

*CLINICAL-EPIDEMIOLOGICAL PROFILE OF BURNS IN CHILDREN BEFORE AND DURING THE COVID-19 PANDEMIC*

**PERFIL CLÍNICO-EPIDEMIOLÓGICO DAS QUEIMADURAS EM CRIANÇAS ANTES E DURANTE A PANDEMIA DE COVID-19**

*PERFIL CLÍNICO-EPIDEMIOLÓGICO DE QUEMADURAS EN NIÑOS ANTES Y DURANTE LA PANDEMIA DE COVID-19*

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**ABSTRACT**

**Introduction:** Burns are one of the main causes of unintentional accidents in children and adolescents, and represent high morbidity and mortality. With the COVID-19 pandemic, changes in its epidemiology were expected. **Aim:** To analyze the clinical-epidemiological profile of burns in children under 12 years of age before and during the COVID-19 pandemic. **Method:** Quantitative study, with a cross-sectional and retrospective design, carried out in a Burn Treatment Center of a public university hospital, in the southern region of Brazil, from 2019 to 2021. Data were extracted from medical records and the MedView system, analyzed in SPSS®. Absolute and relative frequency were used, measured by the mean, median and standard deviation, considering  $p < 0.05$ . **Results:** Burns occurred in 112 children, 63 of them in 2019 and 49 in 2020/2021. Almost 60% were male,  $\leq 6$  years old, with a median age of 24 months. The causal agents were: scald (67.3%), flame (19.1%), and contact (13.6%). Almost all (99.1%) occurred at home, most frequently in the months of June and July (2019) and January and November (2020/2021). Third-degree injuries accounted for 18.8%, and second-degree injuries accounted for 81.2%. For 75.9% of the children, the length of hospital stay was up to 14 days, with a median of 8.5 days, 13.4% developed an infection, and for 96.4%, the outcome was discharge. There was no statistical difference between the two periods analyzed. **Conclusion:** Burns remained predominant in the domestic environment before and during the COVID-19 pandemic; the lower incidence of hospitalization during the pandemic period may be a reflection of social distancing and the longer time adults spent at home.

**Keywords:** Child; Burns; Epidemiology; Burn units; COVID-19.

**RESUMEN**

**Introducción:** Las quemaduras son una de las principales causas de accidentes no intencionales en niños y adolescentes, y representan una alta morbilidad y mortalidad. Con la pandemia de COVID-19 se esperaban cambios en su epidemiología. **Objetivo:** Analizar el perfil clínico-epidemiológico de las quemaduras en niños menores de 12 años antes y durante la pandemia por COVID-19. **Método:** Estudio cuantitativo, con diseño transversal y retrospectivo, realizado en un Centro de Tratamiento de Quemados de un hospital universitario público, en la región sur de Brasil, de 2019 a 2021. Los datos fueron extraídos de historias clínicas y del sistema MedView, y analizados en SPSS®. Se utilizó frecuencia absoluta y relativa, medida a través de la media, mediana y desviación estándar, considerando  $p < 0,05$ . **Resultados:** Se produjeron quemaduras en 112 niños, 63 de ellos en 2019 y 49 en 2020/2021. Casi el 60% entre los varones,  $\leq 6$  años, con una edad media de 24 meses. Entre los agentes causales: escaldadura (67,3%), llama (19,1%) y contacto (13,6%). Casi todos (99,1%) en domicilio, con mayor frecuencia en los meses de junio y julio (2019) y enero y noviembre (2020/2021). Las lesiones de tercer grado representaron el 18,8% y las de segundo grado, el 81,2%. Para el 75,9% de los niños la estancia hospitalaria fue de hasta 14 días, con una mediana de 8,5 días, el 13,4% desarrolló una infección y para el 96,4% el resultado fue el alta. No hubo diferencia estadística entre los dos períodos analizados. **Conclusión:** Las quemaduras siguieron siendo predominantes en el ámbito doméstico antes y durante la pandemia de COVID-19. La menor incidencia de hospitalizaciones durante el período de la pandemia puede ser un reflejo del distanciamiento social y del mayor tiempo que los adultos pasan en casa.

