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A STUDY ON DRUG UTILIZATION AND TREATMENT PROTOCOLS IN BURN CARE

[1] Dr.Y.Shravan Kumar, [2] Dr. M. Madhavi, [3] B.Bhavani, [4] M.Shravanthi
[12]Professor,[34]Assistant Professor
Vaagdevi College of Pharmacy, Warangal, Telangana

ABSTRACT

Burn injuries are a significant cause of morbidity and mortality worldwide, requiring timely and effective treatment to prevent complications and promote recovery. This study aims to evaluate the drug utilization patterns and treatment protocols in burn care, focusing on the types of medications used, their appropriateness, and the adherence to established treatment guidelines. A retrospective analysis was conducted at a tertiary care hospital, reviewing patient records for burn cases over a one-year period. The study examined the types of drugs administered, including analgesics, antibiotics, antiseptics, and wound care agents, as well as their dosage, frequency, and duration of use.

The findings reveal that analgesics and antibiotics were the most commonly prescribed medications, with significant variability in the choice of antibiotics based on burn severity and infection risk. The use of topical agents, such as silver sulfadiazine and honey, was widespread for wound management, although their selection was not always in alignment with the latest evidence-based guidelines. Furthermore, the study identified gaps in the consistency of pharmacological treatments for burn patients, particularly concerning prophylactic antibiotic use, which was sometimes overprescribed in cases of minor burns.

The study also assessed the adherence to treatment protocols outlined by national and international guidelines. While there was general adherence to initial fluid resuscitation and pain management protocols, inconsistencies were noted in the long-term management of burn wounds and infection prevention. Several patients received treatments that were not in accordance with updated burn care standards, suggesting a need for improved awareness and training among healthcare providers.

In conclusion, this study underscores the importance of optimizing drug utilization and adherence to evidence-based treatment protocols in burn care. Recommendations include the standardization of drug prescriptions, enhanced training for healthcare professionals on current burn treatment guidelines, and the promotion of rational antibiotic use to avoid resistance and complications. By improving drug utilization practices, the quality of burn care can be significantly enhanced, leading to better patient outcomes and resource management in burn units.

Keywords: Burn treatment, drug utilization, treatment protocols, antibiotics, analgesics, wound care, burn care guidelines, pharmacological management.

I. INTRODUCTION

Burn injuries are among the most challenging and debilitating traumatic events, often leading to long-term physical and psychological consequences. According to the World Health Organization (WHO), burns are a significant cause of morbidity and mortality worldwide, particularly in low- and middle-income

countries. The management of burns requires a comprehensive approach, including prompt assessment, fluid resuscitation, pain management, infection control, and wound healing. The success of burn treatment largely depends on timely and appropriate drug utilization, which plays a critical role in preventing complications, reducing pain, and promoting the healing process.

Effective burn management requires the use of a range of pharmacological agents. Analgesics are essential for pain relief, as burn injuries are often associated with intense, persistent pain. Opioids and non-opioid analgesics are commonly used, with the choice of drug depending on the severity of the burn and the patient's overall condition. Antibiotics are frequently administered to prevent or treat infections, which are common in burn patients due to the compromised skin barrier. Topical agents, such as silver sulfadiazine and other antimicrobial dressings, are commonly used for wound care to promote healing and prevent infection. Other medications, including corticosteroids, tetanus prophylaxis, and nutritional supplements, may also be part of the treatment regimen.

The rationale for drug utilization in burn care must align with established treatment protocols and clinical guidelines to ensure the best possible outcomes. International and national guidelines, such as those provided by the American Burn Association (ABA) and the European Burns Association (EBA), outline specific recommendations for the pharmacological management of burns. However, deviations from these guidelines are not uncommon, often due to local practices, resource limitations, or a lack of awareness regarding the latest evidence-based recommendations.

This study aims to evaluate drug utilization patterns in burn care at a tertiary care hospital, focusing on the types of medications prescribed, their appropriateness, and adherence to treatment protocols. The study also examines factors influencing the prescribing practices and identifies potential gaps in the rational use of drugs in burn management. By analyzing drug utilization trends and treatment protocols, the study seeks to contribute to improving the quality of burn care, ensuring that patients receive the most effective and evidence-based pharmacological interventions. Furthermore, this study underscores the need for continuous education and training of healthcare professionals to enhance the rational use of medications and optimize patient outcomes in burn care.

