

Research Article

A retrospective study of drug prescribing pattern in burns patients in a tertiary care rural hospital

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ABSTRACT

Background: To study and describe the prevailing prescription trend in burns patients in a tertiary care rural hospital.

Methods: This was a retrospective observational study. Total 100 patients diagnosed with burn injury and admitted during Jan 2012 to Dec 2013 were included in the study. The demographic details, details of burn injury & treatment received were obtained from the medical record section of Dhiraj General Hospital, Piparia. Drug prescriptions were analyzed using Microsoft Excel for total number of drugs per prescription, various classes of drugs prescribed and group of antibiotics commonly prescribed.

Results: Most common age group affected was 20-40 years. The female to male ratio was 1.8:1. Average number of drugs prescribed was 6.8 with a range of 4-9 drugs per prescription. All prescriptions (100%) contain antimicrobials, analgesics and antiulcer drugs. Among antimicrobials, ceftriaxone was most commonly prescribed followed by amikacin and amoxicillin + clavulanic acid. Only 18% patients were immunized against tetanus.

Conclusions: Females are more vulnerable to burn injuries. Polypharmacy was observed in prescriptions. Systemic antibiotic should be used with caution to prevent emergence of resistant microorganisms. Results of the present study indicate that some aspects of drug treatment need to be rationalized in order to achieve better patient care.

Keywords: Burns, Antibiotics, Polypharmacy, Analgesics, Tetanus

INTRODUCTION

Discovery of fire at the dawn of prehistoric time brought not only the benefits to human beings offering the light and heat, but also misfortune due to burns. Burns are one of the most devastating conditions encountered in medicine.¹ Masellis considered it to be the most complex trauma which can strike a human organism.² Burn is a tissue injury from thermal (heat or cold) application or from absorption of physical energy or chemical contact.³

According to WHO, an estimated 2, 65, 000 deaths every year are caused by burns—the vast majority occurs in low and middle income countries. Almost half of these cases occurring in South East Asia Region. Women in South East Asia Region has highest rate of burns accounting for

27% of global burn deaths. Non-fatal burns are a leading cause of morbidity, including prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection.⁴ In India alone as estimated, over 1,00,000 people suffer from moderate to severe burn injury every year.⁵ Burn injuries are common in India. It can be suicidal, homicidal and accidental. Burn injuries may be ordinary burn, scald due to moist heat, electrical burn, chemical burn due to strong acid, radiation burn and burn due to lightning.⁶

Females are at higher risk for burn injury due to their association with open fire cooking, or inherently unsafe cook stoves, which can ignite loose clothing. Open flames used for heating and lighting also pose risks, and self-directed or interpersonal violence are also factors in

developing country like India. Along with adult women, children are particularly vulnerable to burns. Burns are the 11th leading cause of death of children aged 1–9 years and are also the fifth most common cause of non-fatal childhood injuries. Burns occur mainly in the home and workplace. Community surveys in Bangladesh and Ethiopia show that 80–90% of burns occur at home. Children and women are usually burned in domestic kitchens, from upset receptacles containing hot liquids or flames, or from cook stove explosions. Men are most likely to be burned in the workplace due to fire, scalds, chemical and electrical burns. The amount of damage that a burn can cause depends upon its location, its depth, and how much body surface area that it involves. Burns are classified based upon their depth:

A first degree burn is superficial and causes local inflammation of the skin. The inflammation is characterized by pain, redness, and a mild amount of swelling. The skin may be very tender to touch. Sunburns often are categorized as first degree burns.

Second degree burns are deeper and in addition to the pain, redness and inflammation, there is also blistering of the skin.

Third degree burns are deeper still, involving all layers of the skin, in effect killing that area of skin. Because the nerves and blood vessels are damaged, third degree burns appear white and leathery and tend to be relatively painless.

In addition to the depth of the burn, the total area of the burn is significant. Burns are measured as a percentage of total body area affected. The "Wallace rule of nine" is often used, though this measurement is adjusted for infants and children. This calculation is based upon the fact that the surface area of the following parts of an adult body each correspond to approximately 9% of total and the total body area of 100% is achieved.

