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The impact of social isolation by COVID-19 on the epidemiological and clinical profiles of the burn patients. A retrospective study

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ABSTRACT

Background: Social isolation, imposed by the COVID-19 pandemic, may imply changes in the clinical-demographic and epidemiological profiles of burn trauma victims.
Objective: Evaluate the changes in the epidemiological profile of patients with burns that resulted in hospitalization during the social isolation period due to the COVID-19 pandemic, comparing with the same period in the previous year.
Methods: The medical records of burn patients who were hospitalized in our Burn Center during the local confinement period (March 18th to August 31st, 2020) and during the same period in 2019 were analyzed. Data on demographic, clinical and hospitalization aspects were studied.
Results: 470 patients were evaluated. In the pediatric population, a significant increase in the number of cases up to 2 years old ($P = 0.0003$), median of %TBSA ($P = 0.037$), full-thickness burns ($P < 0.0001$), involvement of hands ($P = 0.024$), debridement ($P = 0.046$) and grafting ($P = 0.032$) procedures, and higher scores of severity ($P < 0.0001$) were noted. In the adult population, it was only observed an increase in the burn-hospitalization interval ($P = 0.029$).
Conclusion: The pediatric population was heavily impacted by the imposed period of social isolation, presenting a greater severity of burns. In contrast, the epidemiology of burns for the adult population was slightly altered during the pandemic period.

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1. Introduction

In January 2020, the World Health Organization declared that the COVID-19 outbreak was a Public Health Emergency of International Concern, presenting a high risk for countries with vulnerable health systems [1]. Brazil proved to be one of the most affected countries by the pandemic, reaching a total of 3.5 million cases and 114,250 deaths by August 2020, and it was ranked as the 2nd country in the world in terms of number of confirmed cases and number of deaths [2].

Following the guidelines to contain the spread of the pandemic, on 17th March 2020, the Government of Paraná decided to suspend events open to the public, as well as schools, universities, and shopping centers [3].

Burns are a global public health problem, being responsible for approximately 180,000 deaths annually. Besides their high prevalence, they are important for their potential to cause physical disabilities, as well as mental and emotional damage. They are the fourth most common type of trauma worldwide, and their risk tends to increase with lower socioeconomic levels, as up to 90% of burns occur in low- or middle-income countries, such as Brazil [4,5]. The Hospital Universitário Evangélico Mackenzie (HUEM) is a referral university hospital for the treatment of patients with burns in the state of Paraná, with a surgical center and a 40-bed facility dedicated to the treatment of burns. Our unit provides assistance to a population of approximately 11.5 million people; it receives patients from the capital city and countryside cities in Paraná, receiving approximately 2500 referred patients per year, and admitting approximately 500 patients per year.

The COVID-19 pandemic changed the social, economic, and family life of Brazilians. The context of social isolation contrasts risk and protective factors for the occurrence of burns; therefore, some changes might occur in the clinical-demographic and epidemiological profiles of patients who are victims of this type of trauma in a middle-income country. Thus, this study aimed to assess the changes in clinical, demographic, and epidemiological profiles of burn victims that resulted in hospitalization.

2. Methods

This study was approved by the ethics committee of our institution with the number 4.023.736. A retrospective single-center study was conducted at the Plastic Surgery and Burns Unit of the HUEM (Curitiba, Brazil). We reviewed the medical records of patients hospitalized for burns during the period of social isolation (from 18th March to 31st August 2020) and, as a comparison group, data from the same period of 2019 were studied. We collected patients' demographic data such as sex, age, ethnicity, marital status, place of residence, and type of health insurance. In addition to these, clinical data such as burn depth, total body surface area (%TBSA), anatomical burn site, cause, etiology, intentionality, presence of inhalation injury, and severity scores (Abbreviated Burn Severity Index (ABSI), Revised Baux Score (RBS), and Belgian Burn Outcome Index (BOBI)) were analyzed. In addition, the following data about their hospitalization were collected: burn/hospitalization interval, length of stay (LOS), LOS/%TBSA, use of skin bank tissue, number of debridement or other operations, patient outcome, and cause of death.

2.1. Inclusion and exclusion criteria

All patients hospitalized for burns during both previously mentioned periods, who were admitted either by our emergency team or by referrals from other hospitals in the region, and who had the complete data for the study in their medical records were eligible for inclusion. All re-admissions, non-burned patients, or those who did not have essential data were excluded from the sample.

