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Research Article

INCIDENCE AND CHANGING PATTERNS OF NOSOCOMIAL INFECTIONS IN BURN PATIENTS: A RETROSPECTIVE STUDY

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ABSTRACT

Due to their damaged skin barrier and suppressed immune system, burn patients are at high risk of contracting nosocomial infections during prolonged hospitalizations and invasive diagnostic procedures. Burn patients are less well described in terms of nosocomial infections. An examination of the incidence of nosocomial infection in burned patients admitted to Hospital, as well as its changing patterns during hospitalization was the aim of the present study. The study included 82 patients at the beginning and end. Standard procedures were followed for the isolation and identification of microorganisms. We collected 358 samples from the 82patients and identified 406 bacteria. In the seven days following admission, 305 cultures were positive while 24 (17.2%) remained positive 14 days later. It was reported that 163 Pseudomonas infections, 70 Acinetobacter infections, 66 Staphylococcus aureus infections, and 107 other infections were caused by bacteria. There was a 12% mortality rate. One or more cultures of Pseudomonas or Acinetobacter were positive in all patients. The hospital recommends continuous study of burn infections and an increase in antimicrobial resistance control and measures to treat infectious complications as well as control antimicrobial resistance.

Keywords:-Burn patients, Nosocomial infections, Microbial isolation, Antimicrobial resistance, Pseudomonas, Acinetobacter, Staphylococcus aureus

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INTRODUCTION

Hospitalized patients are most at risk for nosocomial infections, which are common complications contributing to excess mortality and morbidity [1]. A burn injury's immunosuppressive effects put hospitalized patients experiencing hospital-associated infections at greater risk [2]. A nosocomial infection can prolong a patient's stay, increase medical costs, and prolong therapy [3]. In many countries around the world, burn injuries are the most common health problem [4, 5]. The flora found in the patient's own endogenous (normal) flora, environmental contaminants, and healthcare personnel can contribute to nosocomial infections in burn patients. Managing the burn wounds and patients appropriately can improve the distribution of organisms in an individual patient over time [6]. While hospitalized, Staphylococcus becomes predominant in burn wound flora, while Pseudomonas aeruginosa becomes dominant. P. aeruginosa is a multidrug resistant (MDR) opportunistic human pathogen that occurs most commonly in burn patients [5, 7]. There have been a number of studies showing that Staphylococcus aureus causes the majority of nosocomial infections in these patients [1, 8]. Nosocomial infections in burned patients were previously studied in Taleghani Burn Hospital in Khuzestan province [9]. A bacterial distribution among burn isolates is required for all burned patients according to the National Nosocomial Infection Surveillance System (NNIS).

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In this study, burned patients admitted to Motahari Burn Center were examined to determine if there were common bacteria responsible for nosocomial infections and whether these bacteria changed during hospitalization. Despite the fact that the research was focused on a specific population, its findings are not intended to be generalizable. In order to provide the best possible care to this population of patients, we must improve our understanding of the current epidemiologic situation.

MATERIALS AND METHODS

On the basis of 1000 patient-days, a descriptive study calculated the incidence of nosocomial infection. A statistical analysis of the results was performed using SPSS 18. We identified 82 patients admitted to burn treatment center by searching the medical records database. The following data were collected for each admission: age, total body surface area burnt, severity score of injury, duration of hospitalization, duration of ICU stay, days requiring mechanical ventilation, presence of inhalation injury, and survival to discharge from the hospital. To determine the patients with cultures growing microorganisms, the microbiology records were also searched. It is recommended by the National Nosocomial Infections Surveillance System to conduct nosocomial infection surveillance in burn units. This study analyzed 82 patients, of whom 27 women and 55 men participated. In most of them, TBSA (total body surface area) was over 10% and their ages ranged from 1 to 88. They were all hospitalized at least two weeks, had burns with at least a II degree and most of them had burns with at least a III degree. A topical antiseptic solution along with normal saline was applied to them all, and daily dressing changes were performed. Antibiotics such as mupirocin were administered prophylactically. Patients with second- and third-degree burns may benefit from the use of mupirocine, a topical antimicrobial drug, to prevent and treat wound sepsis. A 4-week follow-up period was justified based on active nosocomial infections and antibiotic effectiveness during this time period. Agar, Eosin Methylen Blue, and Nutrient Agar were used in the same laboratory setting for separating bacteria from wounds. To identify Pseudomonas and Acinetobacter, as well as to detect Enterobacteriaceae species, growth at 37 °C in Brain Heart Infusion (BHI) is necessary in the next step.

RESULTS

Hospitalizations for burn patients during the study period totalled 82 over the course of six months. There was a wide range of ages between 1 and 100. There was a range of (8%–100%) burn levels on average. Incidence of infection and burn extent had no statistically significant correlation (P = .098). There were 406 bacteria isolated in total. 175 isolates (40%) were Pseudomonas; 70 (17%) were Acinetobacter; 66 (16%) were Staphylococcus aureus; and 107 (27%) were other bacteria. 95 samples from 358 were identified as containing more than one type of bacteria. Among those whose cultures were positive within 48 hours of admission, 40 percent did not contain Pseudomonas or Acinetobacter. A statistically significant relationship was found between positive and negative cultures in this study. Pseudomonas and/or Acinetobacter were found in 67% of the patients within the first week. A percentage of 81, 84, and 98% was recorded in the second, third, and fourth weeks. In 45 blood cultures, 13 samples (29%) were positive for Pseudomonas (11 samples) and Acinetobacter (two samples). Among patients with positive cultures, 12% died. Acinetobacter was found in three samples and Pseudomonas aeruginosa and Acinetobacter in seven samples (Tables 1 and 2).