The mortality rate is 100% in burns above 60% Total Body Surface Area (TBSA), 69% in 41-60% burns, and 12% in burns of less than 40%.⁵ The causes of deaths are acute renal failure, septicemia, acute respiratory syndrome, shock and upper gastrointestinal bleeding due to peptic ulcer and severe anemia.⁶ The pain and distress caused by a large burn are not limited to the immediate event. The visible physical and the invisible psychological scars are long lasting and often lead to chronic disability. Burn injuries represent a diverse and varied challenge to medical and paramedical staff. Correct management requires a skilled multidisciplinary approach that addresses all the problems facing a burn patient.

The management of the major burn injury represents a significant challenge to every member of the burns team - burns doctors, anesthetists, ward and theatre nurses, physiotherapists, occupational therapists, dietitians,

bacteriologists, physicians, psychiatrists, psychologists and the many ancillary staff whose cleaning and supply services are vital to the successful running of a burns unit. A large burn injury will have a significant effect on the patient's family and future.³

The mortality following burn injuries used to be very high, but improvement in management has resulted in increased survival of the burnt patient over the years.^{7, 8} Last few years has witnessed the change in the management of burn injury owing to the better understanding of pathophysiology of burn. Few studies have examined the cost associated with burn patients' care, still fewer researches have reviewed the pattern of drug utilization and the cost of the medications in the management of burns.^{9, 10} The present study was done to know the pattern of drug use in the management of burns patients in a tertiary care rural set up like ours in a developing country like India.

METHODS

This is a retrospective observational study. We collected data from inpatient files, prescription papers of the burns patients admitted in surgery ward from Jan 2012 to Dec 2013 from the medical record section of Dhiraj General Hospital, Piparia. We conducted this study with the aim of understanding the prevailing prescription pattern in burns patients admitted in surgery ward of Dhiraj General Hospital.

The case sheets and drug charts of these patients were obtained from Medical Record Section and were examined to determine demographic details and drugs prescribed and administered their doses and duration of use. The age, sex and percentage burnt surface area were determined for each patient. The treatment received in burns patients was classified into pharmacological classes such as antibiotics, analgesics, antacids, multivitamins, sedatives, tetanus prophylaxis and others (if any) used. This study was started after taking due permission from Institutional Ethics Committee (IEC), Sumandeep Vidhyapeeth, Piparia. Also, being a retrospective observational study, consent waiver was also obtained from IEC. Patients of either sex and above 18 years of age diagnosed with burns and admitted in the surgery ward of Dhiraj General Hospital, Piparia were included in the present study. Drug prescriptions were analyzed using Microsoft Excel for total number of drugs per prescription, various classes of drugs prescribed per prescription, number of antibiotics per prescription and group of antibiotics commonly prescribed.

RESULTS

Total 100 patients that were admitted during a period of two years from Jan 2012 to Dec 2013 were randomly selected and included in this study. The most common victims were found to be in the age group of 20-40 years. Of the 100 patients in our study, 64 were females and 36

were males with female to male ratio of 1.8:1. The mean age of presentation was 33.69 years in males with range of 5 years to 73 years while mean age of presentation in females was 29.7 years with range of 3 years to 72 years. 17 patients were less than 14 years of age and only 6 patients were 60 years and above [Table 1].

Table 1: Demographic profile of the patients.

Age Group (Years)	Males	Females	Total
0-10	05	09	14
> 10-20	04	07	11
> 20-30	06	19	25
> 30-40	09	17	26
> 40-50	06	05	11
> 50-60	03	03	06
> 60-70	02	02	04
> 70	01	02	03
Total	36	64	100

Out of 100 cases evaluated in our study, 63 cases were diagnosed as burns, 24 cases as electrical burns, 3 cases as chemical burns and remaining 10 cases as scalds. The average burnt surface area per patient was found to be 35.27 % with range from 3% - 98%. We found that patients involving burn surface area in the range of 0-20, 21-40, 41-60, 61-80, and 81-100 percent were 27, 32, 29, 08 and 04 respectively. Out of the 100 patients, 67 were discharged, 11 died, 10 were referred to higher centre for further treatment and 12 patients were DAMA (Discharged Against Medical Advice) [Table 2]. Majority of the deaths occurred in patients with more percent burned surface area.

Table 2: Percentage TBSA (Total Body Surface Area) of burn with outcome of patients.