2.2. Statistical methods

Data were tabulated and expressed as median and interquartile ranges (IQR), mean and standard deviations, or frequencies and percentages. Statistical analysis was performed using the statistical software Prism 5.0 (GraphPad Prism, California). The Kolmogorov–Smirnov test was used to verify the normality of the data. Continuous variables were compared using the *t*-test or the Mann–Whitney test; categorical variables were expressed as percentages and compared using the chi-square test or Fisher's exact test, as appropriate. The significance adopted was 5%.

3. Results

3.1. Demographic data

A total of 470 patients were analyzed: 224 from the 2019 period and 246 from the 2020 period, with an increase of 9.8% in the number of cases. This rise was mainly due to the increase of 39.1% of children burns victims, considering that this finding was not observed from one year to another among adults.

There was a significant increase (P = 0.0003) in the number of children affected by burns up to 2 years of age from 2019 to 2020, while there was a significant reduction (P = 0.002) in children aged between 3 and 5 years in this same period. In both periods analyzed, males were the most affected, as the ratio was 1.46 men for each woman in 2019 and 1.80 in 2020. We found a bimodal distribution according to the age group of burn cases, where young children (0–5 years) and adults (18–59 years) represented most cases. This distribution was maintained in both periods evaluated, as the adult population represented 57.1% of all cases and the young children 23.1% in 2019, while adults represented 50.0% and young children 29.7% in 2020. The demographic details of the patients are presented in Table 1.

3.1.1. Clinical data

3.1.1.1. Total body surface area (%TBSA). Median %TBSA in children were 10% (IQR = 7–18%) and 15% (IQR = 7.7–25%) in 2019 and 2020, respectively, with this increase being significant (P = 0.037). In adults, the median %TBSA was 15% (IQR = 6–30%) in 2019 and 13% (IQR = 5–25%) in 2020, with no significant difference (P = 0.27). When comparing

Table 1 – Demographic data of hospitalized burn patients (*n* = 470).

Data	2019 n (%)	2020 n (%)	P
Number of cases	224	246	Increase of 9,8%
Children	69 (30.8)	96 (39.0)	0.06
Adults	155 (69.2)	150 (61.0)	0.95
Sex			
Female	91 (40.6)	88 (35.8)	0.32
Male	133 (59.3)	158 (64.2)	0.54
Age (years)			
0–2	21 (9.3)	56 (22.8)	**0.0003**
3–5	31 (13.8)	17 (6.9)	**0.0002**
6–12	11 (4.9)	15 (6.1)	0.86
13–17	6 (2.7)	8 (3.3)	0.74
18–59	128 (57.1)	123 (50.0)	0.68
Older than 60	27 (12.1)	27 (11.0)	0.88
Ethnicity			
White	162 (72.3)	176 (71.5)	0.72
Brown	19 (8.5)	15 (6.1)	–
Black	3 (1.3)	2 (0.8)	–
Not informed	40 (17.9)	53 (21.5)	–
Marital status			
Single	198 (88.4)	206 (83.7)	0.92
Maried	24 (10.7)	31 (12.6)	–
Divorced	1 (0.4)	7 (2.8)	–
Widower	1 (0.4)	2 (0.8)	–
Place of residence			
Capital	77 (34.4)	78 (31.7)	0.84
Countryside	147 (65.6)	168 (68.3)	0.78
Health insurance			
Public	191 (85.3)	215 (87.4)	0.71
Private	33 (14.7)	31 (12.6)	0.85

children and adults, %TBSA was significantly higher in adults in 2019 (P = 0.0361), while there was no significant difference in 2020 (P = 0.46). There was also a significant increase (P = 0.017) in involvement among the years studied of %TBSA between 20% and 40% in children, as well as a significant increase in involvement with %TBSA below 20% in adults (P = 0.006).

3.1.1.2. *Burn depth*. Regarding the burn depth, there was a significant increase (P < 0.0001) in children with full-thickness burns between the years 2019 and 2020, and a significant reduction in partial-thickness burns (P = 0.012).

3.1.1.3. *Anatomical burn sites*. We found that the involvement of the hand was significantly greater in 2020 (P = 0.024) in children, while the involvement of lower limbs increased considerably in adults (P = 0.053). It is also noteworthy that the upper limbs, in both age groups and periods analyzed, remain as the main location affected in this type of trauma.

3.1.1.4. *Cause and etiology*. There was no significant change in the cause and etiologies of the burns. Thermal energy remained as the main cause, which includes scald, flame, and contact burns. The most frequent etiology in children was scalding and in adults was flames, during both periods analyzed.