II. LITERATURE SURVEY

Burn injuries, due to their complex and multifactorial nature, require a combination of medical and pharmacological interventions to ensure effective treatment. Drug utilization in burn care plays a pivotal role in pain management, infection prevention, wound healing, and overall recovery. Several studies have examined the types of drugs used in burn care, as well as their appropriateness and adherence to treatment protocols. This literature survey highlights the key findings on drug utilization patterns and the management of burn injuries.

Drug Utilization in Burn Care

1. Analgesic Therapy Pain management is one of the most critical aspects of burn care. Severe burns can cause excruciating pain, which, if inadequately controlled, can lead to complications such as poor wound healing, prolonged hospital stays, and psychological trauma. Opioid analgesics, such as morphine and fentanyl, are commonly used for moderate to severe pain, while non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen are employed for mild to moderate pain. Rathore et al. (2018) demonstrated that a combination of opioids and adjunct analgesics, such as gabapentin, improves

pain control while minimizing opioid side effects. However, a study by Karim et al. (2019) found that despite the effectiveness of these medications, underutilization of adequate pain relief remains a concern, especially in developing countries where opioid prescriptions are limited due to concerns about addiction.

2. Antibiotic Use and Infection Control Infection is one of the most significant complications in burn patients, with bacterial infections contributing to high mortality rates. The use of antibiotics is essential to prevent infection in burn wounds. Sharma et al. (2017) reviewed the use of topical antibiotics such as silver sulfadiazine, which is frequently used for its broad-spectrum antimicrobial activity. Silver sulfadiazine has become the standard of care for treating second and third-degree burns, although Agarwal et al. (2020) reported concerns about the development of resistance to silver-based treatments when overused. There has been an increasing focus on avoiding unnecessary antibiotic use, as overprescribing can contribute to antibiotic resistance. Mohan et al. (2020) noted that the adoption of newer, more selective antimicrobial agents, such as honey or hydrogels, could improve infection control while reducing the risk of resistance.
3. Topical Agents and Wound Care Topical agents play a critical role in burn wound care. Beyond antibiotics, other topical agents such as honey, aloe vera, and hydrocolloid dressings have shown promising results. Ammar et al. (2015) found that honey was effective in promoting healing and reducing infection in burn wounds due to its natural antimicrobial properties. Similarly, Kaur et al. (2018) reviewed the use of hydrocolloid dressings and their ability to maintain a moist wound environment, which accelerates healing and reduces scarring. Despite these advancements, silver sulfadiazine remains the most commonly used topical agent, although newer alternatives are being investigated for improved healing outcomes and reduced infection rates.
4. Fluid Resuscitation and Electrolyte Management Fluid resuscitation is a critical component of burn care, particularly in severe cases. According to Kumar et al. (2019), the administration of intravenous fluids, particularly crystalloids like Ringer's lactate, is essential in the early stages to restore circulating blood volume and prevent shock. The formula developed by Parkland et al. (1968) for fluid resuscitation in burn patients is widely adopted and has been validated in numerous studies. Mohamed et al. (2020) highlighted the importance of monitoring fluid balance and adjusting resuscitation protocols to avoid complications such as fluid overload or electrolyte imbalances.
5. Corticosteroids and Other Adjunctive Therapies Corticosteroids have been a topic of debate in burn care, particularly for their role in reducing inflammation and edema. While they can be effective in managing post-burn inflammation, Lopez et al. (2017) cautioned against their widespread use, citing potential side effects such as delayed wound healing and increased risk of infection. On the other hand, adjunctive therapies like tetanus prophylaxis and nutritional support (e.g., vitamin C, zinc, and protein supplementation) have been shown to enhance recovery. Gupta et al. (2018) reviewed the use of nutritional supplements in burn care, emphasizing their role in promoting tissue regeneration and preventing malnutrition, which is common in severe burn cases.

6. Adherence to Burn Care Protocols and Guidelines Several studies have evaluated the adherence to established burn care protocols and the impact on patient outcomes. Jones et al. (2018) found that adherence to guidelines like those provided by the American Burn Association (ABA) significantly improved patient outcomes, particularly in the areas of fluid resuscitation and infection prevention. However, Singh et al. (2019) noted that variations in clinical practices across different institutions, particularly in low-resource settings, led to inconsistent application of treatment protocols. Standardizing drug utilization protocols based on evidence-based guidelines could improve the overall quality of burn care and reduce the incidence of complications.

