



Original Article

Student study

## CLINICAL PRACTICE GUIDELINES IN ANTIMICROBIAL TREATMENT OF BURNS

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### ABSTRACT

**Background:** A clinical practice guideline is a document with the aim of guiding decisions and criteria regarding diagnosis, management, and treatment in specific areas of healthcare. A burn is a type of injury to skin or other tissues, caused by heat, electricity, chemicals, friction, or radiation. Most burns are due to heat from hot liquids, solids, or fire. **Methods:** A retrospective as well as prospective study was conducted on a randomly selected burn patients in various hospitals of Lahore. A questionnaire was utilized to collect the data of 30 burns patients from the wards of burn department of various hospitals in Lahore. **Results:** Out of total population selected 22 were males and 8 were females. Heat (flame) was the most prevalent cause of burn i.e: 46.66%. other causes were also seen. Coamoxicillin and cefalexin were given empirically in Jinnah Hospital Lahore, cephradine and amikacin were given empirically in Mayo Hospital Lahore. Other antibiotics were prescribed according to the culture report of the patients. Other antibiotic include imipenem, Co-Amoxiclave, cefotaxime, tazobactam, meropenem, sulbactam, ceftriaxone, cefuroxime, cephradine, ceftazidime, vancomycin ciprofloxin. Pharmacists and doctors work together in formation of clinical guidelines at Jinnah and Mayo Hospital Lahore. They have developed their own standard operating procedure. At large we can say that clinical guidelines were being followed at Jinnah and Mayo Hospital Lahore but they are not really upto the mark and in Wapda Hospital Lahore no clinical guidelines were followed as such. **Conclusion:** Clinical practice guidelines in the antimicrobial treatment of burns are fully developed at Jinnah and Mayo Hospital Lahore and are regularly updated according to international guidelines but they are not implemented fully. They have also developed their own standard operating procedures. Antibiotics are not changed at regular intervals at Mayo and Wapda Hospital Lahore which lead to the development of resistance against that antibiotic. Cultures are not done at Wapda hospital until the appearance of infection. This increases the chances of infections.

**Keywords:** burn, international guidelines, antibiotics.

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### INTRODUCTION

A clinical practice guideline is a document with the aim of guiding decisions

and criteria regarding diagnosis, management, and treatment in specific areas of healthcare. Such documents have been in use for thousands of years during the entire history of medicine. However, in contrast to previous approaches, which were often based on tradition or authority, modern medical guidelines are based on an examination of current evidence within the paradigm of evidence-based medicine. They usually include summarized consensus statements on best practice in healthcare. A healthcare provider is obliged to know the medical guidelines of his other profession, and has to decide whether or not to follow the recommendations of a guideline for an individual treatment. <sup>[1, 2]</sup>

A burn is type of injury to skin caused by heat, electricity, chemicals, friction, or radiation. Most burns are due to heat from hot liquids, solids, or fire. Burns are one of the most common and devastating forms of trauma. Burn is a common medico-surgical problem all over the world. It is probably the most devastating of all wounds, and, it imposes a serious burden on physical, mental, and socioeconomic conditions of the victim. It is estimated that, annually, about 11 million people over the world and 1 million people in India suffer from burn injuries. According to a recent Indian study, mortality as high as 40.3% among 2499 burn patients was reported. Approximately 500,000 persons seek medical treatment for burns every year in the United States. Of these, approximately 40,000 are hospitalized for burn injuries, including 25,000 admissions to the approximately 125 medical centers that specialize in burn care. Typically, 4,000 people die from fire and burns every year; of these, approximately 3,500 deaths are due to residential fires, and 500 are due to motor vehicle and aircraft accidents, electrical injuries, chemical exposures, or hot-liquid and substance spills. <sup>[3, 4, 5]</sup>

The skin provides primary protection against infection by acting as a physical barrier. When this barrier is damaged, pathogens have a direct route to infiltrate the body, possibly resulting in infection. In addition to the nature and extent of the thermal injury influencing infections, the type and quantity of microorganisms that colonize the burn wound appear to influence the future risk of invasive wound infection. The pathogens that infect the wound are primarily gram-positive bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA) and gram-negative bacteria such as *Acinetobacter baumannii*-

*calcoaceticus* complex, *Pseudomonas aeruginosa*, and *Klebsiella* species. These latter pathogens are notable for their increasing resistance to a broad array of different antimicrobial agents. Burn wounds are also commonly infected with fungal pathogens. These infections are frequent after the use of broad-spectrum antibiotics. *Candida albicans* is the most common fungal infection<sup>1</sup>; nonetheless, a trend towards nosocomially acquired, intrinsically resistant fungal infections (eg, *Candida krusei*) has been reported.<sup>[6,7,8]</sup>