Percentage TBSA burned	Number of patients	Number of discharged patients	Number of deceased patients	Number of referred patients	Number of patients DAMA
01-20	27	22	00	00	05
21-40	32	29	00	00	03
41-60	29	16	01	08	04
61-80	08	00	06	02	00
81-100	04	00	04	00	00
Total	100	67	11	10	12

A total of 686 drugs were prescribed to the patients. The average number of drugs prescribed was 6.8 with a range of 4-9 drugs per prescription. Among the various drug classes for burns patients, antimicrobials were prescribed in 38.05 % of the total drug used followed by analgesics in 30.03%, antiulcer agents in 16.47%, IV fluids 14.58% and sedatives were 0.87% of the total drugs [Table 3].

Table 3: Category of drugs prescribed.

Category	Number of drugs	Percentage
Antimicrobials	261	38.05
Analgesics	206	30.03
Antiulcer agents	113	16.47
IV fluids	100	14.58
Sedatives	006	0.87
Total	686	100

All the prescriptions (100%) contained one or more antimicrobial drugs, analgesics and antiulcer drugs while prescriptions containing tetanus toxoid injections were 18 and that of IV fluids were 62 [Table 4].

Table 4: Number of prescriptions containing.

Prescriptions containing	Number
Analgesics	100
Antimicrobials	100
Tetanus toxoid Injections	18
Antiulcer agents	100
IV fluids	62

Among the 100 % antimicrobial prescriptions, ceftriaxone, a potent third generation cephalosporin was most commonly prescribed (27.59% of the total antimicrobial drug use). This was followed by amikacin (26.44%), cefoperazone + salbactam (9.96%), piperacillin + tazobactam (9.19%), amoxicillin + clavulanic acid (8.43%), cefotaxime (8.05%), ciprofloxacin (6.13%) and metronidazole (4.21%), [Table 5]. The average number of antimicrobial prescribed was found to be 2.6 with range of 1-4 antimicrobial. The average duration of antimicrobial therapy was found to be 7-10 days. In most of the cases antibiotics were started empirically. Majority of the antibiotics were given by parenteral administration.

Table 5: Frequency of prescription of antimicrobial drugs.

Antimicrobial prescribed	Number of drugs	Percentage
Ceftriaxone	72	27.59
Amikacin	69	26.44
Cefoperazone+ Sulbactam	26	09.96
Piperacillin+ Tazobactam	24	09.19
Amoxicillin + Clavulanic acid	22	08.43
Cefotaxime	21	08.05
Ciprofloxacin	16	06.13
Metronidazole	11	04.21
Total	261	100

DISCUSSION

Burn injuries pose a major global public health crisis.^{11,12} A precise description of the magnitude of the risks for burn injuries is the basis for planning effective interventions. Approximately 90 percent of burns occur in low to middle income countries, regions that generally lack the necessary infrastructure to reduce the incidence and severity of burns.¹³ Accurate data on the incidence of burns and the causes are scarce for many low to middle income countries. A lack of reliable data on risk factors further hampers the development and enactment of effective burn prevention strategies. Burn injury prevention includes four stages: surveillance, analysis, intervention and evaluation and involves the three E's: education, engineering and enforcement.

Prevention programs in the developing countries are still at an infant phase. Along with this, majority of the patients in our country are still managed at peripheral centers. Despite advances in burn care techniques; there remains a trend towards therapeutic failure in burns patients along with long lasting psychological stress which leads to poor quality of life.

Correct management requires a skilled multidisciplinary approach that addresses all the problems facing a burn patient. Appropriate drug utilization studies are needed for evaluating proper utilization of drugs for efficacy, safety, convenience and economic aspects.⁵ In the present study we tried to evaluate the prescriptions and to know the various drug groups currently used in burns patients in our setup.

In the present study, the most common age group affected was the middle age group 20-40 years. Out of 100 patients, 64 were females and the female to male ratio was 1.8:1. This observation was in accordance with the study carried out by Subrahmanyam M, Joshi AV et al.¹⁴

The average number of drugs per prescription is an important index of the prescription audit. In the present study, the average number of drugs per prescription was 6.8 with a range of 4-9 drugs per prescription. This number is higher than previously reported by Santoshkumar R. Jeevangi et al¹⁵ which was 4.5 at the time of admission and also higher than Padwal SL et al¹⁶ which was 5.17 at the time of admission. The higher number of prescriptions made probably reflect the fact that 63% of the cases were of burn injury and therefore the ranges of the drugs prescribed could be high.