Table 1: 82 patients were characterized

Total number	82	
Male	55	68%
Female	27	32%
Age (yr)		
0–14	12	15%
15–29	30	36%
30–44	20	24%
45–59	12	15%
60–74	6	8%
75–87	2	2%
Range of total body surface area burned		
(Percentage)	32	39%
1–29	25	31%
30–50	8	10%
51–69	7	8%

70–100	10	12%
Electricity		

Table 2: In the first hours and other weeks, 82 patients were identified with different kinds of bacteria

	Pseudomonas		Acinetobacter		S. aureus		Pse + Aci + S. aureus	Pse + Aci	Pse + S. aureus	Aci + S. aureus
	Total Pseudomonas isolated	Only Pseudomonas isolated	Total Acinetobacter isolated	Only Acinetobacter isolated	Total S. aureus isolated s	Only S. aureus isolated s				
First 48 hrs	2 (16%)	2 (16%)	1 (4%)	1 (4%)	9 (72%)	9 (72%)	-	-	-	-
Last of first week	24 (55.5%)	17 (34%)	10 (20.6%)	4 (9.2%)	14 (28.8 %)	8 (15.4 %)	1 (2%)	3 (6.1%)	4 (8.2%)	1 (3.1%)
Second week	51 (55.1%)	30 (33.3%)	25 (27.8%)	10 (10.3%)	15 (16.9 %)	9 (9.2%)	1 (1.1%)	14 (15.3 %)	5 (5.4%)	1 (1.1%)
Third week	30 (64.8%)	18 (40.6%)	8 (18.6%)	1 (2.1%)	7 (16.4 %)	3 (5.4%)	1 (1.1%)	7 (14.2 %)	4 (8.7	1
Fourth week	24 (58.3%)	13 (30.9%)	12 (27.3%)	3 (7.1%)	6 (14.2 %)	1 (1.2%)	1 (2.3%)	8 (17.8 %)	4 (10.7 %)	-

DISCUSSION

Patients with high-risk conditions, such as burns, are more likely to die from nosocomial infections in all countries. There are many dangers associated with burn site infections that can compromise a patient's survival and their ability to obtain a successful recovery after a reconstructive procedure. Burn patients are not adequately researched for nosocomial infections. Nosocomial infections are not well studied despite numerous epidemiological studies. As early as 2000, Tehran's burn hospital reported the first nosocomial infection. It is believed that Pseudomonas and Acinetobacter belong to the nosocomial bacteria group according to the CDC protocol [10]. The presence of S. aureus is one of the most common causes of nosocomial infections in burn patients. 40 percent of 82 patients after admission in this study showed a positive culture without Pseudomonas and Acinetobacter. Dermatology Research and Practice reached 81 Pseudomonas and Acinetobacter samples owing to the replacement of positive cultures and colonization of negative cultures following the third week, and ultimately 98% by the fourth week. There are changes in bacteria genus and species in positive and negative cultures which represent nosocomial infections in burn wounds as a result of this issue [11]. In Iraq, S. aureus became the most prevalent agent [12], while Pseudomonas species were found to be most prevalent in England [13] and Turkey. The importance of isolation was higher [14]. Patients with catheter-related infections were the most likely to be infected with Acinetobacter in Sao Paulo [15]. It is estimated that 20 of these patients (12%) died from third degree burns, which is 65%. Acinetobacter and Pseudomonas were both cultured positive in all of them at least once. There has been a decline in the mortality rate associated with burns among burn patients. Studies conducted in the past have indicated a 19% percentage for Tehran hospitals, and 34.45% for the south west of Iran in 2000 [16].

Various strategies, such as hand hygiene and altering the hospital environment, might prove particularly useful in reducing nosocomial infections [17]. Infections in burn patients may be affected by factors such as the patient's age, gender, smoking history, nutritional status, and underlying diseases such as diabetes, chronic kidney disease, and liver disease [18]. Direct or indirect contact with unsuitable decontaminated equipment or their hands is the primary way burn patients get infected. In addition to being vulnerable to colonization by organisms in the surroundings, burn patients also tend to disperse them. Burn injuries, in general, will disperse a greater amount of organisms into the environment because of the size of the wound. Providing appropriate diagnostics and medical therapy can also reduce nosocomial infections.

CONCLUSION

A burns unit should consider infection prevention when treating burn patients. Patients should be isolated, staff should be monitored, bed sheets,

dressings, and other equipment related to these patients should be sterilized, and the environment should be prepared for optimum care conditions for burn survivors. During the study, mupirozin 2% reduced the local bacterial count in the burn wounds as well as prevented systemic infections.

A very important option for burn patients is treatment based on antimicrobial resistance patterns. The use of new extended-spectrum antibiotics for treatment can be beneficial. In addition to increasing our epidemiological knowledge, these results also prepare us for a better view of the situation among burn patients in the future.

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