Topical antimicrobial preparations have been particularly applied to prevent and treat burn infections compared to other traumatic, surgical and medical indications which could be susceptible to infection. Non-healing chronic wounds such as diabetic, vascular and pressure ulcers are another similar indication. Many of the agents are designed to be used to prevent infection developing, while others are designed to kill the actually microbial cells that are proliferating within the burn when an infection has developed. Since many of these topical agents are applied onto the surface of the burn, if they are designed to be actively microbicidal, consideration must be given to the degree which the agents will penetrate into the burned infected tissue to reach the microbial cells.<sup>[9,10]</sup>

Studies have been carried out investigating the ability of “penetration enhancing agents” such as (glycerin, saline, sodium dodecyl sulfate, ethanol, hexane: ethanol, ethyl acetate: ethanol dimethyl sulfoxide, glycine and terpenes) to increase the penetration of diverse antimicrobial agents into the eschar of 3<sup>rd</sup> degree burns. Another consideration that is important in the field of topical antimicrobials is the selectivity towards microbial cells versus cytotoxicity to host cells and tissue. Many antimicrobial agents such as topical antibiotics, antiseptics, silver preparations, antimicrobial peptides, antimicrobial photodynamic therapy have been investigated for possibility toxicity towards skin and other human cells. that have invaded.<sup>[11,12]</sup>

The goals of antimicrobial therapy are to treat an underlying infection, to reduce morbidity, and to prevent mortality. Topical therapy is often applied to prevent infection and to treat ongoing infections or used as an adjunct to surgical treatment and systemic antibiotics. <sup>[13]</sup>

**AIMS AND OBJECTIVES:** Aims and objectives of this study are:

- To study the antimicrobials used in treatment of

**TABLE 1**  
Cause of burn: Sample size(N): 30

Cause of burn	Frequency	Percentage (%)
Heat (flame)	14	46.66
Acid	3	10
Electric shock	10	33.33
others	3	10

**TABLE 2**  
Antibiotics used: Sample size(N): 30

Antibiotics	Frequency	Percentage (%)
Imipenem	4	13.33
Augmentin	6	20
Cefotaxime	5	16.66
Taobactam	4	13.33
Amikacin	6	20
Merepenem	2	6.66
Salbactam	1	3.33
Ceftriaxone	1	3.33
Cefuroxime	1	3.33
Cefalexin	3	10
Cephadrine	2	6.66
Ceftazidine	1	3.33
Vancomycin	2	6.66
Ciprofloxacin	1	3.33

**TABLE 3**  
Other treatments: Sample size(N): 30

Other treatment	Frequency	Percentage (%)
I/V fluids	30	100
Corticosteroids	1	3.33
None	0	0

**TABLE 4**  
Immunization: Sample size(N): 30

Immunization	Frequency	Percentage(%)
Yes	30	100
No	0	0

various degrees of burns.

- To study the clinical guidelines followed for the treatment of burns.
- To study the adverse effects associated with antimicrobial therapy in burns.

### METHODOLOGY

A retrospective as well as prospective study was conducted on a randomly selected 30 burn patients during in period of one month in various hospitals of Lahore.

- Jinnah burn and reconstitution center.
- Mayo Hospital Lahore.
- Wapda Hospital Lahore.

### Inclusion and Exclusion Criteria:

- Hospitalized burn patients were included.
- Males and females both were included.
- Outdoor patients were excluded.

Study was done by selecting 50 burns patients from the wards and OPD's of burn department of various hospitals in Lahore. A data collection form was designed which comprised of the questions regarding the demographic data, history of the patients, the treatment being given and various questions related to the burns treatment. Data collection forms were filled by the patients by face to face interview and by following their medical records.

### RESULTS

Most of the patients belonged to middle class i.e, 63.3%. None of the patient belonged to upper class. In most patients burn is caused by heat(flame) i.e, 46.66% and the second most prevalent cause was electric shock i.e 33.33%. Other causes include hot boiling liquids, hot water steam etc. Most of the patients suffered from 11-20% of the burns i.e, 33.33% and 30% of the patients suffered from 31-40% of the burns. Co-Amoxiclav and amikacin were mostly used antibiotics i.e, 20%. I/V fluids i.e, lactated ringer or normal saline were given to all patients and only one patient was administered with corticosteroids (beclomethasone). Adverse drug reactions were not very common. Only a single patient was reported with mucopapillary reaction. Only 3 patients encountered hospital acquired infections i.e, 10% of the population selected. All the patients were immunized against tetanus on admission to the hospital. Table no 1 shows the cause of burn with sample size,

Table 2 shows antimicrobial used in sample size and Table 3 presents the protective medication and Table 4 immunization done accordingly.