3.1.1.5. *Intentionality*. It is important to highlight that the vast majority of cases, in both analyzed periods and age groups, are accidental, representing the totality of cases for children.

Table 2 shows the available data of patients' clinical details that were analyzed in this study.

3.1.1.6. *Hospitalization data*. Regarding the burn/hospitalization interval, there was a significant increase (P = 0.029) in adults who sought medical care within an interval greater than 3 days. It was also observed that the LOS/%TBSA ratio had a median of 1.1 in 2019 and 1.0 in 2020. The increase in surgical procedures, such as debridement (P = 0.046) and partial skin grafting/allograft (P = 0.032), among children can be highlighted when comparing the years 2019 and 2020.

No statistically significant differences were found in the mortality rates between the periods studied in both populations. The mortality rate for the pediatric population was 1.4% and 2.1% in 2019 and 2020, respectively. For the adult population, it was 6.5% and 7.3% in 2019 and 2020, respectively.

Table 3 shows the hospitalization data of the studied patients.

In Fig. 1, we can observe that the length of stay (LOS) in the hospital for children had a median of 11 days (IQR = 7–22 days) in 2019 and 13 days (IQR = 6.25–20.75 days) in 2020, without a significant difference (P = 0.92). Among adults, the median was 14 days (IQR = 9–26 days) and 15 days (IQR = 7–25 days), respectively, without a statistical difference (P = 0.32) either. Comparing between children and adults, the LOS was significantly longer in adults (P = 0.04) in 2019, and there was no significant difference in the year 2020 (P = 0.24).

3.1.1.7. *Burn severity scores*. Regarding the calculated scores, there was no significant difference in the adult population between the analyzed periods; on the other hand, in the pediatric population, there was a significant increase in both ABSI (P < 0.0001) and BOBI (P = 0.018) between 2019 and 2020, and this increase was not significant in RBS (P = 0.20). In Table 4 and Table 5, the data referring to the burn severity scores of the adults and children studied are available, respectively.

3.1.1.8. *Surgical procedures*. Regarding the number of debridement in the adult population, the median was 4 (IQR = 2–7) in 2019 and 4.5 (IQR = 2–8) in 2020, without a significant difference (P = 0.98). In children, we found a significant increase (P = 0.005) between these years, with medians of 3 (IQR = 2–5) and 5 (IQR = 3–7).

4. Discussion

In this study, we demonstrated the impact of the stringent lockdown imposed by the COVID-19 pandemic on the epidemiologic profile of burn patients admitted in a referral burn center in Brazil. The pediatric population was largely affected by the pandemic period, with a significant increase in cases as well as the severity of burns.

Table 2 – Clinical data of hospitalized burn patients.

