

## Management of Burns

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### Abstract :

Burns inflict serious injuries both psychologically and physically as a consequence of deformity and disfiguration (scarring) which is the most obvious and most probable outcome of burn injury. Thus the major challenge encountered by the healthcare team, as regards, burn management is not only in saving life but also in improving quality of life of psychologically and emotionally distressed and physically deformed patient, so that he is able to perform the day to day activities as nearly as possible, in the normal state of mental and physical health. To achieve the positive outcomes, an efficient coordination of healthcare team is required. For understanding the burn resuscitation, handling, transfer, management, medication and counseling for improvement in quality of life of patient, a study is carried out on thirty hospitalized patients (Mayo, Ganga Raam and Jinnah Lahore) by the use of well designed Performa and the data was evaluated. The results showed that mostly burns are encountered accidentally with adult males forming the major proportion, presenting 21-40%TBSA as a major surface area involved. Nelbine, ranitidine and amoxicillin came out to be the most commonly prescribed medicines for pain management; prophylaxis of stress induces ulcer and sepsis respectively. Septicemia came out to be the most fatal post burn complication. Most burn patients were satisfied at the care provided to them and there was a small mortality ratio among the burn victims, indicating provision of efficient burn care.

**Key words:** *Burn Management, Septicemia, Parkland's Formula, Silver sulfadiazine.*

### Introduction:

Burn is a type of injury that may be caused by heat, cold, electricity, chemicals, light, radiation, or friction. Burns can be highly variable in terms of the tissue affected, the severity, and resultant complications. Muscle, bone, blood vessel, dermal and epidermal tissue can all be damaged with subsequent pain due to profound injury to nerves.

Depending on the location affected and the degree of severity, a burn victim may experience a wide number of potentially fatal complications including shock, infection, electrolyte imbalance and respiratory distress. Beyond physical complications, burns can also result in severe psychological and emotional distress due to scarring and deformity.

The traditional system of classifying burns categorizes them as first, second-, or third-degree. Most burns are first to third-degree, with the higher-degree burns typically being used to classify burns postmortem. This system is however being replaced by one reflecting the need for surgical intervention. The burn depths are described as either superficial, superficial partial-thickness, deep partial-thickness, or full-thickness

First-degree burns are usually limited to redness (erythema), a white plaque and minor pain at the site of injury. These burns involve only the epidermis. Most sun burns can be included as first-degree burns. Second-degree burns manifest as erythema with superficial blistering of the skin, and can involve more or less pain depending on the level of nerve involvement. Second-degree burns involve the superficial (papillary) dermis and may also involve the deep (reticular) dermis layer. Major second-degree burn caused by contact with boiling water. Third-degree burns occur when the epidermis is lost with damage to the subcutaneous tissue. Burn victims will exhibit charring and extreme damage of the epidermis, and sometimes hard scars will be present. Third-degree burns result in scarring and victims will also exhibit the loss of hair shafts and keratin. These burns may require grafting. Fourth-degree burns damage muscle, tendon, and ligament tissue, thus result in charring and catastrophic damage of the hypodermis. In some instances the hypodermis tissue may be partially or completely burned away as well as this may result in a condition called compartment syndrome, which threatens

both the life and the limb of the patient. Grafting is required if the burn does not prove to be fatal.

“A newer classification of "Superficial Thickness", "Partial Thickness" (which is divided into superficial and deep categories) and "Full Thickness" relates more precisely to the epidermis, dermis and subcutaneous layers of skin and is used to guide treatment and predict outcome.”

Burns are caused by a wide variety of substances and external sources such as exposure to chemicals, friction, electricity, radiation, and extreme temperatures, both hot and cold.

Most chemicals that cause severe chemical burns are strong acids or bases. Chemical burns are usually caused by caustic chemical compounds, such as sodium hydroxide, silver nitrate, and more serious compounds (such as sulphuric acid and Nitric acid). Hydrofluoric acid can cause damage down to the bone and its burns are sometimes not immediately evident.

Electrical burns are caused by an exogenous electric shock. Common causes of electrical burns include workplace injuries or being defibrillated or cardioverted without a conductive gel. Lightning is a rare cause of electrical burns. The internal injuries sustained may be disproportionate to the size of the burns seen, and the extent of the damage is not always obvious. Such injuries may lead to cardiac arrhythmias, cardiac arrest, and unexpected falls with resultant fractures.

