gastrointestinal Management

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Feed: orally | | | |
| NG tube | | | |
| Parenterally | | | |
| Started within: 24 hours | | | |
| 36 hours | | | |
| 48 hours | | | |
| - Intake & output monitored | | | |

Other _____

_____

6. Skin Assessment:

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Oedema assessed | | | |
| - Condition of wound indicated | | | |

Other _____

_____

7. Pain Control

| | Yes | No | Not Recorded |
|---|---|---|---|
| Pain Assessment: | | | |
| - Analgesics | | | |
| * morphine | | | |
| * pethedine | | | |
| * valium | | | |
| * panado | | | |

8. Wound Care

| | | |
|---|---|---|
| Dressing: | Daily | |
| | Alternatively | |
| | When necessary | |

Type _____

Solution used: _____

Topical dressing:

| | |
|---|---|
| * betadine | |
| * silver sulfadiazine | |

Other _____

_____

9. Investigation

| | Done | Not Done |
|---|---|---|
| * Bloods | | |

Other _____

_____

10. Treatment

| | Yes | No | Not Recorded |
|---|---|---|---|
| - Antibiotics | | | |
| - Antiacids | | | |

- Type of antibiotics _____

Other _____

_____

11. Patient Outcome

a. *Developed complications*

| | Yes | No | Action Taken |
|---|---|---|---|
| - infections | | | |
| - renal failure | | | |
| - pneumonia | | | |
| - pulmonary oedema | | | |

Other _____

b. *Disposition*

| | Yes | No | Not Recorded |
|---|---|---|---|
| - patient in the ward | | | |
| - transferred/discharge | | | |
| - death | | | |

Cause of death _____

_____

# APPENDIX B

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

COMMITTEE FOR RESEARCH ON HUMAN SUBJECTS (MEDICAL)
Ref: R14/49 Dithole

CLEARANCE CERTIFICATE PROTOCOL NUMBER M980605

PROJECT Profile Of Care Given To Burn Injured Patients During The First 48 Hours In Princess Marina Hospital- Botswana

INVESTIGATORS Mrs KS Dithole

DEPARTMENT Dept of Nursing Education, Ministry of Health Botswana

DATE CONSIDERED 980626

DECISION OF THE COMMITTEE *

Approved unconditionally

DATE 980629 CHAIRMAN ..... (Professor P E Cleaton-Jones)

* Guidelines for written "informed consent" attached where applicable.

c c Supervisor: Mrs J Bruce
Dept of Dept of Nursing Education, Wits Medical Schhol

Works2\lain0015\HumEth97.wdb\M 980605

==========

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and ONE COPY returned to the Secretary at Room 10001, 10th Floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

DATE 30-07-98 SIGNATURE .....

PROTOCOL NO.: M 980605

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

# APPENDIX C

TELEPHONE: 353221
TELEGRAMS: NGAKA
REFERENCE:

REPUBLIC OF BOTSWANA

PRINCESS MARINA HOSPITAL
P.O. BOX 258
GABORONE
BOTSWANA

16 November 1998

Mrs Kefalotse Dithole
University of Witwatersrand
Department of Nursing
Parktown 2193
Johannesburg

Dear Mrs Dithole,

**Re: Profile of Care Given to Burn Injured Patients during the First 48 hours in Princess Marina Hospital, Botswana**

Having read your proposal and consulted with the Committee Chairperson I am happy, on behalf of the Research and Ethics Committee, to give provisional Ethics approval for you to proceed with the above named research. We note that this will be a purely retrospective observational enquiry based on hospital records that will not involve direct patient contact or interventions.

In giving you this provisional approval, I wish to inform you that it is the mandate of this Committee to maintain a Research Inventory on behalf of this hospital. Consequently, you will be obliged to provide the Committee with one copy of your study report, including all the key research findings, at the end of the study.

On behalf of the Committee, I wish you success in this endeavour.