**Palabras clave:** Niño; Quemaduras; Epidemiología; Unidades de quemados; COVID-19.

**RESUMO**

**Introdução:** A queimadura é uma das principais causas de acidentes não intencionais em crianças e adolescentes, e representa alta morbimortalidade. Com a pandemia COVID-19, a alteração de sua epidemiologia foi esperada. **Objetivo:** Analisar o perfil clínico-epidemiológico das queimaduras em crianças menores de 12 anos antes e durante a pandemia COVID-19. **Método:** Estudo quantitativo, com delineamento transversal e retrospectivo, realizado em um Centro de Tratamento de Queimados de hospital público universitário, região sul do Brasil, de 2019 a 2021. Extraíu-se os dados de prontuários e do sistema MedView, analisados no SPSS®. Utilizou-se a frequência absoluta e relativa, medidas pela média, mediana e desvio padrão, considerou-se  $p < 0,05$ . **Resultados:** Ocorreram queimaduras em 112 crianças, 63 destas em 2019 e 49 em 2020/2021. Quase 60% entre o sexo masculino,  $\leq 6$  anos, sendo a mediana de 24 meses de idade. Entre os agentes causais: escaldamento (67,3%), chama (19,1%) e contato (13,6%). Quase a totalidade (99,1%) no domicílio, mais frequentemente nos meses de junho e julho (2019) e janeiro e novembro (2020/2021). Lesões de 3º grau representaram 18,8% e, de 2º grau, 81,2%. Para 75,9% das crianças o tempo de internação foi até 14 dias, mediana de 8,5 dias, 13,4% desenvolveram infecção e para 96,4% o desfecho foi a alta. Não houve diferença estatística entre os dois períodos analisados. **Conclusão:** As queimaduras permaneceram predominantes no ambiente doméstico antes e durante a pandemia COVID-19, a menor ocorrência de internação no período pandêmico pode ser reflexo do afastamento social e maior tempo de permanência de adulto no domicílio.

**Palavras-chave:** Criança; Queimaduras; Epidemiologia; Unidades de queimados; COVID-19.



## INTRODUCTION

Global epidemiological studies indicate that burns are one of the main causes of unintentional accidents in children and adolescents, and represent an important cause of morbidity and mortality in childhood<sup>(1)</sup>. In Brazil, data from the Brazilian Burn Society (SBQ) show that burns affect approximately 1 million people per year and can occur in people of any age group, with 40% in children up to 10 years old, and the majority of accidents are domestic and preventable, corresponding to approximately 77%<sup>(2)</sup>.

To this end, in December 2019, the new coronavirus (SARS-CoV-2) emerged in China, responsible for the COVID-19 pandemic, and, as a result, humanity faces a serious global health crisis. The World Health Organization (WHO) declared a Public Health Emergency of International Concern on January 30, 2020, and a pandemic on March 11, 2020. Many countries implemented a series of interventions to reduce transmission of the virus and slow the rapid evolution of the pandemic, such as: isolating cases; encouraging hand hygiene; adopting respiratory etiquette and the use of face masks; progressive social distancing measures with the closure of schools and universities; banning mass events and gatherings; restricting travel and public transport; and raising awareness among the population to stay at home<sup>(3)</sup>.

Social distancing measures led to the closure of schools, affecting more than 1.5

billion children and adolescents worldwide. A study conducted by the United Nations Children's Fund (UNICEF) found that 104 of 136 countries stopped offering child protection services against violence during the pandemic, 83% of which were located in Latin America. In Brazil, 23 million children and adolescents stopped attending elementary and high school. Furthermore, one of the impacts is the increased reporting of cases of violence after schools closed in the country<sup>(4)</sup>.

Social distancing has had its adaptations in each location where it was adopted, depending on cultural differences or political decisions by governments. In Europe, without a uniform standard, it varied with the implementation of diverse strategies and with different percentages of adherence. In some countries, there was a complete lockdown, which included prohibiting people from leaving their homes, except to buy basic supplies or access health services. Worldwide, at least 186 countries implemented various degrees of restrictions on the movement of people, with lockdown reaching 82 of them<sup>(5)</sup>. According to a study carried out in 2021<sup>(6)</sup>, the pediatric/young age group (0-19 years) and geriatric age group ( $\geq 60$  years) were the most susceptible to domestic accidents during the pandemic.

The change in the epidemiology of burns during the COVID-19 pandemic was expected due to the change in the pattern of daily activities of families due to the longer stay at home and social isolation. Given the importance and



severity of this condition, the general objective of this research was to analyze the clinical-epidemiological profile of burns in children under 12 years of age before and during the COVID-19 pandemic.