Radiation burns are caused by protracted exposure to UV light (as from the sun), hospitalization and treatment are done according to WHO guidelines. with resultant fractures.

In hospital setting the initial treatment involves ABC maintenance, fluid resuscitation by estimating parkland's formula; (Lactated Ringer's solution volume

= 4ml x % TBSA (2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> degree in the first 24 hrs)

Analgesics are used in management of pain systemic anti-inflammatory drugs such as naproxen or ibuprofen may be effective in mitigating pain and swelling. Thus study was carried out with the objective of understanding burn patient management in our setting. To help ease the suffering of a burn victim, they may be placed in a special burn recovery bed which evenly distributes body weight and helps to prevent painful pressure points and bed sores. Survival and outcome of severe burn injuries is remarkably improved if the patient is treated in a specialized burn center/unit rather than a hospital. Serious burns, especially if they cover large areas of the body, can result in death.

Burn management is done to improve the quality of life of the patient. This requires the co. ordination of health care team including doctors, nurse and most important pharmacists. It is suggested that each hospital should be equipped with burn unit and clinical pharmacist to help to achieve positive outcomes of the therapy.

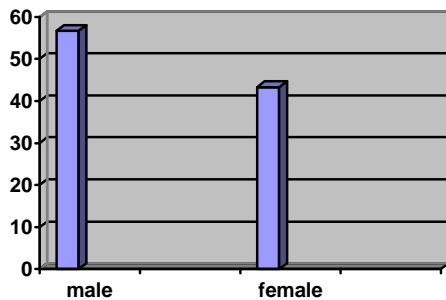
#### **Materials and Methods:**

Initially, burns are sterile. Focus the treatment on speedy healing and prevention of infection. In all cases, administer tetanus prophylaxis. Except in very small burns, debride all bullae. Excise adherent necrotic (dead) tissue initially and debride all necrotic tissue over the first several days. After debridement, gently cleans the burn with 0.25% (2.5g/litre) chlorhexidine solution, 0.1% (1g/litre) cetrimide solution, or another mild water-based antiseptic. Do not use alcohol-based solutions. Gentle scrubbing will remove the loose necrotic tissue. Apply a thin layer of antibiotic cream (Silver Sulfadiazine) Dress the burn with petroleum gauze and dry thick enough to prevent seepage to the outer layers.

**Results:**

The study was carried out in thirty patients of three hospitals (Jinnah Hospital, Mayo Hospital, Sir Ganga Ram Hospital) to understand the management of burn patients. A well designed Proforma was made to collect the data and then it was evaluated.

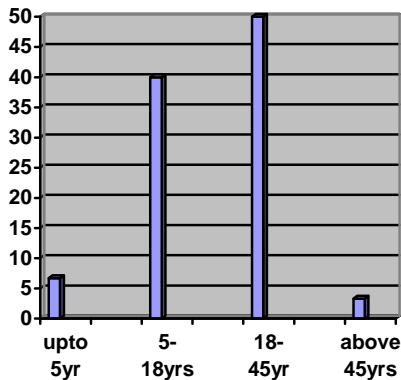
**Gender group: N=30**



**Figure 1:** Gender group

In our study population of male was 56.7% and female were 43.3%

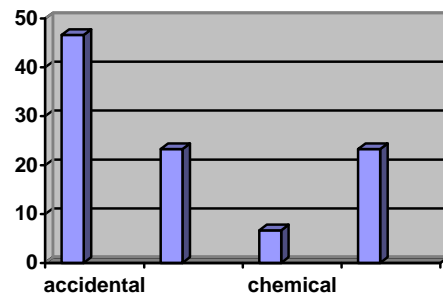
**Age group: N=30**



**Figure 2:** Age group

In our study there are 6.67% children up to 5 years, 40% patients from 5-18 years, 50% patients 18-45 years and above 45 years 3.33%

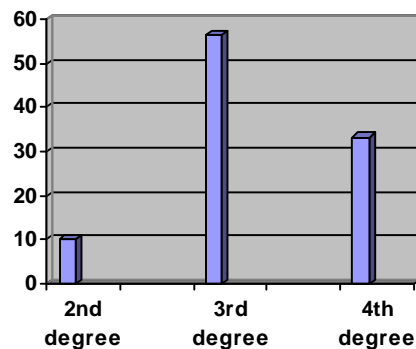
**Causes of burns: N=30**



**Figure 3:** Causes of burns

Causes of burns accidental are 46.6%, homicidal; 23.3 %, chemical 6.67% and electrical 23.3%

