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Treatment costs of burn victims in a university hospital

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ABSTRACT

Objectives: To analyze the direct costs of treating critically ill patients in the intensive care unit of a center specializing in treating burns.
Methods: This is a prospective cohort study of 180 patients from May 2011 to May 2013. Clinical and demographic data were collected in addition to data for the calculation of severity scores. The costs related to daily clinical and surgical treatment were evaluated until hospital outcome. The costs were grouped into five blocks: Clinical support, Drugs and blood products, Medical procedures, Specific burn procedures and Hospital fees. The level of significance was set at 5%.
Results: There was a predominance of males, 131 (72.8%). The mean age of the patients was 42.0±15.3 years and the mean burned body surface area was 27.9±17%. The median length of stay in intensive care beds was 15.0 (interquartile range IQR: 7.0-24.8) days and the median hospital stay was 23.0 (IQR: 14.0-34.0) days. The mean daily cost was US$ 1330.48 (standard error of the mean SE=38.36) and the mean total cost of hospitalization was US$ 39,594.90 (SE: 2813.11). The drugs and blood products block accounted for the largest fraction of the total costs (US$ 18,086.09; SE 1444.55). There was a difference in the daily costs of survivors and non survivors (US$ 1012.89; SE: 29.38 and US$ 1866.11, SE: 36.43, respectively, $P<0.001$).
Conclusion: The direct costs of the treatment of burn patients at the study center were high. The drugs and blood products block presented the highest mean total and daily costs. Non surviving patients presented higher costs.

1. Introduction

Over the past 20 years there has been a remarkable evolution in the management of patients with burns and the survival rate and quality of the results have reached unprecedented levels. These changes in perspective have resulted in a series of developments which encompass various aspects and include the organization of specialized centers with complex

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hospitalizations and better understanding of the pathophysiology of the burn [1].

The treatment of burns is complex and involves many components, the initial treatment, excision of devitalized tissue and skin grafting, wound management to control infection and adequate nutritional support. Progress in each of these areas contributes significantly to the increased survival of burn victims. However, this optimized management is also responsible for a high cost of treating burns [2–4].

Sanchez et al. [5] recognize that the care of burns is one of the most costly areas of health care. They claim that the high frequency of severe burns and their consequences for society warrant special attention for burn victims from the authorities and society in general. The impacts arising from this trauma in social, family and work environments increases the importance of measuring the costs.

Although the care of burn patients is recognized as expensive, there are few studies on the topic, especially in populations from low- and middle-income countries [5–8]. Studies on costs are designed to measure the specific health problems, describing their impact on available resources. These data may be useful for drawing public attention, encouraging debates and assisting in the planning of health care services, including the prioritization of preventive research and the evaluation of policy options [9]. Collecting accurate data in these types of studies often poses great difficulty and the majority of studies exclusively describe direct costs, which account for about 19.6% of total costs [5].

Considering that the measurement of costs can provide an extremely important tool to guide decision making regarding resource allocation, quality programs and prevention strategies [10–12], the aim of this study was to evaluate the direct costs of hospitalization of burn victims at an intensive care unit of a center specializing in treating burns in a university hospital.

2. Methods

2.1. Population/study location

This is a prospective cohort study including all patients consecutively admitted to intensive care beds (ICU) at a specialized center for the treatment of burns from May 2011 to May 2013. The exclusion criteria were hospitalizations <24h, age <18years and admissions for causes other than acute burns. The study was conducted in a public university hospital serving a geographic region with an estimated population of 1,790,000 inhabitants [13] and is a public university referral hospital with 330 beds. The Burn Treatment Center (BTC) consists of 10 ward beds and 6 intensive care beds, with an emergency care room, two operating rooms and two rooms for multidisciplinary outpatient care. Data collection included only adult patients admitted to intensive care beds.

2.2. Variables

Demographic and clinical data were collected and included age, gender, type, length and depth of the burn, the causal agent, length of stay and hospital outcome. On the day of hospitalization, data for the calculation of severity scores were collected through the *Acute Physiology and Chronic Health Evaluation* (APACHE II) [14] and *Abbreviated Burns Severity Index* (ABSI) [15], in addition to the organ dysfunction score *Sequential Organ Failure Assessment* (SOFA) [16]. The use of therapeutic interventions was evaluated using the score from the *Therapeutic Intervention Scoring System* (TISS) [17].

2.3. Cost evaluation

The direct costs related to the daily clinical and surgical treatment of the study patients until the hospital outcome were evaluated. Costs were grouped into five blocks: Clinical support, Drugs and blood products, Medical procedures, Specific burn procedures and Hospital fees. The clinical support block included laboratory tests, complementary examinations, imaging examinations, nutrition and renal support. The drugs and blood products block included drugs, blood and blood products. The medical procedures block included costs related to personnel providers: nonspecific surgical procedures performed by plastic surgeons; anesthetic procedures; intensivist invasive procedures and materials specific to intensive care. The specific burn procedures block included costs related to personnel providers (plastic surgeons) performing specific procedures (hydrotherapy, bed dressings, debridement, autologous grafts, allografts and escharotomies) and specific materials (dermal matrix, nanocrystalline silver dressings, ionic silver dressings, hydrocolloids, Essential Fatty Acids (EFA) and heparin sodium spray). The hospital fees block included daily ICU intensivist salaries and daily Hospitalist Physician salaries. Costs related to the use of equipment, infrastructure, electricity, security systems, information technology, non-clinical support, salaries of personnel providers other than physicians and indirect costs (loss of productivity, etc.) were not analyzed.

After collecting the data, prices were attributed to all items. The values were determined using standard tables. For medical procedures, the Brazilian Classification for Medical Procedures (CBHPM) of the Brazilian Medical Association [18] was used and for hospital consumable items, medications and solutions, the values were based on the Brasíndice price list [19]. These two tables were chosen as they are applied by the Brazilian health system to pay for the physicians' fees, materials and medicines analyzed in the present study. Therefore, these values are close to the real amount of money a hospital would have to pay for these variables. Subsequently the values were translated into US dollars (US$) based on the average price of the currency for the year 2013.

2.4. Patient treatment protocol

The patients received an initial evaluation in the emergency care unit room, together with the initial hydrotherapy and debridement of the lesions, as well as invasive procedures when indicated, such as venous access, urinary and enteral catheter.

The total burned surface area (TBSA) calculation was conducted using the Lund and Browder table [20] and defined

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