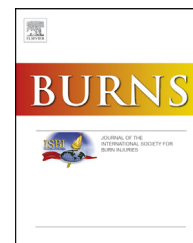


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The epidemiology of burns in young children from Mexico treated at a U.S. hospital[☆]

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ABSTRACT

Introduction: Young children are the most vulnerable for sustaining burns. At this pediatric burn hospital we have provided medical care to young children with severe burns from Mexico for many years. This study identified modifiable risk factors that could be used to assist in prevention of burns in this age group.

Methods: A retrospective chart review was performed with children <5 years of age from Mexico who were injured from 2000 to 2013. The medical records of 447 acute patients were reviewed. **Results:** There were 187 females and 260 males with large burns >20% total body surface area (TBSA) burned. Primary causes of burns were flame and scalds. Children with flame injuries were older (3.0 ± 1.5 years of age) than those with scalds (2.6 ± 1.2 years of age). Admissions attributed to flame burns were largely from explosions by propane tanks, gas line leaks, and house fires. Most admissions for scalds were predominantly from falling in large containers of hot water, food, or grease; and fewer were attributed to spills from hot liquids. Most cases reported to a social service agency were to find resources for families. Mortality rate for flame and scald burns was low.

Conclusions: It is important take into account demographic, cultural, and socioeconomic variables when developing and implementing prevention programs. Burn prevention instruction for parents is crucial.

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1. Introduction

Burns are a major public health issue in developing nations. Considerable disparities exist in the rate and severity of burns

between countries with diverse standards of living. Low and middle income countries report higher rates of burn and mortality than in high income nations [1–6].

The World Health Organization (WHO) has shown that children under five from low and middle income countries

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have a much higher rate of burns than similarly aged children from high income countries. In 2004, the WHO estimated that more than 96,000 children died due to a burn. The death rate in children from burns in low and middle income countries is eleven times higher than that in high income countries (4.3 per 100,000 as against 0.4 per 100,000) [1]. Children are particularly susceptible to burns for a variety of reasons. Younger children are almost entirely dependent on caregivers for their most basic needs [3]. Developmentally as young children learn to crawl and walk and become curious about their environment, they may come into contact with objects that can result in severe burns [1]. Infants and toddlers are not cognitively capable of comprehending the potential danger of certain situations [7] and depend on adults for safety [8]. The etiology of burns can be attributed to several reasons such as poverty, limited resources, family lifestyle, cultural variables, insufficient household safety and supervision, and limited information regarding burn prevention [1]. Epidemiology studies reported that young children are more likely to sustain scald burns [5,9–11]. Burns in early childhood have a wide range of adverse long term consequences ranging from psychological trauma to physical impairment [1]. In fact, the younger the age at the time of burn, the greater the impact may be throughout their lives [2].

In order to reduce burn related injuries in children from low to middle income countries, preventative campaigns based on the epidemiological nature of burns is necessary. However, there is scant literature on the etiology of burns in young children in Latina American countries [2,5]. At this pediatric burn hospital we have provided medical care to children with large burns primarily from the United States and Mexico. Over the past 19 years, children with major life threatening burns from Mexico have been sent to this pediatric burn center by the Michou & Mau Foundation which is a philanthropic organization dedicated to saving the lives of children with severe burns. The purpose of this study was to examine the etiology of burns in young children from Mexico who received medical care at this pediatric burn center with the aim of identifying modifiable risk factors and using this information as a guide for prevention.

2. Methods

2.1. Design

This study was approved by the Institutional Review Board of the University of Texas Medical Branch in Galveston. A retrospective chart review was performed for young children from Mexico who sustained acute burns from 2000 to 2013. The hospital census for each year was reviewed to identify all potential participants. The medical records of 447 children were reviewed to identify the causes of burns and modifiable risk factors.

In Mexico the Desarrollo Integral de la Familia (DIF) is a social service government agency that provides diverse resources and assistance to families. Information about DIF referrals was addressed in this review.

2.2. Participants

The following inclusion criteria were used. Children who were 5 years of age and younger at the time of the burn and were injured in Mexico were included in the study. All children were transported by life flight to this pediatric burn hospital and received medical care at this center. Children who were older and/or had other medical conditions were excluded from the study.

2.3. Analyses

Data were analyzed by a faculty statistician using R statistical software. Descriptive statistics were used for demographic information. Chi-square tests were used to assess differences among categorical variables. Analysis of Variance (ANOVA) was used to assess differences between group means among continuous variables. A 95% level of confidence was assumed with $\alpha = 0.05$.

3. Results

The medical records of 447 eligible participants were identified from the hospital census and reviewed. There were more males 260 (58%) than females 187 (42%). The primary causes of injury were flame burns ($n = 226$, 51%) followed by scalds burns ($n = 208$, 46%) with fewer children sustaining contact ($n = 5$, 1%), chemical ($n = 4$, 1%) and electrical injuries ($n = 4$, 1%). Children who sustained flame and scald injuries had larger total body surface area burns (TBSA) than children with other types of injuries. The mean total body surface area (TBSA) burned for flame injuries was $45.5 \pm 19.0\%$, scalds $44.5 \pm 15.4\%$, electrical injuries $35.8 \pm 23.9\%$, chemical $29.9 \pm 18.2\%$, and contact burns $20.0 \pm 16.3\%$. The mean age at time of burn for flame injuries was 3.0 ± 1.5 , for scalds 2.6 ± 1.2 , contact 1.8 ± 2.5 , chemical 2.9 ± 1.2 , and electrical 3.7 ± 2.5 years of age.

Flame burns were attributed to explosions ($n = 82$, 36%) largely by fuel containers and house fires ($n = 61$, 27%) from cooking and electrical shorts. Scald injuries were primarily caused by falling into large containers of hot liquids ($n = 136$, 65%) and fewer from spills ($n = 45$, 22%). Of the contact burns, one child was injured by coming into contact with hot coals and one by coming into contact with combustible material. Of the chemical injuries, one child was injured when a chemical substance was thrown and another by falling into a container which contained a chemical. No information about the mechanism of the remaining contact and chemical injuries were available. The electrical injuries were attributed to children coming into contact with low tensions wires/cords. Additional information regarding causes of flame burns and age stratified by severity is available in Tables 1.1 and 1.2, and for scald injuries and age stratified by severity is found in Tables 2.1 and 2.2. Receiving immediate medical care after a major burn is crucial (i.e., intravenous fluid resuscitation, wound debridement). Medical resources are usually more readily accessible in urban than rural communities. Seventy-four percent (166 of 224) of the children with flame injuries lived in urban areas and 26% (58 of 224) in rural communities.

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