



Time series of hospital admissions for burns in pediatric patients in the Southern Region of Brazil in the period from 2016 to 2020

Série temporal das internações hospitalares por queimaduras em pacientes pediátricos na Região Sul do Brasil no período de 2016 a 2020

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■ ABSTRACT

Introduction: Burns are considered global public health problems and have a higher incidence in underdeveloped countries. In Brazil, it is estimated that 1,000,000 accidents involving burns occur annually. In pediatric patients, burns are the second most common cause among incidents that occur in childhood, being the third cause of death in them. This study aimed to analyze the rates of hospital admissions for burns in pediatric patients in the southern states, from 2016 to 2020. **Methods:** Ecological time series study, with data obtained in the southern region of Brazil, using the database of data from the Hospital Information System of the Unified Health System, from 2016 to 2020. To analyze temporal trends, standardized morbidity coefficients and the simple linear regression method were used. **Results:** From 2016 to 2020, there were 8,256 hospitalizations of children and adolescents victimized by burns in the southern region of Brazil, with the state of Paraná being responsible for the highest rates throughout the study period. The main age group involves preschool children aged 1-4 years (n=4748); regarding gender, most of the child sample is predominantly male (n=5.205). **Conclusion:** There is a trend towards stability in the overall hospitalization rate. Males and the age group of 1-4 years are the most affected by burns in southern Brazil. Paraná has higher hospitalization rates when compared to other states.

Keywords: Surgery, plastic; Burns; Hospitalization; Pediatrics; Epidemiology.

■ RESUMO

Introdução: Queimaduras são consideradas problemas de saúde pública global e apresentam maior incidência nos países subdesenvolvidos. No Brasil, estima-se que anualmente aconteçam 1.000.000 de acidentes envolvendo queimaduras. No paciente pediátrico, as queimaduras são a segunda causa mais comum entre os incidentes que ocorrem na infância, sendo a terceira causa de morte nas mesmas. O presente estudo teve por objetivo analisar as taxas de internações hospitalares por queimadura em pacientes pediátricos nos estados da região Sul, no período de 2016 a 2020. **Métodos:** Estudo ecológico de séries temporais, com dados obtidos na Região Sul do Brasil, utilizando o banco de dados do Sistema de Informações Hospitalares do Sistema Único de Saúde, no período de 2016 a 2020. Para análise das tendências temporais, foram utilizados os coeficientes de morbidade padronizados e o método de regressão linear simples. **Resultados:** No período de 2016 a 2020, foram realizadas 8.256 internações de crianças e adolescentes vitimadas por queimadura na Região Sul do Brasil, tendo o estado do Paraná como o responsável pelos maiores índices durante todo o período estudado. A principal faixa etária envolve crianças pré-escolares de 1-4 anos (n=4748); quanto ao sexo, a maior parte da amostra infantil tem predominância do sexo masculino (n=5.205). **Conclusão:** Há tendência de estabilidade na taxa geral de internação. O sexo masculino e a faixa etária de 1-4 anos são os mais acometidos por queimaduras no Sul do Brasil. O Paraná tem maiores taxas de internação quando comparado aos outros dois estados.

Descritores: Cirurgia plástica; Queimaduras; Hospitalização; Pediatria; Epidemiologia.

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INTRODUCTION

By definition, burn is a tissue injury caused by any form of heat, contact with electric current or chemical substance¹, generating local, systemic, and metabolic effects, whose depth and extent depend on the intensity and duration of the thermal agent².

Burns are considered a global public health problem and have a higher incidence in underdeveloped countries, accounting for approximately 180,000 deaths per year³. In Brazil, it is estimated that 1,000,000 accidents involving burns occur annually, with 100,000 patients seeking medical assistance and of these, about 2,500 result in death due to the severity of the injuries⁴.

In pediatric patients, burns are the second most common cause among incidents that occur in childhood (mainly children under 14 years of age) and the third cause of death in children⁵. Among the most frequent causal agents, scalding is consolidated as the main one, followed by flammable liquid and heated surface^{2,6,7}.