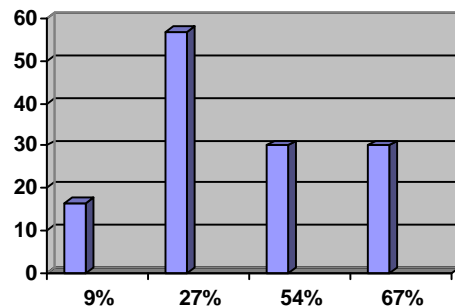
**Types of burns: N=30**



**Figure 4:** Types of burns

Types of burns 2<sup>nd</sup> degree burns 10%, 3<sup>rd</sup> degree burns 46.6%, 4<sup>th</sup> degree burns 43.3%

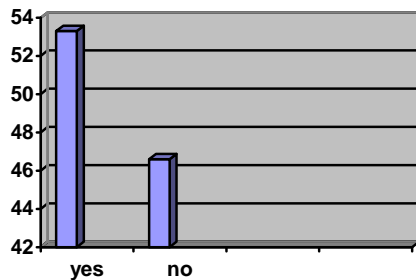
**Percentage (%) TBSA: N=30**



**Figure 5:** Percentage (%) TBSA

Percentage (%) TBSA 18% were 16.6% in our study population, 27% TBSA was found in 56.6% of the total patients, 54% TBSA was found in 30% of the total patients and 63% burns in 8%

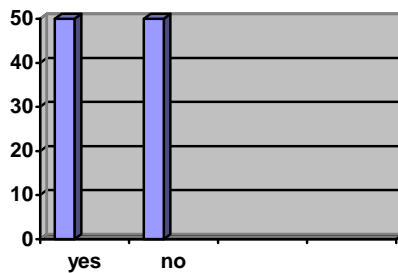
**Inhalation injury:** N=30



**Figure 6:** Inhalation injury

53.3% of the patients were having inhalation injury

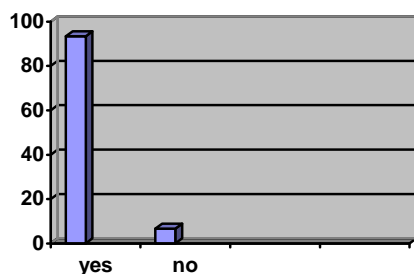
**Treachtomy done:** N=30



**Figure 7:** Treachtomy done

Treachtomy was done in 50% of the total patients

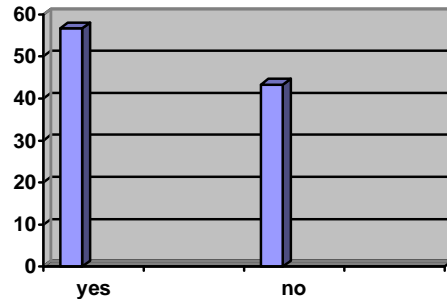
**Daily input and output monitoring:** N=30



**Figure 8:** Daily in put and out. put monitoring

93.3% patients were monitored daily

**Shifted to burn unit:** N=30



**Figure 9:** Shifted to burn unit

56.7% of the patients were shifted to burn unit.

**Discussion:**

The burns injuries present a challenge to the healthcare team, but an orderly, systematic approach can simplify initial stabilization and management.

Adults formed the greater part of the burnt population; they usually encountered burns accidentally, at their workplace (men) and working in homes (women). Mostly people got burns accidentally but there were cases of suicidal and homicidal burn injuries. (But the victims of these attempts, especially suicidal, don't tell, they say it was accidental). In case larger surface areas are involved the extent of harm to the body is increased and if the burn injury has invaded to great depth; the risks of infection and hence mortality increase.

All the burnt patients received tetanus prophylaxis as a part of their initial management. The wound was scrubbed to remove the loose necrotic tissue and debridement was done. The wound was washed with normal saline [this differs from the WHO guidelines (A1) which specify the use of an antiseptic solution].

