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Infection in burn patients in a referral center in Colombia

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ABSTRACT

Introduction: Worldwide, burns are responsible for more than 300,000 deaths annually; infection is a major cause of morbidity and mortality in these patients. Early identification and treatment of infection improves outcome. Toward this end it's necessary to identify the institutions flora and organisms that most frequently produces infection.
Objectives: To characterize infections developed by burn patients hospitalized at the University Hospital of Santander (HUS).
Methodology: Burn patients hospitalized in the HUS from January 1 to December 2014 were followed. Medical information regarding infections, laboratory and pathology reports were obtained. Statistical analysis with measures of central tendency, proportions, global and specific incidence density plus overall and specific incidence was obtained. For the microbiological profile proportions were established.
Results: 402 burn patients were included, 234 (58.2%) men and 168 (41.8%) women, aged between 6 days and 83 years, median 12.5 years. The burn agents include scald (52.5%), fire (10.0%), gasoline (9.2%), electricity (7.5%), among others. Burn area ranged from 1% to 80% TBS. Cumulative mortality was 1.5%. 27.8% of burned patients had one or more infections. Identified infections include folliculitis (27.0%), urinary tract infection (19.0%), infection of the burn wound (10.4%), pneumonia (8.6%), Central venous catheter (7.4%), bloodstream infection (7.4%) and skin grafts infection (4.3%) among others. Bacteria were responsible for 88.5% of the cases and fungi 11.5%. The most frequently isolated germs were *P. aeruginosa*, *A. baumannii*, *E. coli*, *S. aureus* and *K. pneumoniae*. Most gram-negative bacteria were sensitive to Amikacin, gram positive bacteria were sensitive to multiple antibiotics.
Conclusion: Burns is a severe trauma that occurs in adult and pediatric patients, has several causative agents and can compromise the patient's life. The burned patient is at risk for a

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Abbreviations: HUS, Hospital Universitario de Santander; HUSVP, Hospital Universitario San Vicente de Paul; TBE, total body surface; UTI, urinary tract infection.

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variety of infections. According to the type of infection it is possible to infer the most common causative organisms and their antibiotic sensitivity/resistance which allow a directed early empiric treatment.

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1. Introduction

Burns are a global public health problem, those produced by fire are responsible for more than 300,000 deaths annually around the world [1].

Burn patients are immunosuppressed and at high risk of developing infectious processes [2,3].

Infection is a major cause of mortality and morbidity [4–6]. Seven out of ten clinically relevant complications in burn patients are related to infectious processes [7].

The experience gained in the initial management of burns patients and advances in fluid resuscitation has dramatically changed the prognosis and cause of death in these patients; currently 75% of deaths in burn patients are caused by infectious processes rather the initial shock of the burn or hypovolemia [8]. Other studies estimate that infection is responsible for 50–75% of deaths in burn patients [9,10].

Several factors increase the risk of infection in burn patients, among which are the extent and depth of the burn, presence of comorbidities and age. In patients with burned TBS greater than 30%, the incidence of infection increases rapidly [11], the same applies to older patients (over 60 years) or pediatric patients [12] and those with comorbidities [13,14].

Frequent infections found in burn patients include cellulites, burn wound infection, pneumonia, infection of the urinary tract, bloodstream infection and infection of the venous access either central or peripheral [7,15–23].

Germs identified as responsible for infection in burn patients include *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Acinetobacter baumannii* [12,15,16,19,24].

The University Hospital of Santander (HUS) has one of the 3 largest burn units in Colombia attending a population of about 5 million [25]. In this article we report the characterization of infectious processes in burn patients treated at HUS.

2. Materials and methods

All burn patients hospitalized at the University Hospital of Santander (HUS) from 1 January to 31 December 2014 were included.

These patients were followed from the time of admission to the hospital until they were discharged from the burn unit or by plastic surgery team. Medical records, lab reports and pathology reports were reviewed searching infectious episodes.

Infectious processes were diagnosed by medical staff following ABA (American Burn Association) [26] and the CDC/NHSN (Atlanta USA) [27] recommendations for diagnosis of infection in patients burned.

Infectious processes present at time of admission, or those that were developed after the patient has been discharged were excluded. Reactivation of latent infections such as herpes, syphilis or tuberculosis was excluded as well.

Statistical analysis was performed on statistical software SPSS v.20.

Sociodemographic and clinical data is reported with central tendency measures (mean and standard deviation/median and interquartile range [IQR]) or proportions according to the variables.

The following measures were established:

- Global Cumulative incidence
- Specific cumulative incidence of major infectious diseases
- Overall incidence density
- Specific incidence density for major infectious diseases

Exposure time was the denominator of the incidence density, this was calculated as the time in days between the time of the burn and the diagnosis of infection; for patients that didnpt developed any infection, the denominator will be the time in days between the time of burn and discharge (censoring time). In the case of skin graft infection, denominator of incidence density was calculated as the time in days between grafting and the diagnosis of infection.

Differences were explored by Student's *t* test, χ^2 or Fischer according to the variable and population's size. Incidence density was explored by Kaplan–Meier graphs and differences were assessed with log-rank test. $\alpha < 0.05$ was considered significant.

Proportions were established for the microbiological profile (type of bacteria and antibiotic susceptibility). Cultures reported as intermediate sensitivity were considered resistant.

3. Results

402 burn patients were included, of whom 234 (58.2%) were male and 168 (41.8%) female. Male: female ratio was 1.39:1. Aged between 6 days old and 83 years (median 12.5 years, IQR 2–33 years).

Patients came from 12 states of Colombia, most from Santander, Norte de Santander, Arauca and Cesar.

Etiologic agents include scalds (52.2%), gasoline (9.2%), electricity (7.5%), fire (10.0%), chemicals (3.7%), gas (3.2%), gunpowder/fireworks (2.5%) among others.

Burns compromise between 1% and 80% of body surface, with a median of 7% (interquartile range 4–14%).

No cases with first degree burns were found, 316 (78.6%) patients had partial thickness or II degree burns, 50 patients (12.4%) II and III degree and 36 patients (9.0%) had full thickness or III degree burns.

The median hospital stay was 14 days, with a range from 1 to 117 days.

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