Among the risk factors linked to the development of this trauma, age of fewer than 5 years, male gender, domestic environment, superheated liquids and use of liquid alcohol stand out^{8,9}.

Burns can be classified according to extent and depth. As for the extent, several methods are available to calculate this percentage¹⁰; a child with more than 10% of the affected body surface is considered a major burn^{7,11}. Regarding depth, a 1st-degree burn affects only the epidermis, 2nd degree when it affects part of the dermis and 3rd degree when all layers of the skin and deep tissues are affected¹². Short- and long-term morbidity and mortality are related to the extent and depth of the lesions^{13,14}, the initial approach and treatment instituted¹⁵, with infection as the main complication^{16,17}. The psychosocial implications^{18,19} for the individual and the family should also be considered to minimize them.

The elaboration of care protocols²⁰, the multidisciplinary approach²¹, and the structuring of specialized centers²² and intensive care units trained to accommodate this patient have contributed to the reduction of mortality, reduction of functional, aesthetic and psychological sequelae, improving the quality of life of these patients²³.

The COVID-19 pandemic is one of the most impactful public health issues in Brazil and worldwide. The permanence of children and adolescents in the home environment increases the risk of domestic accidents²⁴, mostly unintentional and preventable situations.

The kitchen^{25,26} represents a great danger, as well as the frequent use of alcohol²⁷, especially at this time for hand hygiene, surfaces and objects, highly flammable, which makes it equally dangerous²⁸, not to mention the use of cell phones and tablets while charging.

In this sense, the present study aims to analyze the rates of hospital admissions due to burns in pediatric patients in the states of the Southern Region from 2016 to 2020, aiming to enrich the epidemiological knowledge about burns in Brazil and possibly assist in prevention policies and burn patient care at local, state, regional, and national levels.

OBJECTIVE

Main objective

To analyze the rates of hospital admissions due to burns in pediatric patients in the states of the Southern Region (Paraná, Santa Catarina and Rio Grande do Sul) from 2016 to 2020.

Specific objectives

- Describe the socio-epidemiological characteristics of the victims;
- Check the annual trend in the period studied;
- Check the average length of stay of victims in hospitals;
- Analyze the mortality rate of this trauma during the stipulated period;
- To examine this trauma's clinical outcome (death) in children and adolescents.

METHODS

This is a time series (ecological), descriptive and retrospective study of hospitalization rates for burns in pediatric patients in the southern region of Brazil from 2016 to 2020. The study population following data from the Brazilian Institute of Geography and Statistics (IBGE), comprising 8,256 children and adolescents aged 0 to 14 years who had hospitalization registered in the Hospitalization Authorizations (HA) due to burns and registered in the Hospital Information System (HIS/SUS) in the southern region of the country, from 2016 to 2020. Incomplete data were excluded.

All patients, aged between 0 and 14 years, included in the HA from the South Region of Brazil who were hospitalized and registered by the HIS/SUS for burns, which is available at the Department of Informatics of the SUS (DATASUS), were included. Data were stratified by gender and age group.

Data were obtained from DATASUS, the Hospital Information System (HIS), which were grouped into the system through HA records. The data were accessed through the Tabwin data tabulator and later converted into files compatible with the Excel program. For the construction of the database, all hospitalizations for burns in the age group from 0 to 14 years in the period from 2016 to 2020, according to the International Statistical Classification of Diseases (ICD-10), in the South Region were considered.

Data were organized in a database created and analyzed using Microsoft Excel® version 365 software. Quantitative variables were described using measures of central tendency and data dispersion. Qualitative variables were described using absolute and percentage frequency. The temporal trend was performed using linear regression. The statistical significance level adopted was 5% ($p < 0.05$).