	Children - 2019	Children - 2020		Adults - 2019	Adults - 2020	
Data	*n* = 69 (%)	*n* = 96 (%)	P	*n* = 150 (%)	*n* = 155 (%)	P
Burn depth						
Partial-thickness	46 (66.7)	44 (45.8)	**0.012**	70 (46.7)	58 (37.4)	0.35
Full-thickness	13 (18.8)	52 (54.2)	**< 0.0001**	78 (50.3)	92 (61.3)	0.23
Not informed	10 (14.5)	0 (0)	–	7 (4.5)	0 (0)	–
TBSA (%)						
Less than 20%	51 (73.9)	58 (60.4)	0.07	69 (44.5)	93 (62.0)	**0.006**
20–40%	11 (15.9)	31 (32.3)	**0.017**	37 (23.9)	37 (24.7)	0.85
41–80%	1 (1.4)	4 (4.2)	0.4	12 (7.7)	11 (7.3)	0.62
More than 80%	0 (0)	1 (1)	–	1 (0.6)	0 (0)	–
Not informed	6 (8.7)	2 (2.1)	–	36 (23.2)	9 (6.0)	–
Anatomical burn sites						
Upper limbs	43 (62.3)	70 (72.9)	0.54	94 (60.6)	99 (66.0)	0.87
Lower limbs	25 (36.2)	36 (37.5)	0.78	59 (38.1)	78 (52.0)	**0.053**
Head/Face/Neck	38 (55.1)	44 (45.8)	0.62	60 (38.7)	61 (40.7)	0.54
Thorax	28 (40.6)	49 (51.0)	0.18	43 (27.7)	52 (34.7)	0.41
Abdomen	11 (15.9)	26 (27.1)	0.09	40 (25.8)	37 (24.7)	0.77
Back	9 (13.0)	17 (17.7)	0.41	16 (10.3)	11 (7.3)	0.28
Perineum	2 (2.9)	4 (4.2)	0.55	9 (5.8)	8 (5.3)	0.88
Hip	1 (1.4)	7 (7.3)	0.14	5 (3.2)	7 (4.7)	0.58
Hands	11 (15.9)	30 (31.3)	**0.024**	43 (27.7)	50 (33.3)	0.35
Feet	4 (5.8)	13 (13.5)	0.1	15 (9.7)	22 (14.7)	0.26
Cause						
Thermal	67 (97.1)	95 (99.0)	0.88	125 (80.6)	127 (84.7)	0.76
Electric	1 (1.4)	1 (1.0)	–	13 (8.4)	11 (7.3)	–
Chemical	1 (1.4)	0 (0)	–	9 (5.8)	9 (6.0)	–
Not informed	0 (0)	0 (0)	–	0 (0)	3 (2.0)	–
Etiology						
Scald	54 (78.3)	66 (68.8)	0.17	28 (18.1)	36 (24.0)	0.24
Flame	8 (11.6)	19 (19.8)	0.82	77 (51.3)	81 (52.3)	0.74
Contact	5 (7.2)	10 (10.4)	0.26	18 (11.6)	10 (6.7)	0.09
Low-voltage current	0 (0)	1 (1.0)	–	0 (0)	5 (3.3)	0.12
High-voltage current	1 (1.4)	0 (0)	–	11 (7.1)	6 (4.0)	0.22
Chemical product	1 (1.4)	0 (0)	–	9 (5.8)	9 (6.0)	0.88
Not informed	0 (0)	0 (0)	–	0 (0)	3 (2.0)	–
Intentionality						
Accidental	69 (100.0)	96 (100.0)	1	150 (96.8)	145 (96.7)	0.95
Aggression/ Self-harm	0 (0)	0 (0)	–	5 (3.2)	5 (3.3)	–
Inhalation injury						
Yes	1 (1.4)	0 (0)	–	9 (5.8)	3 (2.0)	–

In general, males were the most affected gender, corroborating with the literature [6,7]. We observed that the most frequent anatomical burn site was the upper limbs, and the leading cause was thermal energy, agreeing with the literature findings [5]. Regarding etiology, our findings corroborate with the literature as scalding was the dominant cause in children [8] while flames were the most frequent cause for the adult population [9,10].

Regarding the age of the burn victims, we observed a bimodal distribution, in both periods analyzed, in agreement with the literature findings [4]. However, we noted a change in the composition of this distribution, with a higher number of cases among the affected young children and an unchanged number of cases in adults, during the social isolation period. This significant increase in pediatric cases during the pandemic period occurred mainly in those aged up to 2 years old, who are totally dependent on their caregivers [5]. Apparently, the fact that children stayed at home and not in a school environment increased their exposure to risks. In contrast, a significant reduction in burn cases was observed in those aged between 3 and 5 years old, which could not be explained by the authors. Despite not being an expected finding, it could be attributed to the fact that children in this age group acquire a better cognitive ability, which guarantees them a greater ability to follow simple instructions and rules, besides the improvement in their motor coordination due to an intense muscle development [11].

We also observed a significant increase in hand injuries in pediatric patients, which could not be correlated with any specific etiology based on our findings. However, previous studies [12] reported that 96% of burns in this location in children up to 5 years of age resulted from contact with a heated surface. This may be associated with an increase in the number of Brazilians who weren't used to cook and started with this habit due to the social isolation and the sudden closure of the restaurants in this pandemic [13], increasing children's exposure to kitchen utensils [14] and the kitchen itself, which is the leading site of domestic burns [5].

Table 3 – Hospitalization data of burned patients.