## METHODS

Quantitative, cross-sectional, and retrospective study, conducted from March 2019 to February 2021. The population consisted of children under 12 years of age who were burn victims and were admitted to the Burn Treatment Center (CTQ) of a public university hospital located in the northern region of Paraná, southern Brazil.

This hospital serves patients from approximately 250 municipalities in Paraná and more than 100 cities in other states, from various regions of the country, mainly São Paulo, Mato Grosso, Mato Grosso do Sul, and Rondônia<sup>(7)</sup>, for all medical specialties.

The inclusion criteria were: all children under 12 years of age who were burn victims and admitted to the CTQ. Those admitted for elective surgeries who required hospitalization after their first hospital discharge were excluded.

Initially, the hospital statistics service was consulted to obtain the records of all children admitted to the CTQ during the study period, after which information was collected from the medical records of the medical archive service, the electronic medical system (MedView system) and by the project researchers.

For data collection, an electronic spreadsheet previously prepared in Microsoft Excel 2013 was used, with the COVID-19 pandemic as the dependent variable and the clinical and epidemiological conditions of hospitalization due to burns as independent variables (sex, age group, reason for the accident, causal agent, Burned Body Surface Area (BSA), depth of the injury, affected body region, length of hospitalization, infection and outcome (discharge and death)). Subsequently, all analyses were performed using the IBM Software Statistical Package for the Social Sciences (SPSS) for Windows and version 20.0®. Absolute and relative frequencies were used for categorical analysis, and for continuous variables, measured by the mean, median and minimum and maximum standard deviation, a p-value <0.05 was considered.

This study was extracted from the research entitled “Evaluation of Infections Associated with Healthcare in Children and Adolescents”, approved by the Ethics Committee for Research Involving Human Beings of the State University of Londrina (CEP/UEL), opinion no. 4,165,597 and Certificate of Presentation for Ethical Assessment (CAAE) no. 28068119.6.0000.5231.

## RESULTS

During the period analyzed, 123 children were admitted to the CTQ, with 11 cases excluded due to lack of clinical and epidemiological data in the medical records that



were essential for the consolidation of the research, such as the causal agent, reason for the accident, SCQ, among others.

A total of 112 children were victims of burns, 63 in 2019 and 49 in 2020/2021.

Among children under six, the median age was 24 months, while among those aged seven or over, it was 108 months. In 2019, there was a median of four burn accidents and, in 2020/2021, five accidents. Children aged  $\leq 6$  years were the most affected, especially in June, July and August 2019 and in January, February, July and November 2020 and 2021.

Burns in 2019 occurred predominantly in the months of June (11 cases), July (10 cases) and September (8 cases). In 2020/2021, January (7 cases) and November (7 cases) occurred.

The predominant causal agent in both years of the study was scald, with 40 cases in 2019 (35.7%) and 31 in 2020 (27.6%). The months in which they occurred most frequently were July and September in 2019, and November in 2020/2021. It is worth noting that burns caused by flames had their highest number in May 2019 and contact burns in June of the same year.

Regarding the epidemiological and clinical characteristics (Table 1), it was observed

that males were the most affected. Among children aged  $\leq 6$  years, the incidence was similar for both sexes. Among those aged  $\geq 7$  years, 19.4% of burns were among boys. Almost all (99.1%) of the accidents occurred in the home.

In the group of children aged  $\leq 6$  years, the median age was 24 months, while in the group aged  $\geq 7$  years, it was 108 months. Among those aged  $\leq 6$  years, 75.4% had more than two body segments affected and the depth of the injury was 2nd degree for 81.2%. The highest percentage of children had  $\leq 10\%$  of the BSA. Regarding the affected body region, both groups had multiple segments affected.

The median hospital stay was 8.5 days, with a minimum of 1 day and a maximum of 191 days, and 75.9% remained hospitalized for  $\leq 14$  days. 13.4% of cases of infection were reported during hospitalization, and 80% were aged  $\leq 6$  years.

There were 4 deaths in 2019, two female and two male, of which two were five and six years old and the other nine years old. Regarding the causal agent, one was a heated liquid, two were a flame with flammable liquid, and one was a homicide victim using flammable liquid. All had multiple injured segments, with 3rd-degree burns and SCQ  $\geq 25\%$ .

**Table 1** - Clinical-epidemiological characteristics by age group ( $\leq 6$  years and  $\geq 7$  years), 2019 to 2020/2021, Paraná, Brazil. N=112.