The author stated that the data used in the preparation of the manuscript entitled “Time series of hospitalizations for burns in pediatric patients in the southern region of Brazil from 2016 to 2020” were obtained from the online database and access free from HIS/SUS, available at DATASUS, which justifies the absence of the opinion of the Research Ethics Committee (CEP). This information is available on the Internet for a free consultation in the form of data aggregated by states and municipalities; that is, they were not collected individually and nominally.

In this sense, there is no possibility of physical or moral damage from the individual’s perspective and the collectivities, as the principles contained in Resolution 466 of December 12, 2012, were respected.

Thus, this article did not require submission to the CEP of the University of Southern Santa Catarina (UNISUL).

RESULTS

In the period from 2016 to 2020, 8,256 hospitalizations of children and adolescents victims of burns were carried out in the Southern Region of Brazil, with the state of Paraná as responsible for the highest rates throughout the period studied, as opposed to the state of Rio Grande do Sul, with the minors. In 2018, the study showed its worst data ($n = 1848$) regarding the number of hospitalizations (Figure 1).

The main age group (Figure 2) involves preschool children aged 1-4 years ($n = 4748$), followed by third childhood children aged 5-9 years ($n = 1588$). As for gender (Figure 3), most of the children’s sample predominates males ($n = 5205$). Regarding color/race (Figure 4), white color is predominant with 6263 of those involved, with medical records without this variable

(SI) obtaining numbers higher than black, brown, indigenous and yellow in total ($n = 929$), mainly in the state of Paraná ($n = 766$).

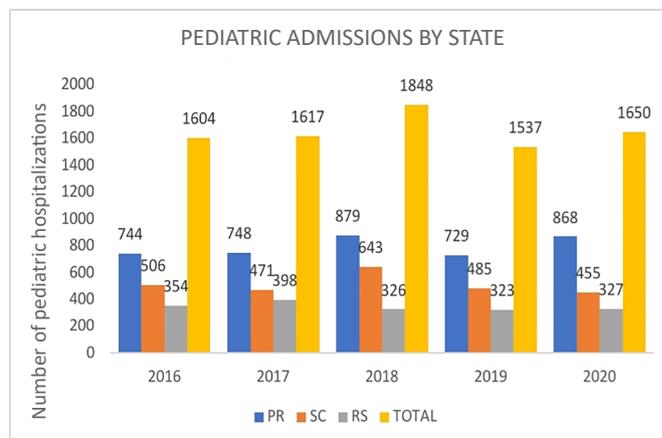


Figure 1. Hospitalizations for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

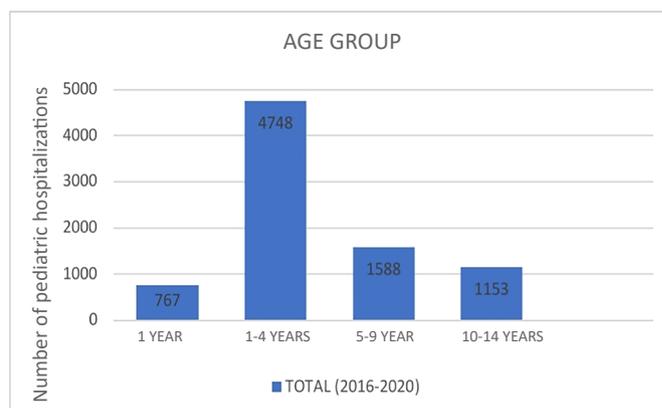


Figure 2. Age range of hospitalizations for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