	Children - 2019	Children - 2020		Adults - 2019	Adults - 2020	P
Data	*n* = 69 (%)	*n* = 96 (%)	P	*n* = 155 (%)	*n* = 150 (%)	
Burn/hospitalization interval (days)						
< 1	64 (92.8)	80 (83.3)	0.07	115 (74.2)	98 (65.3)	0.09
1–3	4 (5.8)	13 (13.5)	0.10	14 (9.0)	15 (10.0)	0.87
> 3	1 (1.4)	3 (3.2)	0.35	22 (14.2)	36 (24.0)	0.029
Not informed	0 (0)	0 (0)	–	4 (2.6)	1 (0.7)	–
Length of stay (days)						
Median	11 (IQR = 7–22)	13 (IQR = 6–20)	0.92	14 (IQR = 9–26)	15 (IQR = 7–25)	0.32
Procedures performed in the surgery center						
Debridement	68 (98.6)	87 (90.6)	0.046	149 (96.1)	140 (93.3)	0.45
Partial Skin graft /Allograft	23 (33.3)	48 (50.0)	0.032	79 (51.0)	89 (59.3)	0.38
Escharotomy/Fasciotomy	0 (0)	3 (3.1)	–	1 (0.6)	7 (4.7)	0.14
Amputation	0 (0)	0 (0)	–	2 (1.3)	3 (2.0)	0.8
None	1 (1.4)	7 (7.3)	0.14	5 (3.2)	6 (4.0)	0.66
Skin bank tissue						
Yes	6 (8.7)	15 (15.6)	0.18	17 (11.0)	25 (16.7)	0.29
Outcomes						
Medical release to ambulatory	68 (98.6)	94 (97.9)	0.88	144 (92.9)	139 (92.7)	0.78
Death	1 (1.4)	2 (2.1)	–	10 (6.5)	11 (7.3)	–
Cause of death						
Cardiopulmonary arrest	1 (100)	2 (100.0)	–	9 (90.0)	11 (100.0)	–
Not informed	0 (0)	0 (0)	–	1 (10.0)	0 (0)	–

It was observed that in addition to the increase in the number of cases among children, the severity was also greater during the lockdown period compared to the previous year, and these findings may reflect the overcrowding of houses due to lockdown, lapses in child supervision due to the home office establishment, increase in unemployment [15], and storage of flammable substances such as alcohol gel [16]. All these situations imposed by the pandemic are critical risk factors for pediatric burns [5].

There was a significant increase in the median %TBSA and the number of full-thickness burns, also requiring a greater length of hospital stay and more procedures. The increase in full-thickness burns in this population may be correlated with the rise, although not significant, in the number of burns caused by flames and by contact with heated surfaces.

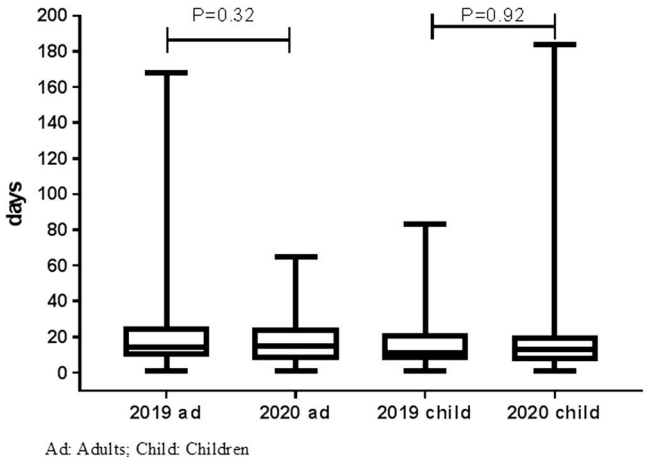

Fig. 1 – Comparison of length of stay by age group between the 2019 2020 periods.

Scores that predict burn mortality such as ABSI and BOBI also showed a significant increase. The RBS did not increase significantly, which can be explained by its restricted use in the pediatric population [17].

The vast majority of burn cases were accidental, demonstrating the need to implement educational and prevention campaigns that focus mainly on domestic accidents with children. Effective campaigns would be those that reach precisely those responsible for the children, whether through social media or other means of communication such as television or radio. It is a consensus that social isolation is necessary due to the COVID-19 pandemic, however, it is crucial to disseminate the increased risk of burns that children are subjected to when confined in the home environment without the proper supervision and primary prevention care.

Interestingly, in the adult population, the number of cases and epidemiologic data were slightly altered. We observed a significant increase in the number of adult cases with %TBSA below 20%, which could be correlated with the removal of adults from the workplace – the principal place of occurrence of burns in the male adult population [5] – which constitutes approximately 2/3 of our sample. Regarding the adult location of burns, a significant increase in lower limb injuries was observed in the social isolation period. Although it was not possible to correlate the location of burns with any specific etiology, an Iranian study [18] stated that the majority (52.5%) of lower extremity burns occur by scalding; therefore, it can be inferred that the increase in this variable is associated with the greater exposure of adults to cooking activities [13], since most scald burns occur in the kitchen environment [19].