Variables	$\leq 6$ years	$\geq 7$ years	Total
	n (%)	n (%)	n (%)

<b>Gender</b>			
Male	54 (80,6)	13 (19,4)	67 (59,8)
Female	38 (84,4)	7 (15,6)	45 (40,2)
<b>Reason of accident</b>			
Home Accident	91 (82,0)	20 (18,0)	111 (99,1)
Homicide	1 (100,0)	-	1 (0,9)
<b>Causal agent</b>			
Scald	63 (85,1)	11 (14,9)	74 (67,3)
Flame	14 (66,7)	7 (33,3)	21 (19,1)
Contact	13 (86,7)	2 (13,3)	15 (13,6)
<b>Burned Body Surface Area</b>			
≤10%	67 (84,8)	12 (15,2)	79 (74,5)
11 a 24%	15 (75,0)	5 (25,0)	20 (18,9)
≥25%	5 (71,4)	2 (28,6)	7 (6,6)
<b>Depth of injury</b>			
2nd degree	78 (85,7)	13 (14,3)	91 (81,2)
3rd degree	14 (66,7)	7 (33,3)	21 (18,8)
<b>Affected body region</b>			
More than two segments	49 (75,4)	16 (24,6)	65 (58,0)
One segment	43 (91,5)	4 (8,5)	47 (42,0)
<b>Hospitalization period</b>			
≤ 14 days	72 (84,7)	13 (15,3)	85 (75,9)
>15 days	20 (74,1)	7 (25,9)	27 (24,1)
<b>Infection</b>			
Yes	12 (80,0)	3 (20,0)	15 (13,4)
No	80 (82,5)	17 (17,5)	97 (86,6)
<b>Outcome</b>			
Discharge	90 (83,3)	18 (16,7)	108 (96,4)
Death	2 (50,0)	2 (50,0)	4 (3,6)

**Source:** Prepared by the authors (2024).



In view of the above, there was no statistical difference between before and during the COVID-19 pandemic in the clinical-epidemiological findings of children who suffered burns at the CTQ that serves all regions of Paraná and neighboring states.

## DISCUSSION

With most schools closed in 2020, children spent much more time at home. Thus, there was an increase in pediatric domestic accidents during this period, including burn injuries (usually caused by children pulling pots off the kitchen table, accidentally spilling hot water on their bodies), resulting in both mild and severe burns, which therefore require several sessions of wound debridement under general anesthesia and long-term treatment in a hospital environment<sup>(8)</sup>.

The increased time spent and contact within the home, which does not always offer the best conditions for well-being and safety, can increase the risk of accidents, tensions and conflicts between parents, and even episodes of violence. This context increases the chance of injuries, accidents, and harm to children's physical and mental health<sup>(9)</sup>. On the other hand, children, with the distance from schools and daycare centers, places that are generally built with their safety in mind, are spending full time at home with their families, suggesting greater exposure to domestic accidents.

Authors compared the occurrence of burns in 2019 and 2020, before and during the COVID-19 pandemic in the United States (2021) and observed that scald burns were the most common type of injury during both study periods. However, the proportion of home fires was significantly higher during the pandemic compared to the non-pandemic period. Although the exact reasons for the observed increase in home fires are unclear, reasons include loss of social connections and family support, stress from working from home, and inadequate supervision<sup>(10)</sup>. Given the studies mentioned, this research observed that there was no significant difference between accidents before and during the pandemic. However, the causal agent scald was the predominant (67.3%) in both periods, in line with the findings evidenced.

The burn accidents that occurred in this study were more frequent in the months of June, July, and September before the pandemic, and January and November during the pandemic. In Brazil, these months represent school vacation periods for children, except for November, when schools were still in social isolation. It is suggested that during these periods, children spent more time at home and, therefore, accidents were not prevented.

These data are different from other countries, since school vacations occur at different times in each country. In the United States, children typically do not attend school for up to 12 weeks during the summer (May to August), commonly referred to as summer



vacation. Year-round schools (also known as distributed calendars) operate on a 180-day schedule similar to traditional schools.

However, year-round schools incorporate shorter and more frequent breaks throughout the calendar year, rather than taking an extended 2- to 3-month break during the summer. A typical year-round school operates for nine weeks straight and then takes a three-week break from school<sup>(11)</sup>. It is noteworthy that during the pandemic, there was a change in school routines worldwide.