Yours sincerely,

Prof. Gabriel M. Anabwani
Secretary, Research and Ethics Committee

Cc: Chairman, Research and Ethics Committee

# APPENDIX D

TELEGRAMS: PULA

TELEPHONE: 350800
TELEX 2655 BD

REPUBLIC OF BOTSWANA

OFFICE OF THE PRESIDENT

PRIVATE BAG 001

GABORONE

OP 46/1 LXX (114)

2 November 1998

Mrs. K. Dithole
University of Wits
Parktown Village 1 L7
Blackwood Rd
Parktown 2193
R.S.A.

Dear Madam

**RE: GRANT OF A RESEARCH PERMIT: DITHOLE**

Your application dated 14th October, 1998 refers.

We are pleased to inform you that you have been granted permission to carry out research on "Profile of Care Given to Burn Injured Patients During the First 48 hours in Princess Marina Hospital". The permit is valid for a period not exceeding one (1) year, effective November 1, 1998.

The permit is granted subject to the following conditions:

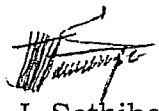
1. Copies of any papers written as a result of the study are directly deposited with the Office of the President, National Archives (2 copies each), National Institute for Research, National Library Service, University of Botswana Library, and the Ministry of Health.

2 The study is conducted according to particulars furnished in the application.

3. The research team comprises only Mrs. K. Dithole.

4. The permit does not give authority to enter any premises, private establishment or protected area. Permission for such entry should be negotiated with those concerned.

Yours Faithfully



J. Sethibe
**for/PERMANENT SECRETARY TO THE PRESIDENT**

cc. Permanent Secretary
Ministry of Health
Director, National Institute for Research
Director, Botswana National Library Services
Government Archivist
Librarian, University of Botswana Library
District Commissioner, Gaborone
City Clerk, Gaborone

JS/ck

# APPENDIX E

TELEPHONE: 305169
FAX: 314697
TELEGRAMS: RABONGAKA
TELEX: 2818 CARE BD
REFERENCE: MH 13/18/1

REPUBLIC OF BOTSWANA

MINISTRY OF HEALTH,
PRIVATE BAG 0038,
GABORONE.

08 October, 1998

K. S. Dithole
Witwatersrand University
South Africa

Dear K. S. Dithole

## Grant of a Research Permit: K. S. Dithole

Your application for a research permit refers.

I am pleased to inform you that you have been granted permission to conduct research on **"Profile of Care to Burn Injured patients during the first 48 hours in Princess Marinah Hospital, Botswana".**

The permit does not give authority to enter any premises, private establishment or protected area without permission of concerned parties. Such permission should be negotiated with those concerned. You may also need to request permission from other relevant authorities, i.e. Local District Health Team, etc.

You are also requested to submit at least one copy of the findings of your study to the Princess Marinah Hospital and the Ministry of Health, Health Research Unit.

Yours sincerely

Pilate Khulumani.
For Permanent Secretary

# APPENDIX F

TELEPHONE: 353221
TELEGRAMS: NGAKA
REFERENCE:

REPUBLIC OF BOTSWANA

PRINCESS MARINA HOSPITAL
P.O. BOX 258
GABORONE
BOTSWANA

Ref: PMH 2/11A

12 July 1998

Mrs Kefalotse Dithole
Wits University
Parktown Village 1 L7
Blackwood Road
Parktown
2193
South Africa

Dear Mrs Dithole,

Re: Research on Burn Injured Patients

Thank you for your letter of 10 June 1998 in which you request permission to conduct a study on care given to burn patients using record review. I note you wish to carry out the study in December 1998.

I have no objection in principle to your performing this study and I concur with your view that the results will help to improve the care that is given to patients with burn injuries. However as we now have a hospital research and ethics committee which is charged with the responsibility of assessing all hospital based research projects I would be grateful if you would submit your research protocol to this committee for its evaluation and approval. The address is as follows:

Professor G. Anabwani
Secretary,
Princess Marina Hospital Research and Ethics Committee
P O Box 258
Gaborone,
Botswana

In the meantime you may continue with your pilot study as this will assist you in refining your protocol.

With best wishes.

Yours sincerely,

H.J. Moffat
Acting Hospital Superintendent

**Author** Dithole K S *
**Name of thesis** Profile Of Care Given To Burn Injured Patients During The First 48 Hours In The Princess Marina Hospital (Botswana) Dithole K S * 1999

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