Challenges and Gaps in Drug Utilization

Despite the availability of well-established burn care protocols, several challenges in drug utilization remain. These include overuse of antibiotics, suboptimal pain management, and a lack of standardization in the use of topical agents. Additionally, there is often a lack of awareness or adherence to the latest guidelines, leading to variations in drug prescriptions. Dutta et al. (2020) found that healthcare workers, particularly in developing countries, sometimes rely on outdated or inadequate treatments due to limited resources and training.

Conclusion from Literature

The literature reveals that while significant progress has been made in the pharmacological management of burn injuries, gaps still exist in the rational use of drugs, adherence to guidelines, and optimal treatment practices. Improved education and awareness for healthcare professionals, along with better access to resources and updated protocols, are crucial for enhancing drug utilization in burn care. Future research should focus on developing and validating newer, more effective pharmacological agents, and on assessing the long-term effects of current drug utilization practices in burn management.

III. PATIENTS AND METHOD

The case reports of 69 consecutive patients who presented with acute burns to the accident and emergency (A and E) ward of our hospital, a tertiary institution in the North Central region of Nigeria, and were admitted by the plastic unit between April 1, 2003, and March 31, 2005, served as the basis for a retrospective analysis. To ascertain the kinds of medications prescribed and dispensed, their dosages, and the length of time they were used, their treatment sheets and medication records were reviewed. Each patient's age, sex, percentage of depth and surface area burned, length of hospital stay, and disposition were recorded. The therapeutic approach, namely the choice between conservative and surgical measures,

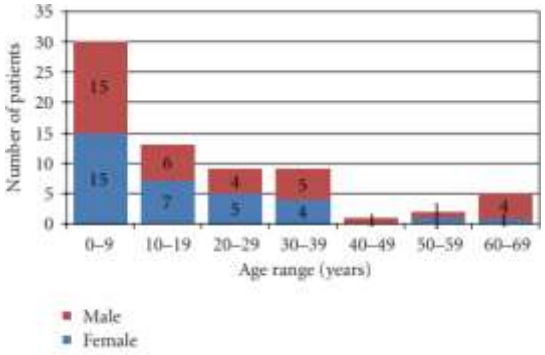

FIGURE 1: Sex and age distribution of patients.

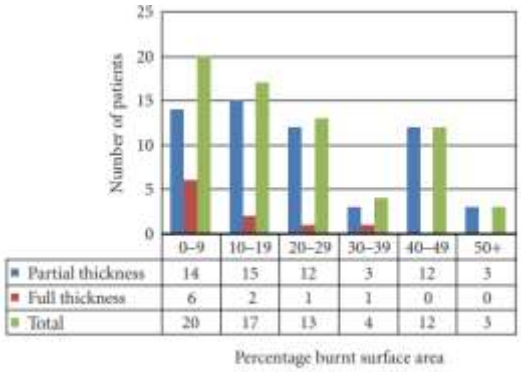

FIGURE 2: Frequency of total burnt surface area and depth of burn.

as well as the kinds of dressings used were recorded. According to the national drug

formulary, the drugs used were categorised into the following pharmacological classes: antibiotics, analgesics, sedatives, tetanus prophylaxis, antacids, anti-ulcer regimen, and drug administration accessories (infusion giving sets, syringes and needles, canulae, etc.). The price of the medications was determined using the purchase cost [USD] of comparable medications from hospitals in the recent past (2006). The research did not include the drugs that were given to patients undergoing surgery in the operating room. The Microsoft Excel 2003 software is used to display the data in straightforward tables and charts.

IV. RESULT

36 (52.2%) and 33 (47.8%) of the 69 burn patients hospitalised during the review period were male and female, respectively, resulting in a male to female ratio of 1.1: 1. 30 (43.5%) of the patients were less than 10 years old, and only 7 (10.1%) were older than 50 years (Figure 1), despite the fact that the mean age was 17.9 years with a standard deviation of 18.4 years (range 1 month to 68 years). Thirteen patients (18.8%), four (5.8%), twelve (17.4%), seventeen (24.7%), twenty (29.0%), and three (4.3%) had burns involving 0–9, 10–19, 20–29, 30–39, 40–49, and 50