A study conducted in São Paulo, Brazil, prior to the coronavirus pandemic, on children's play in the metropolis indicated that the cold weather may be an important factor in the low frequency of young children in parks, especially in July<sup>(12)</sup>. It is suggested that, even without the need for social isolation imposed by the pandemic, children remain at home more frequently during the month of July due to the winter period, especially in the southern region of Brazil.

Furthermore, no national or international studies were found that address the months of prevalence of burns in children during the COVID-19 pandemic and the relationship of this accident with school holidays.

In this scenario, one of the relevant aspects to be considered in this study was the greater number of accidents among school-age children during the middle and beginning/end of the year. It is suggested that the change in the type of supervision and exposure to the risks of domestic

accidents during school holidays may be determining factors in resulting in the increase in burn accidents. It is worth noting that the difficulty in accessing daycare centers during school holidays can also lead parents to leave their children with little or no supervision. Previous studies have shown that caregivers and health professionals are not aware of effective first aid measures for burns, leading to greater aggravation with deeper and more extensive injuries due to the time of exposure of the agent to the skin<sup>(13-15)</sup>.

In this study, it was noted that burns were more frequent in children under 6 years of age (82.1%), both before and during the pandemic, and it can be inferred that, even in the presence of adult parents and/or family members, the accident continued to occur.

Regarding the extent of burns, it was noted that most children (74.5%) had TBSA <10% in this study. Other authors report that the severity of burns was greater during the lockdown, evidenced by an increase in burn alerts, total body area burned >5%, and admissions to Intensive Care Units (ICU)<sup>(10)</sup>. Depending on the severity of the burn, related to the SCQ, the depth and the affected body region, the child requires a longer hospitalization time. This fact can lead to susceptibility to infections and, subsequently, the occurrence of death. However, the occurrence of deaths in this study occurred in 2019 when there was no social isolation imposed by the pandemic, so no relationship was



identified between before and during the pandemic with mortality.

According to a study carried out at the Pediatric Burn Unit of the University Children's Hospital of Zurich (Switzerland) in 2019, despite advances in surgical management and intensive care for burn surgery, the morbidity and mortality of patients with severe burns remains high. Especially in the pediatric population, burns often lead to devastating consequences, such as the need for corrective surgery until adulthood. The authors emphasize the need for highly specific prevention measures and indicate the need for certain target groups that are especially vulnerable, such as children<sup>(14)</sup>.

Another aggravating factor during growth and development from childhood to adulthood is the functional impairment of the affected area, as well as emotional and social impairment, compromising the quality of life of both the victim and their family members<sup>(16)</sup>. It is worth mentioning that, in October 2018, law no. 13,722 was enacted in Brazil, making training in basic first aid mandatory for teachers and staff of public and private elementary schools and children's recreation facilities<sup>(17)</sup>. Among the studies published on this topic in the country, it is observed that since January 2011, health professionals had already indicated significant deficits in knowledge about first aid practices for early childhood education teachers, due to experiencing school situations that required immediate care<sup>(18)</sup>.

A study conducted in Catanduva, São Paulo, demonstrates the need to develop awareness-raising and guidance actions for parents and the general population, through educational programs and prevention campaigns, placing the family and school as responsible for the education of children and adolescents, and which play an important role in the promotion and prevention of child and adolescent accidents<sup>(19)</sup>.

These data point to the need for ongoing education actions for education and health professionals, as well as for the population, for emergency care in the extra-hospital setting for adequate management, with timely referrals so that other complications can be minimized, such as infections that increase the risk of mortality.

The limitations of the study were the difficulty in collecting data at the CTQ during the pandemic period, and also, as mentioned above, the lack of complete information in some electronic medical records specifically about burns.

## CONCLUSIONS

It was believed that the number of burns during the pandemic could be lower, given the social isolation and the presence of adults, possibly children would be better supervised. However, burns remained predominant in the domestic environment, even though the number of cases in 2020/2021 was lower compared to the previous period.





The persistent occurrence of this condition and the longer hospitalization time for treatment increases the susceptibility of this age group to infections and invasive and painful procedures, which are harmful to their physical and psychological health, compromising their quality of life, and can even lead to death.

In this sense, given its severity and high prevalence to this day, with or without a pandemic, it is urgent to implement prevention, promotion and rehabilitation policies that involve institutions in education, health, the judiciary, social assistance and other organizations in society to reduce morbidity and mortality rates.

To this end, sharing information in language accessible to everyone about risk factors and prevention measures is an essential strategy to prevent the occurrence of the condition, the consequences, and consequently deaths<sup>(20)</sup>.

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Nothing to declare.

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