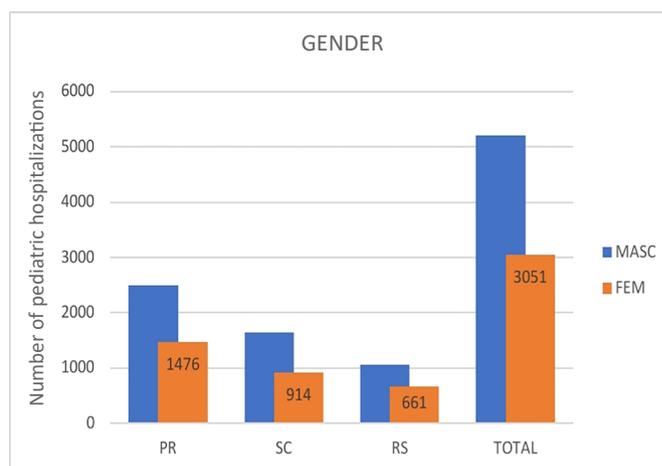


Figure 3. Gender of hospitalizations for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

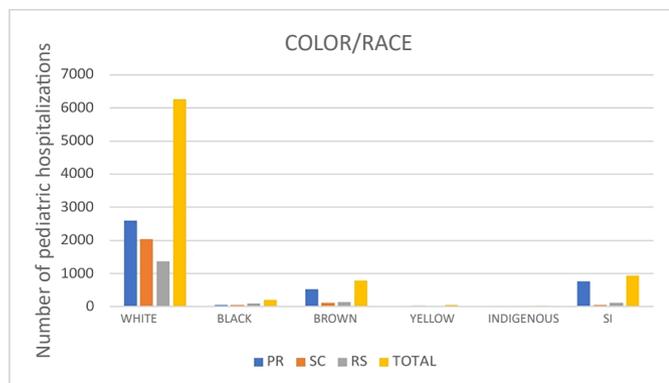


Figure 4. Color/race of hospitalizations for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

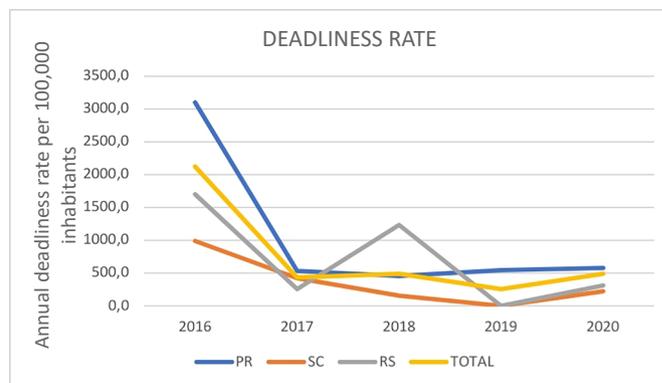


Figure 6. Lethality rate of hospital admissions due to burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

Regarding the annual trend, according to the Pearson scale (Table 1), it is noted that there was no significant linear correlation in the cases with the occurrence of the years (Figure 5) of the studied period since the numbers presented are not close to or exceed the value absolute of 1.

Table 1. Correlation of annual variations in the Pearson Scale of hospital admissions for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

	PR	SC	RS
R	0.493	-0.184	-0.64
P	0.398	0.767	0.244
N	5	5	5

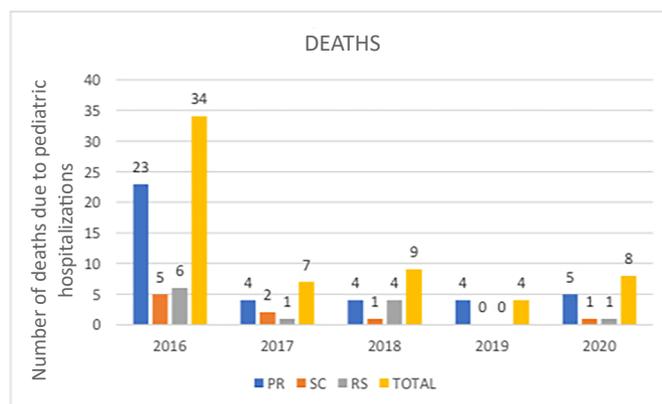


Figure 7. Number of deaths from hospitalizations due to burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