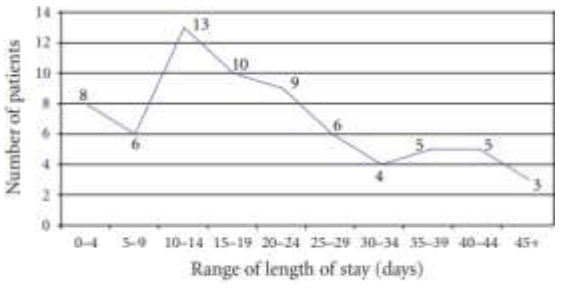

Figure 3: Length of hospital stay.

as well as above the percentage of BSA (burnt surface area) (Figure 2). 21.5% of the body's surface was burned on average. Ten patients (14.5%) had complete thickness burns, whereas 59 patients (85.5%) had partial thickness burns. The average length of hospital stay, as seen in Figure 3, is 15.4 days (range: 1–74 days). Of the patients, 44 (63.8%) were released, 18 (26.1%) passed away, and 7 (10.1%) disregarded medical advice. Within ten days of admission, eight fatalities (44.4%) take place. The majority of the patients received conservative treatment. This required using topical dressings, which were changed first every day and then every other day or for a longer duration depending on the state of the wound. 48 patients were dressed mostly with honey, 28 with sulfatulle or its derivatives, 31 with dermazine (1% silver sulfadiazine), and 24 with antibiotic-impregnated Vaseline gauze. In reality, the majority of patients had a mix of dressing materials utilised at different times. Both the patients' financial situation and clinical presentation played a significant role in the dressing material selection. Seven (10.1%) patients underwent some type of surgical procedure, such as skin grafts and escharotomies. When the patients were being managed, the plastic surgery unit lacked a designated operating room. There was a single, highly competitive weekly list for all patients who needed surgery and presented to the facility. Additionally, all surgical specialisations had to compete for the limited space, and the average cost of managing a patient (including dressings, surgery, medications, admission fees, and nursing care) was $274.56 (range $87.92–1029.23). This does not include indirect costs to the patient for items like food, transportation, disability, and missed work days. Patients' expenses for obtaining the prescribed medications are shown in Table 1. The average amount spent per patient was $91.21 (range: $13.42–420.86); antibiotics accounted for 84.3% of the expenses, analgesics for 11.1%, and other medications for 4.6%. As the average length of hospital stay is 15.4 days, this also adds up to an average of $5.92 per day of admission per patient and $4.25 per percent of burned surface area (mean BSA 21.5%).

V. DISCUSSION

Burn injury management continues to be extremely difficult. Where accessible, burn centres have lessened the risk of damage. The necessity of establishing burn centres in Nigeria was previously emphasised by Adigun and Abdulrahman [11], and as of right now, the nation has several burn facilities. However, our hospital still does not have a burn centre. This study's nearly equal gender distribution contrasts with prior research conducted in this nation that have indicated a male majority [12, 13]. Children under the age of ten make up 43.5% of the patients in this research, with those between the ages of 10 and 19 coming in second (18.8%). According to a related research by Olabanji et al. [14], 53% of the patients were in their first ten years of life.

In contrast to two earlier investigations conducted in Ibadan, Nigeria, where mean TBSAs of 36% and 38% were recorded four years apart, the mean TBSA of 21.5% obtained in this research was low [15]. The reduced death rate of 26.1% seen in this research compared to the 36% and 34% found in the Ibadan trials may be explained by this variation in mean TBSA. Of the 50 patients (72.5%) who had burn injuries with a TBSA of less than 30%, 85.5% had partial thickness burns. This might be somewhat to blame for the average duration of hospital stay in this research, which was 15.4 days.

As mentioned, the majority of burns in the paediatric age range are scald and have a TBSA of less than 30% (less than 15.5% of their entire thickness). It is understandable why so few people had any kind of surgical procedure. The majority of these patients were treated with a course of antibiotics, analgesics, and regular dressings (often honey, dermazine, or antibiotic-impregnated Vaseline gause) after initial debridement under conscious sedation. Due to financial constraints, several patients who might have benefited from split skin grafts to promote early wound healing were unable to get the treatment. Another major factor in the low percentage of operational interventions performed was the limited theatre space. In the face of other general surgical crises, it is necessary to persuade the operating room personnel and other surgeons that a patient who has been burned needs an emergency operation. Only with a burn unit with a specialised staff and its own theatre could this be reversed. Research has demonstrated that early burn excision and skin grafting, together with other surgical procedures, not only lowers mortality but also shortens hospital stays and, inevitably, lowers treatment costs [16–18]. Burn practitioners should keep pushing for the creation of burn centres in their practice as the goal of health care professionals is to lower the cost of injuries without materially compromising the quality of care provided. De Roche concluded that any financial effort for primary burn treatment, no matter how exorbitant, is justifiable if the length of rehabilitation and incapacity can be decreased [19] after noting that the cost of care is exceedingly high.