Out of 100 patients in our study, 67 were discharged, 12 were DAMA (Discharged Against Medical Advice), 11 died and 10 were referred to higher center for further treatment. Out of 100 patients, 32 suffered 21-40% TBSA burned followed by 29 patients who suffered 41-60% TBSA burned. Majority of the deaths occurred in more than 60% burns. The mortality was less than that reported

by Jeevangi RS¹⁵ and Subrahmanyam M, Joshi AV¹⁴ and also less than that as reported by padwal SL et al.¹⁶

Infection in the burn patient is a leading cause of morbidity and mortality and remains one of the most challenging concerns for the burns team. The most common drug class prescribed in our study was antimicrobial agents (38.05%). Antimicrobials were prescribed therapeutically as well as prophylactically. Antibiotic utilization study performed in two medical departments showed that 35.3% and 39% patients received at least a single antimicrobial agent.¹⁷ In the present study antibiotics were prescribed in 100% of prescriptions which is similar to a study conducted by Padwal SL et al.¹⁶ Systemic antimicrobial treatment must be thoughtfully considered in the care of the burn patient to prevent the emergence of resistant organisms and also to avoid unnecessary increase in the cost of treatment.

Current guidelines for management do not recommend systemic antibiotic prophylaxis for burns patients, stating lack of evidence for efficacy and induction of antibiotic resistance. A study conducted by Tomer Avni et al have shown that systemic antibiotic prophylaxis administered in burns patients in the first 4-14 days significantly reduces mortality by nearly a half and limited perioperative prophylaxis reduces wound infections but not mortality. Prophylactic antimicrobial therapy is recommended only for coverage of the immediate perioperative period surrounding excision or grafting of the burn wound when it is used to cover the documented increase in risk of transient bacteremia.¹⁸ A Cochrane review on antibiotic prophylaxis for preventing burn wound infection found that systemic antibiotic prophylaxis had no effect on burn wound infection rates in non-surgical patients, and that perioperative systemic antibiotic prophylaxis had no effect on any of the review outcomes.¹⁹ Thus the role of prophylactic antibiotic use in burns patient is controversial.

Most of the patients in our study received combination therapy with two or three types of antibiotics. Most common antimicrobial prescribed was ceftriaxone (27.59%) and amikacin (26.44%) followed by cefoperazone+sulbactam (9.96%) and piperacillin+tazobactam (9.19). Other antimicrobials like amoxicillin+clavulanic acid (8.43%), cefotaxime (8.04%), ciprofloxacin (6.13%) and metronidazole (4.21%) were also prescribed depending on antibiotic sensitivity tests of individual patient. The burned patient, despite all efforts, will be exposed to microorganisms. Treatment involves first identifying the organism responsible for clinical sepsis, then choosing appropriate agents.²⁰ Combination therapy offer many advantages like treatment of polymicrobial infections, prevention of emergence of bacterial resistance and also act in synergism. On the other hand, it also increases expenses, risk of adverse effects and chances of superinfection. In our setup, antimicrobials were prescribed according to the sensitivity tests of the patient, therefore combination

agents may be considered rational. We observed that majority of the patients received antibiotics for 7-10 days of duration, which is in accordance to the Guidelines from the French Society for Burn Injuries (SFETB).²¹

Burn pain is very likely the most difficult form of acute pain to treat from any type of etiology. Pain, in addition to being a source of outright suffering in patients, can interfere with wound care and therapies as well as lengthen hospitalization. As such, there are practical as well as humanitarian reasons to control burn pain aggressively. Present study shows that analgesics were prescribed in 100% of the prescriptions. Most common analgesic prescribed was diclofenac sodium and paracetamol followed by ibuprofen, aceclofenac and tramadol. Opioids were prescribed in severe burns pain while diclofenac sodium and paracetamol were prescribed in mild to moderate burns. Higher number of non-opioids prescribed may be due to the fact that more patients in our study suffered mild to moderate burns.

Burn wounds are tetanus-prone; even small burn wounds may lead to fatal tetanus in inadequately immunized patients.²² Thus, the immunization status of all burn patients should be determined on admission and a booster and/or tetanus immune globulin should be given as appropriate.²³ In the present study only 18 patients out of 100 were immunized against tetanus. This practice needs to be rationalized.