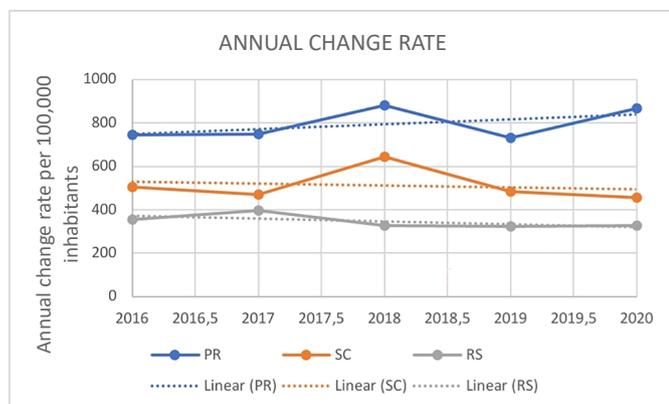


Figure 5. Annual trend of hospitalizations for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

According to the lethality rate per 100,000 inhabitants (Figure 6) and the exact number of deaths (Figure 7), the state of Paraná leads in these variables, except for the year 2018, when the state of Rio Grande surpasses it do Sul in fatality rate (n=1227.0), in almost all the years evaluated, with the highest numbers obtained in 2016 – these being, respectively, 3091, 4 and 23. On the other hand, the lowest rates were obtained in 2019, with a lethality rate of 0.0 for the states of Santa Catarina and Rio Grande do Sul due to the non-occurrence of deaths in those states during this period.

Analyzing the average length of hospital stay for pediatric burns in the South Region of Brazil between 2016-2020 (Figure 8), Rio Grande do Sul has the highest average, reaching close to 7 days, especially in 2016 and 2019. On the other hand, despite Paraná leading the hospitalization rate throughout the period studied, it only figures with an average of more than 5 days in 2016.

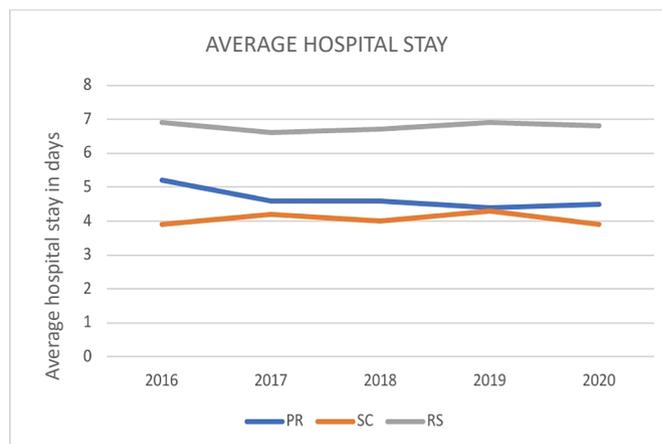


Figure 8. Average length of stay of hospitalizations for burns in pediatric patients in the Southern Region of Brazil from 2016 to 2020.

DISCUSSION

Burns have been considered a serious public health problem in underdeveloped countries, including Brazil. Knowledge of epidemiological data is of paramount importance to provide subsidies for prevention and treatment programs, as well as helping to define a parallel between the experiences of national and international centers¹¹.

The data obtained in the present study demonstrated a stable temporal trend in the number of pediatric burn hospitalizations in the southern region of Brazil during the period studied (2016-2020). However, a similar study carried out throughout Brazil between 2008 and 2015 showed increased cases in the South Region¹⁸. Likewise, when analyzing the hospitalization rate due to burns in each state, it was found that Paraná had the highest rates concerning Santa Catarina and Rio Grande do Sul for all age groups, in agreement with other authors^{15,29}.

Regarding gender, there was a predominance of males, with 63.04% (n=5205) of cases, a finding similar to that described by several authors^{2,5-8,11,15}. This fact can be explained by the difference between the behavior of male and female children, given that boys are educated to be more independent, have greater freedom to carry out riskier activities and games, being more exposed to such accidents⁷.