### DISCUSSION

Demographic data of the patients showed that 63.33% patients belonged to middle class, 23.33% from the lower class and 10.33% from the poor class. None of patient belonged to the upper class in government hospitals. Out of total population selected 22 were males and 8 were females. Heat(flame) was the most prevalent cause of burn i.e: 46.66%. Acid caused burn in 10% of patients. 33.33% of the patients suffered from electric shocks. Other causes of burns included hot boiling liquids, hot water steam etc which caused burn in 10% of the patients. Coamoxicillin and cefalexin were given empirically in Jinnah Hospital, cephradine and amikacin were given empirically in Mayo Hospital. Other antibiotics were prescribed according to the culture report of the patients. *Pseudomonas aeruginosa*, *klebsiella pneumonia* and *staplococcus aureus* were the most common strains found in the patients. Other antibiotics included imipenem, augmentin, cefotaxime, tazobactam, meropenem, sulbactam, ceftriaxone, cefuroxime, cephradine, ceftazidime, vancomycin, ciprofloxacin. Vancomycin was given to the patients hypersensitive to penicillins. Other therapies included proton pump inhibitors (omeprazole, sucralfate), antihistamines (Ranitidine), Calcium channel blockers (amlodipine), ACE inhibitors (lisinopril), nutritional supplements (potassium supplement, calcium supplement, protein supplement, ensure powder, iron supplement etc), analgesics (opioid analgesics, Paracetamol, tramadol, diclofenac etc), muscle relaxants are given to relieve stress, albumin to treat hypovolemia, heparin to stop clotting of blood in blood vessels and motillium and gravinate to treat nausea and vomiting. Lactated ringer and normal saline 0.005% are used to treat electrolyte imbalance. Corticosteroids were also given in case of any hypersensitivity reaction. There was no system of reporting adverse drug reactions in Mayo and Wapda Hospital. Jinnah Hospital has developed ADR reporting form and pharmacist regularly had ward rounds and had a close look on the condition of the patient. Only one adverse reaction was reported at Mayo Hospital i.e, mucopapillary reaction. There were no reported hospital acquired infections at Jinnah and Wapda hospital. Hospital acquired infections at Mayo Hospital included herpes and pneumonia. So antiviral drugs were also

prescribed along with antibiotics. Immediate immunization against tetanus was done on admission to the hospital. No antibiotics were used prophylactically in adults and children and also in minor burns. In major burns dressing changes gentamicin was used in Mayo Hospital whereas amikacin was used in Jinnah hospital which belonged to same class. This was according to clinical practice guidelines. No topical antibiotics were used as such after washing. Mostly used topical ointments included polyfax, fucidin (fucidic acid) and visol gel (polycrylic acid). All the hospitals have developed their own standard operating procedures and clinical practice guidelines which were updated on regular intervals. Pharmacists and doctors work together in formation of clinical guidelines at Jinnah and Mayo Hospital. There were no pharmacist at wapda hospital and they don't follow any standard guidelines as such. They have developed their own standard operating procedures. Antibiotics were prescribed according to the international clinical guidelines. At Jinnah hospital antibiotics are changed after every 7 days or at maximum after 14 days. At Mayo Hospital antibiotics are changed after every 14 days. And at wapda hospital there was no concept of changing antibiotics and no culture is done until any sign of infection appears. Pharmacist played his role in developing and implementing clinical guidelines at Jinnah hospital and in Mayo Hospital pharmacist was only restricted to pharmacy and had no role in implementation of these guidelines. At large we can say that clinical guidelines were being followed at Jinnah and Mayo Hospital but they are not really upto the mark and in wapda hospital no clinical guidelines were followed as such. Those practice guidelines helped in reducing the chances of drug resistance, adverse drug reactions and hospital acquired infections. Those guidelines also proved helpful in providing better health facilities to the patients and better care reduce the load of patients as well as of hospitals.

#### CONCLUSION AND RECOMMENDATIONS

It was a face to face as well as medical record survey of the patients of burns at Jinnah Hospital Lahore, Mayo Hospital and Wapda Hospital Lahore. After the compilation of result it is concluded that clinical practice guidelines in the antimicrobial treatment of burns are fully developed at Jinnah and Mayo Hospital Lahore and are regularly updated according to international guidelines. But they are not implemented fully. They have also developed their own standard operating

procedures. Antibiotics are not changed at regular intervals at Mayo and Wapda Hospital Lahore which lead to the development of resistance against that antibiotic. Cultures are not done at wapda hospital Lahore until the appearance of infection. This increases the chances of infections.

All hospitals should develop, update and implement their clinical guidelines according to the international clinical practice guidelines of use of antimicrobials in burn patients. Separate burn unit should be present at each hospital with all the facilities according to international guidelines. Cleanliness must be maintained to reduce the chances of hospital acquired infections. Pharmacist should be present and should play his role in proper medication to reduce the chances of ADR's and also in the development and implementation of proper clinical guidelines.

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CLINICAL PRACTICE GUIDELINES IN ANTIMICROBIAL TREATMENT OF BURNS

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**Authors contribution**

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