With regards to antiulcer drugs in burns patients, prescriptions were 16.47% of the total drug use. Commonly prescribed antiulcer drugs were pantoprazole, rabeprazole, ranitidine, and famotidine. It has been documented that patients with severe burns experience stress gastritis within 72 h of major burn injury. GI erosions occur within 5 hour of injury in 80% of all patients with severe burns.²⁴ Prophylactic treatment with antacids - H₂-receptor antagonists or proton pump inhibitors has dramatically reduced the incidence of GI bleeding in many burn units. So this practice can be considered rational in our setup.

In the present study, IV fluids were prescribed in 100 % prescriptions. Majority of the patients were prescribed RL(Ringer Lactate) and NS(Normal Saline). It is a widely accepted fact that severe fluid loss is the greatest problem faced following major burn injuries. Appropriate fluid management of major burns directly improves the survival rates of burn patients. A study has revealed that RL is the most popular type of fluid in burn units located in USA and Canada.²⁵ According to the American Burns Association practice guidelines, adults and children with burns greater than 20% TBSA should undergo formal fluid resuscitation using estimates based on body size and surface area burned.²⁶

Out of 100 prescriptions screened, we observed that sedatives constitute 0.87% of the total drugs. Most commonly alprazolam was prescribed in the burns patients.

Untreated pain and improper sedation in burns patient may result in psychological distress such as post-traumatic stress disorder, major depression or delirium. Current aggressive therapies for cutaneous burn wounds together with the persistent and repetitive qualities of background and procedural pain, make burn care an experience that is likely to cause anxiety in both adult and pediatric patients. It is also recognized that anxiety can worsen acute pain. This has led to the common practice in U.S. burn centers of using anxiolytic drugs in combination with opioid analgesics. Although previously shown that benzodiazepine therapy improves postoperative pain scores in non-burn settings, it has been recently reported that low dose benzodiazepine administration significantly reduces burn wound care pain.²⁷

Among the topical agents, 1% silver sulfadiazine cream was prescribed for dressings along with antibiotic impregnated Vaseline gauzes were used in majority of the patients. The choice of the dressing materials was largely determined by the patients' clinical presentation as well as their financial status.

A variety of studies have suggested increased requirements of nicotinic acid, biotin, pyridoxine, thiamine, and folate in the burned patient. It is generally agreed that vitamin and mineral needs are also increased for burn patients. Exact requirements of the burn patient in a hyper metabolic/catabolic state have not been established.²⁸ However, present study lacks any prescription of multivitamins, minerals or albumin in burns care which should be bought into consideration.

Thus, it may be concluded that the drugs used for the burns care management in our set up is in adherence with the standard treatment guidelines. The results of our study indicate that some aspects of drug treatment need to be rationalized in order to achieve better patient care.

CONCLUSION

The worldwide occurrence of burn injuries remains high despite efforts to reduce injury incidence through public awareness campaigns and improvements in living conditions. The successful treatment of burns has now been made possible by better knowledge of the pathophysiology of thermal injuries and their consequences, medical technology advances and improved surgical techniques. Though existing drugs offer promising advances in the care of burn injuries, burns remain among the most common injuries presenting to emergency departments, and they continue to result in significant morbidity and mortality in the community. Based on the observations made in the present study, we conclude that females are more vulnerable to burn injuries. The average number of drugs per prescription should be kept minimum in burns patient to avoid unnecessary increase in the cost of treatment and also increase toxicity in the patient. Tetanus immunization is important in burns patients to prevent

complications which should be considered in the treatment. Polypharmacy should be avoided in burns prescriptions. Systemic antibiotics are a valuable therapeutic modality in the burned patient and should be used with caution. Injudicious use may produce direct toxicity or contribute to the emergence of resistant strains of micro-organisms. There seems to be a discrepancy between current guidelines for management of burns patients recommending against antibiotic prophylaxis and the evidence showing a reduction of about 50 % in all-cause mortality with systemic antibiotic prophylaxis. Given the paucity and limitations of the available evidence, this should serve as an urgent call for a large randomized controlled trial. Future trials should assess a full selective decontamination regimen including systemic and topical antibiotics.

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