Historically, burns are potentially preventable injuries, predominantly in the pediatric class, requiring basic and essential care from their guardians and the children themselves⁶. This is demonstrated by the fact that 57.5% (n=4748) of burns occurred in children aged 1-4 years, an age group in which, due to neuropsychomotor development, there is no adequate notion of danger and safety. This data agrees with other published studies, in which the average age of fewer than 5 years corresponds to most burn victims^{2,7,8,11,15}. In this sense, it is necessary to increase vigilance on the part of parents and other family members, in addition to the adoption of some preventive measures, such as not leaving flammable liquids in the children's field of vision, in an attempt to reduce such rates in the appropriate age group.

In several publications^{2,6-8,11}, it was demonstrated that superheated liquid was the main etiological agent of burns in children in Brazil, surpassing liquid alcohol. This fact can be explained by an article from 2009, as it shows a significant reduction of 10.16% in the incidence of burns caused by liquid alcohol in children in the year immediately following the ban on its sale³⁰.

Analyzing the average hospitalization per state, it was noted that even the largest of them, corresponding to Rio Grande do Sul, is in line with

other literature, being limited to a number lower than or close to two weeks^{2,7,11,22}. However, another epidemiological study carried out between 2010 and 2017 in a hospital in the southern region of Brazil found an average length of stay higher than those described in this article⁶.

As for the outcome that occurred in this period, 0.76% (n=62) of the patients died, a result that may be related both to better access to the specialized service and notification by the states of this region¹⁸ and to governmental and non-governmental initiatives in the prevention of this stir as the National Policy for Reducing Morbidity and Mortality from Accidents and Violence, implemented in 2001 by the Ministry of Health, with proposals for specific actions in all public spheres, whose guidelines aim to promote the adoption of safe and healthy behaviors and environments³¹.

It is also worth noting, on a non-governmental level, the national burn prevention campaigns developed by the *Revista Brasileira de Queimaduras* (RBQ) and the Non-Governmental Organization (NGO) *Criança Segura*, an affiliate of International Safe Kids Worldwide, based in Washington, D.C. in the United States. Such idealizations are positive agents in the reduction of cases of burns that require hospitalization since most occur accidentally¹⁸.

In general, all epidemiological studies are subject to bias. The data corresponding to the three southern states shows a tendency towards stability in the number of pediatric burn hospitalizations over the years. However, some limitations must be highlighted in the interpretation. Including only hospitalization data from the DATASUS database is prone to bias; that is, there may be underreporting of hospitalizations due to external causes and some distortions concerning the types of causes in the HIS.

Added to this, another limitation refers to the funding source for these hospitalizations. The present study only included hospitalizations financed by the SUS, which excludes hospitalizations by private individuals and health insurance, which were not evidenced in this study. As the vast majority of consultations are carried out via the SUS, it is believed that the present work can offer a good picture of the reality of hospitalizations due to burns in the southern region of Brazil.

CONCLUSION

In the period between 2016 and 2020, there were 8256 hospitalizations for burns in children aged 0 to 14 years in the southern region of Brazil. Most of these (63.04%) occurred in the male population and the age group of 1-4 years (57.5%).

During the studied period, there was no significant annual variation in the number of hospitalizations for burns in Brazil when analyzing the age group of 0 - 14 years of each state in the South Region. Separately, the state of Paraná had the highest rates of pediatric hospitalization throughout the study. On the other hand, the state of Rio Grande do Sul had the lowest rates.

Therefore, it is necessary to raise the awareness of parents and other family members to increase vigilance and care for children and adolescents, seeking the adoption of preventive measures against this tormentor. Furthermore, against burns, prevention is the best treatment.

COLLABORATIONS

TGS Analysis and/or interpretation of data, Data collection, Conception and design of the study, Writing - Preparation of the original.

KMS Final approval of the manuscript, Conception and design of the study, Project Management, Writing - Review and Editing, Supervision, Validation, Visualization.

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