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A population-based study of the epidemiology of acute adult burns in Ecuador from 2005 to 2014

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ABSTRACT

Objectives: To describe the demographic, risk factor, occupational, and morbidity and mortality characteristics of burns in adults in Ecuador using national data. These data are from the only specialized public hospital in Ecuador that has a 12-bed burn unit.

Methods: The National Institute of Statistics and Census provided data from the burn unit of the Hospital Eugenio Espejo, in Quito. Three different datasets pertaining to burn deaths, burn unit inpatient admissions, and hospital discharge were analyzed. Patients who died or were discharged before entering the burn unit were not included in this analysis.

Results: During the 10-year period, 1106 patients were admitted to the burn unit, men represent 69.37% with 768 cases and women represent 30.62% with 337 patients; the number of patients per year was on average 123 cases; the average age was 33–34 years old, with a range between 16 and 96 years old. Heat (thermal) burns represent 65.78% followed by electrical with 30.53%, friction burns with 2.06%, and chemical burns with 1.62%. Domestic methane gas was the most frequent agent causing thermal burns and the most affected occupational groups are construction workers and people who stay at home. The overall mortality is 10.2% and the average length of stay was 23 days.

Conclusions: Thermal burns are more frequent than any other cause of burns. Electrical burns are more frequent in Ecuador than anywhere else according to our research, meaning that control and prevention of workplace safety, urban planning, and home safety are scarce. The most affected groups are those dedicated to labor work. Finally, mortality in hospitalized patient is higher when compared with developed countries.

1. Introduction

Burns represent one of the leading causes of death worldwide, placing these injuries as the fourth cause of mortality in 2004, representing a higher incidence than tuberculosis and HIV put together [1]. Patients that suffer from burns can have physical, emotional, socioeconomic, and functional consequences that, in many cases, can be devastating. The worldwide incidence of fire-related burns was estimated to be 1.1 per 100,000 population, Southeast Asia being the most affected and America the least [1].

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The importance of keeping track of the epidemiology of burns in a country comes from the need to find better public health policies focused mainly in workplace safety and home prevention. Additionally, by gaining an understanding of the epidemiology of burns, especially in developing countries, several strategies can be implemented in order to improve the efficiency of specialized health care for our patients. The number of burns in a population reflects socioeconomical aspects such as current labor conditions and inadequate urban planning. Data from several countries worldwide have shown that poverty and poor education are correlated with more severe burns [2,3]. Despite the fact that burn epidemiology has been described around the world, in South America, those reports are scarce and the data usually need to be extrapolated from other regions, including developed countries [2,4–9].

Current statistics show that in the United States around 400,000 patients require hospitalization in a burn unit every year, of which 3% die due to post-burn complications, compared to 20–30% mortality reported in the 1980s [10–12]. A European systematic review of 76 publications concluded that about 186,500 patients get burns per year in Europe [13], with a mortality rate between 1.4 and 18%, depending on the country. In global statistics, around 90% of mortality caused by burns originated in developing countries, which continue having a high mortality rate due to the lack of adequate pre-hospital and hospital care, smaller access to expensive treatments, lack of skin substitutes, and absent or non-functional tissue banks [14–19].

In Ecuador, there is no official record of burn epidemiology in adults. However, in 2005, Vernimmen et al. [20] published the demographic description of electrical burns in Hospital Luis Vernaza in Guayaquil, Ecuador; they specifically describe the risk factors of electrical burns, excluding all other types of burns. In 2007, Dávalos et al. published statistics of burns in pediatric patients hospitalized in one of the major hospitals in the country [21]. Dávalos et al. compared data from 2007 with those records reported in 2005, finding a reduction in mortality due to burns from 17% to 4.25% in the last report [21]. The lack of information about the incidence of burns in adults in Ecuador and deeper analysis of national mobility, mortality, and risk factors, lead us to collect this data, allowing us to describe the epidemiology, demographics, and socioeconomic factors involved with burns in Ecuador. The data collected in this study refer to patients hospitalized in the only specialized public hospital in Ecuador, its burn unit, and all the available data from all over the country from 2005 to 2014.

2. Methods

This cross-sectional study was done using registered data from the National Institute of Statistics and the biggest government and public-funded burn unit. Data were collected from January 2005 to January 2014 at the Eugenio Espejo Hospital, this being the only specialized public hospital in Ecuador, which serves not only the city of Quito but also all the surrounding regions including part of the Amazon rainforest and the north part of the coast. This hospital has a burn unit made up of 12 beds, of which only one is equipped for intermediate care. This hospital has a tissue bank, unlike any other public hospital in the country; however, it is not currently functioning due to the lack of capabilities.

2.1. Selection and description of patients

The data used in this study are collected from patients that meet the admission criteria for the burn unit, which are the same criteria used for the *American Burn Association* [22–24]. The patients are adults or adolescents over 16 years old, which have suffered some kind of burn. These burns can be accidental, occupational, or self-injuries caused by heat, electrical, physical, or chemical sources. Patients with burns that did not require hospitalization were excluded as well as the patients who died in the emergency room or the intensive care unit without having entered the burn unit. Beside the data collected directly from the hospital, national statistics were used in order to have a broader approach, especially for the demographic data. The variables included in the study are age, sex, occupation, characteristics of the burn lesion (etiology, type, deepness, body part affected, and extension), arrival condition, date of release, and final condition.

2.2. Technical information

All of the data of the patients included in the study were collected from their respective medical records and from the statistical files of the unit. These data were stored both manually and electronically. The nurses in charge of the burn unit collected each patient's data, starting with the admission to the burn unit and including medical records, laboratory exams, images, and complementary studies. Each patient and their family members completed any missing information.

2.3. Statistics

Considering this is the first analysis of its kind made in Ecuador, some of the statistical comparisons are made based on other countries and their populations. The information from the Ecuadorian National Institute of Statistics and Census is also taken into consideration, as well as the epidemiological data from the Eugenio Espejo Hospital.

The statistical analysis includes a detailed description of the data to obtain the total distribution, calculating a series of measures of central tendency, the correlation between variables using Pearson correlation method and multiple *t*-test to show differences among groups.

Graphics have been designed to help visualize the distribution, including pie charts, bar charts, as well as scatter plots, and linear models, in which the relationship between certain variables and morbidity and mortality is calculated, using linear regressions.

The data were stored on a spread sheet in an XLS format from Microsoft® Office. The statistics and graphics were analyzed and created, respectively, with SPSS17 software and Sigmaplot version 10.

All of the bibliographic references and the full text have been retrieved through the Ovid, Pubmed, Scopus, and Google