After washing the wound was covered with a thin layer of silver sulphadiazine cream 1% (a topical antibacterial) and xylocaine gel 2% (a local anesthetic) and the wound was then wrapped in a crepe bandage [in

case of involvement of larger % of TBSA the whole body was enclosed in a metal cage covered with a blanket (where it was not available muslin cloth is used as a cover

In case of inhalation injury, to ensure normal breathing tracheotomy is done, A cut was made in trachea and tube was passed. Outer end of tube was covered with a netted lid which was kept covered at all times with a moist piece of gauze to wet the entering air. Cleaning of the tracheotomy tube was done through suction daily.

In all the patients fluid requirements were calculated using PARKLAND'S formula, and Foley's catheter was passed for monitoring urinary outputs as an index of assessment of renal function and whether the fluid intake was required to be increased or not. In certain cases Ringer Lactate infusion was given to meet the fluid intake requirements. (Inadequate fluid resuscitation causes renal failure and death).

I/V line maintenance are of prime importance. In cases where almost whole of the skin was lost and peripheral vessels could not be located, venous cut down was done (observed in Mayo hospital).

In three hospitals the patient hospitalized was according to the WHO guidelines. Dressing of the patient was changed regularly and the wounded skin was bathed twice daily (although it is not recommended in WHO guidelines) with chloroxylenol in water and scrubbed with a piece of gauze (Mayo) or using simple warm water (GangaRam). In latter, special bathing beds were provided for the patients and analgesic (nalbina) was injected before giving bath. In Mayo no such practice was observed. Assessment of wound was done on regular basis. There was daily monitoring of vitals i.e. B.P, temperature, pulse, respiratory rate. Different degrees of burns produce varied degrees of skin loss, thus, chances of microbial invasion are increased. To combat this various broad spectrum, systemic

antibiotics were used. The most commonly observed practice was the use of penicillin and cephalosporin, which were given after test dose. Prevention of sepsis in burnt patients is of particular concern, since failure to this may lead to septicemia (one of the major post burn complications), which proves to be fatal (three deaths were reported our study from septicemia, Mayo).

In case the wound was severely gangrenous (in extremity), amputation of the affected limb or a part of it was done, as a prophylaxis of sepsis. Three out of the total patients observed, were having their fingers, and in one case hand, amputated.

Hydrocortisone was employed as an anti inflammatory drug in burns (it also provides immunity against infection, indirectly). But its use was subjected to the condition of the patient and is not generally prescribed in usual practice.

#### **Conclusion:**

Pain management is one of the most important outcomes of burn management. Analgesics most commonly employed is nalbina (narcotic analgesic) for acute pain (co administered with marzine to counteract the nausea produced by the former), that usually accompanied the burn injuries. Diclofenac Sodium and Ibuprofen are also used but for mild to moderate pain. The burn patient is under tremendous stress, and there is likelihood of development of stress induced ulcer and chances of acid aspiration are increased. Therefore, ranitidine is most commonly used for its prophylaxis.

Most commonly adopted route of administration in burnt patients was observed to be parenteral, since oral route may lead to vomiting. There were various lab investigations made in case of burn injury which showed the extent of damage by the burn and thus, guide the therapy e.g. in use of specific antibiotics, hydrocortisone (in certain instances), intake fluid volume etc. Certain patients required blood

transfusion as their lab reports show a below normal Hb level. If they show allergic reaction, the blood transfusion immediately stop and inj. of anti allergy is given.

High protein content is required for the anabolic functions to restore the physiology as near to normal as possible. We observed that attendants were guided about the fact that the patient be given high protein, high-calorie diet and in certain cases the patients were given the diet plan for this. In case the patients were non compliant or oral feeding was impossible to replace loss infusion of aminovel (amino acid preparation) was recommended.

The burnt patients require aseptic conditions during management. Those hospitals which are provided with a burn unit even there the aseptic conditions were not maintained. In Ganga Ram hospital situation was much better as compared to Mayo. Patient satisfaction is the key component of patient-care. Burn patients are already under such a huge physiological and psychological stress that they often create problems in handling; they want quick relief of pain and prompt healing of burn wounds. Since depending upon nature the burn wound may take days to weeks and even months to years to heal (and often require grafting) for obtaining as near to the normal appearance of the part affected; thus it proves to be difficult to make them understand.

Pain management and antibiotic therapy are the prime objectives of the burn management and are the key competency areas required of a clinical pharmacist; thus, these areas offer room for the pharmacist to prove their worth. Burn care presents an excellent opportunity to pharmacist to counseling and interaction with patient / Family.