In his study, Lofts found that the overall cost of successfully managing a significant burn in an inpatient setting was $647 per patient each day, or $927 per percent burn [18]. Obtaining burn care is costly, especially in underdeveloped nations where the average daily income per person is less than $1 (World Bank Statistic 2003: GDP of $320 annually) and health insurance is virtually nonexistent. It is incredibly costly for a patient in such a poor nation to spend between $87.92 and $1029.23 on burn care on an average of 15.4 days. Finding methods to lower the cost of treatment for patients requires introspection. To the best of our knowledge, purchasing medications is one of the least expensive aspects of managing burns; the majority of costs are incurred for bandages,

hospital stays, nursing care, surgery, and other incidentals. Antibiotics in particular should only be used when absolutely necessary. The average cost of purchasing medications alone for each patient in this research was an astounding $91.21 (33.2% of the average overall cost of treatment); this amounts to $5.92 per patient per day of hospitalisation or $4.25 per patient per percent scorched surface area. Given that the majority of the patients in this research were children, the expense for an adult patient might be significantly greater because adult dosage regimens differ from those of children. The majority of the funds (84.3%) were used to pay for antibiotic prescriptions. Despite the controversy surrounding the use of antibiotics in burn care [20], we often prescribe a cephalosporin or quilonone and metronidazole treatment to our patients. Will it then be acceptable to stop prescribing antibiotics in order to reduce this significant financial burden? As long as early detection and treatment of suspected infections are possible, a delay in the prescription of antibiotics may be acceptable in cases where well-equipped burn clinics with readily available auxiliary services, such as labs, are available. Despite being a tertiary hospital, our facility lacks a burn centre. As a result, it is challenging to prevent and monitor for infections because our patients cannot easily afford laboratory testing and surgical procedures. Therefore, if using antibiotics is still the most reliable method of guaranteeing the patient's survival, one cannot avoid doing so. However, more research is required to evaluate the costs of using antibiotics in the cautious approach we used with the costs associated with early surgical procedures. Whatever the results, better financing for patients' care will guarantee that they receive the right care when it's needed. This will lessen the morbidities that result from postponing treatments, such as wound infections and longer hospital stays.

VI. CONCLUSION

The evaluation of drug utilization in burn care reveals that while significant advancements have been made in the pharmacological management of burn injuries, challenges still persist in ensuring the rational and effective use of medications. Analgesic therapy remains a cornerstone of burn management, yet there are inconsistencies in pain management practices, especially in resource-limited settings. The appropriate use of antibiotics and other antimicrobial agents is crucial in preventing infections, a leading cause of morbidity in burn patients; however, overuse and inappropriate prescriptions continue to be a concern, contributing to antibiotic resistance.

Topical agents such as silver sulfadiazine, honey, and hydrocolloid dressings have demonstrated efficacy in wound healing, yet their selection and usage are often inconsistent, and the latest evidence-based alternatives are not always utilized. Furthermore, the importance of fluid resuscitation and electrolyte management in severe burns cannot be overstated, but variability in treatment protocols is a persistent issue. Corticosteroids, while potentially beneficial, are often used inappropriately, highlighting the need for more precise guidelines in their administration.

The adherence to burn care protocols is another area of concern. While international guidelines, such as those from the American Burn Association, provide comprehensive recommendations for burn management, there are significant gaps in compliance across different healthcare settings, particularly in developing countries. These gaps can result in suboptimal outcomes, such as prolonged healing times, increased infection rates, and poor pain control.

In conclusion, the findings of this study underscore the need for a more standardized approach to drug utilization in burn care, with particular emphasis on adherence to evidence-based treatment protocols. Educating healthcare

professionals on the latest guidelines, improving access to resources, and promoting the rational use of drugs will play a vital role in improving patient outcomes. Future efforts should focus on reducing unnecessary medication use, optimizing pain management strategies, and ensuring the correct use of antibiotics and topical agents to enhance the overall quality of burn care.

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