In this study, we observed a significant increase in the number of adults who had a period longer than three days between the date of the incident and hospital admission. This finding could be mainly related to two factors. First,

Table 4 – Severity burn scores in hospitalized adults.

ABSI 2019	ABSI 2020	P	RBS 2019	RBS 2020	P	BOBI 2019	BOBI 2020	P
n = 119	n = 141	–	n = 119	n = 141	–	n = 119	n = 141	–
3	3	–	24	26	–	0	0	–
4	5	–	46	43,5	–	0	0	–
5	6	0.68	60	61	0.88	1	1	0.89
7	7	–	75	74	–	2	2	–
13	12	–	141	124	–	7	6	–

ABSI: Abbreviated Burn Severity Index.
RBS: Revised Baux Score.
BOBI: Belgian Outcome in Burn Injury.

Table 5 – Severity burn scores in hospitalized children.

	ABSI 2019	ABSI 2020	P	RBS 2019	RBS 2020	P	BOBI 2019	BOBI 2020	P
Number of values	n = 63	n = 93	–	n = 63	n = 93	–	n = 63	n = 93	–
Minimum	2	2	–	3	1	–	0	0	–
25% Percentile	3	3	–	12	12	–	0	0	–
Median	3	4	**< 0.0001**	18	19	0.20	0	0	**0.018**
75% Percentile	4	5	–	22	28	–	0	1	–
Maximum	9	10	–	63	83	–	3	4	–

there was a notable reduction in the search for medical care for non-COVID-19 conditions in 2020 due to the population's fear of SARS-CoV-2 infection, even though the demand for these cases didn`t reduce during the pandemic [20]. Second, the reduction in the capacity of hospitals, redistribution of medical teams, and increased concern about patient safety [21] led the staff to avoid as much as possible the treatment of injuries in the hospital environment, hospitalizing the patient only in situations that, with the evolution of the clinical condition, proved to be necessary. This delay can impact the evolution of the injury as well as the treatment proposed to the patient [22].

Analyzing the LOS alone, the results found in both periods for the adult population agreed with the literature, which reported a variation of 3–18 days [23].

In the total group of patients, the length of stay/%TBSA (LOS/%TBSA) ratio obtained in the present study for both years agreed with the literature, with values ranging within the interval of 0.5–1.4 [6].

The average mortality rate in the studied burn center located in a middle-income country was 4.9% in 2019 and 5.5% in 2020, contrasting with the findings in the literature of low to middle-income countries, which showed an average mortality rate of 9.9% [5]. When analyzing data from the literature presented by high-income countries, the mortality rate varied between 1.4% and 6.8% [24–30]. These data reveal the quality and expertize of the unit studied in the management of burn cases.

Knowing the prevalent burn epidemiology made the predictability of burn profiles and recognition faster, allowing an earlier request of the necessary treatment materials. Also, it allowed the treatment plan to become more standardized and aligned with other specialties such as pediatrics and social assistance.

At our hospital, the burn patients were divided into two groups. Those infected with the new coronavirus were isolated, and their approaches were made exclusively on a recently created infected-only operating room, and those not infected continued to be treated at the burn center. To deal with the demand, it was necessary to reduce elective surgeries and increase the number of employees. Outpatients remained being attended in-person in our burn center during the pandemic, taking the necessary precautions to prevent COVID infection.

This study had some limitations due to retrospective design, the limited period of years analyzed, and the single-center nature. However, our data were obtained in a referral burn center in Brazil and showed significant changes in the epidemiological profile of burn patients during the current pandemic and demonstrated the impact of social isolation. The knowledge generated by this study could help to plan strategies, in case other lockdowns occur. In addition, conducting urgent educative campaigns for parents could help to prevent domestic children's burns, as they are more at risk staying at home than at school.

5. Conclusion

This study shows that the burn epidemiology for the pediatric population was heavily impacted by the imposed social isolation period, presenting an increase in the number of cases, and greater severity of burns. In contrast, for the adult population, it was slightly altered during the pandemic period.

Ethics approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This study was approved by the Committee of

Ethics in Research from Evangelic Mackenzie School of Medicine under protocol number 3.308.378.

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CRediT authorship contribution statement

All authors contributed to the study conception and design. Material preparation and data collection were performed by BFMR, MFB, RAI, RD, MVASN and RMN. The data analysis and the first draft of the manuscript was done by BFMR, MFB and RMN and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Declarations

NA.

Consent to participate

All participants signed an informed consent.

Consent for publication

Yes.

Transparency declaration

The authors affirm that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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