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#### **References:**

- [1] Abdul Razzak Memon, Tahir S M, Imdad A Khushk, Ghulam Ali Memon; 2005 Dec; Therapeutic effects of honey versus silver sulphadiazine in the management of Burn injuries; J Lquat Uni Med Health Sci;4(3):100-4.
- [2] Brett DW; 2006 Jan; A discussion of silver as an antimicrobial agent: alleviating the Confusion; Ostomy Wound Manage; 52(1):34-41.
- [3] Dai NT, Chen TM, Cheng TY, Chen SL, Chen SG, Chou TD, Wang HJ;1998 Nov; The comparison of early fluid therapy in extensive flame burns between inhalation And non inhalation injuries; Burns; 24(7);671-5.
- [4] Driver VR; 2004Sep; Silver dressing in clinical practice; Ostomy Wound Manage. 2004 Sep; 50(9A Suppl):11S-15S.
- [5] G.M. Doherty, J.K. Loweny, J.E. Mason; Burns; the Washington Manual of Surgery; Third Edition.

- [6] Gueugniaud PY; 1997; Management of severe burns during the 1<sup>st</sup> 72 hours; *Ann Fr Anesth Reanim*; 16(4):354-69.
- [7] Harvey JS, Watkins GM, Sherman RT; 1984 Feb; Emergent burn care; *South Med J*; 77(2):204-14.
- [8] Honari S; 2004 Mar; Topical therapies and antimicrobials in the management of burn wounds; *Crit Care Nurs Clin North Am*; 16(1):1-11.
- [9] Hoskins SL, Elgjo GI, Lu J, Ying H, Grady JJ, Hrendon DN, Kramer GC; 2006 May-Jun; Closed-loop resuscitation of burn shock; *J Burn Care Res*; 27(3):377-85.
- [10] J Latarjet; Nov 2002; The management of pain associated with dressing changes in patients with burns; *World wide wound*.
- [11] Mlack R, Cortiella J, Desai MH, Herndon DN; 1998 Feb; Emergency management of pediatric burn victims; *Pediatr Emerg Care*; 14(1):51-4.
- [12] Nancy Risser, Mary Murphy; March 2005; Pediatric Burn; *The Nurse Practitioner: The American Journal of Primary Health Care*; Volume 30 Number 3; Pages 63-63.
- [13] Nasir Khan; Sep 2006; Presentation of burn injuries and their management outcome: *J Pak Med Assoc*; 56(9):39.
- [14] Navar PD, Saffle JR, Warden GD; 1985 Dec; Effect of on halation injury on fluid Resuscitation requirements after thermal injury; *Am J Surs.*; 150(6):716-20.
- [15] Pagani JL, Eggimann P; 2008 Feb; Management of catheter-related infection; *Expert Rev Anti Infect Ther*; 6(1):31-7.
- [16] Prasanna M, Singh K.; 1996 May; Early burn wound excision in "major" burns with "pregnancy": a preliminary report; *Burns*; 22(3):234-7.
- [17] Pruitt BA Jr, McManus AT, Kim SH, Goodwin CW; 1998 Feb; Burn wound infections; current status; *World J Surg.*; 22(2):135-45.
- [18] Salinas J, Drew G, Gallagher J, Cancio LC, Wolf SE, Wade CE, Holcomb JB, Herndon DN, Kramer GC; 2008 Apr; Closed-loop and decision-assist resuscitation of burn patients; *J Trauma.*; 64(4 suppl):s321-32.
- [19] Spires MC, Kelly BM, Pangilinan PH Jr, 2007 Nov; Rehabilitation methods for the burn Injured individual; *Phys Med Rehabil Clin N Am*; 18/94/0/; 925-48.
- [20] Stephen-Haynes J, Toner L; 2007 Mar; Assessment and management of wound infection: the role of silver; *Br J Community Nurs*; 12(3):S6, S8 and S10-2.
- [21] Summer GJ, Puntillo KA, Maiskowski C, Green PG, Levine JD; 2007 Jul; Burn injury pain: the continuing challenge; 8(7):533-48. Epub.
- [22] Tanaka H, Matsuda T, Miyagantani Y, Yukioka T, Matsuda H, Shimazaki S; 200 Mar; Reduction of resuscitation fluid volumes in severely burned patients using Ascorbic acid administration: a randomized, prospective study; *Arch Surg.*; 135(3):326-31.