




Epidemiological profile of 0–18-year-old child victims of burns treated at the Plastic Surgery and Burns Service of a University Hospital in Southern Brazil

Perfil epidemiológico de crianças de 0-18 anos vítimas de queimaduras atendidas no Serviço de Cirurgia Plástica e Queimados de um Hospital Universitário no Sul do Brasil

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■ ABSTRACT

Introduction: Injuries caused by burns represent a significant public health problem, constituting the fourth leading cause of childhood death in Brazil and the United States. In addition, few diseases carry such substantial losses as burns, with considerable morbidity due to the development of physical and psychosocial sequelae. This study aimed to outline the epidemiological profile of 0–18-year-old children treated for burns at a teaching hospital in Curitiba, Paraná.

Methods: This cross-sectional, retrospective study involved analysis of 625 medical records of 0–18-year-old children who were victims of burns from January 2010 to December 2017. Information was collected on age, sex, length of hospitalization, death, body region affected, burned body surface area (BSA), depth, etiologic agent, and therapeutic approach. **Results:** A plurality of the sample were infants (43%), and the average age of the sample was 12.6 years. Most of the sample was comprised males, and the patients remained hospitalized for an average of 14.5 days. Of the burns, 98% were caused by thermal agents, particularly hot liquids. Most burns were second-degree burns (61.3%), reaching up to 25% of the BSA, and the most affected region was the trunk. Among the treatment modalities, 44% of the patients needed surgical intervention with debridement and grafting. **Conclusion:** Younger children are more prone to burns, especially in the home environment. A prepared and qualified team is of crucial importance for optimizing outcomes in these patients.

Keywords: Burns; Pediatrics; Surgery, Plastic; Epidemiologic studies; Multiple trauma.

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■ RESUMO

Introdução: Lesões geradas por queimaduras representam um importante problema de saúde pública, constituindo a quarta causa de morte na infância no Brasil e Estados Unidos. Além disso, poucas são as doenças que trazem prejuízos tão importantes, com considerável morbidade pelo desenvolvimento de sequelas físicas e psicossociais. Diante disso, o objetivo deste estudo é traçar o perfil epidemiológico de crianças de 0-18 anos atendidas em um hospital escola de Curitiba, Paraná. **Métodos:** Estudo transversal e retrospectivo realizado através da análise de 625 prontuários de internação de crianças de 0-18 anos vítimas de queimaduras, entre janeiro de 2010 a dezembro de 2017. Foram coletadas informações sobre idade, sexo, tempo de internação, óbito, região corporal atingida, extensão da superfície corporal, grau de profundidade, agente etiológico e abordagem terapêutica. **Resultados:** A maior parte da amostra era composta por lactentes (43%), com média de idade de 12,6 anos. O sexo mais afetado foi o masculino e os pacientes permaneceram cerca de 14,5 dias internados. No estudo, 98% das queimaduras apresentaram como etiologia o agente térmico, principalmente por líquido quente. Em relação ao grau de profundidade, a maioria das queimaduras foram de 2º grau (61,3%), atingindo até 25% de superfície corporal queimada (SCQ), sendo o tronco o mais afetado. Dentre as modalidades de tratamento, 44% dos pacientes necessitaram de intervenção cirúrgica com debridamento e enxertia. **Conclusão:** Crianças mais novas são mais propensas a sofrerem queimaduras principalmente no ambiente domiciliar e, além disso, uma equipe preparada e capacitada é de crucial importância no prognóstico destes doentes.

Descritores: Queimaduras; Pediatria; Cirurgia plástica; Inquéritos epidemiológicos; Traumatismo múltiplo.

INTRODUCTION

Injuries caused by burns represent a significant public health problem and are the fourth leading cause of childhood death in Brazil and the United States, behind only other traumatic causes, such as traffic accidents, and homicides.^{1,2} According to the Brazilian Society of Burns, around 1 million burns occur per year in Brazil. Of these, 100,000 patients will seek hospital care, and approximately 2,500 will die directly or indirectly from their burns.^{2,3}

Due to musculoskeletal and immunological immaturity, children are more vulnerable to death. It is estimated that approximately 70% of all deaths caused by burns at this age could be avoided.^{1,4} This mortality rate is mainly due to infection and sepsis as well as systemic repercussions.¹ After the destruction of the primary protective barrier, the thermal trauma leads to the release of mediators, with extensive damage to capillary integrity and accelerated loss of fluids, which may even lead to hypovolemic shock. Due to the disproportionate

body surface-to-weight ratio, these individuals more frequently present with systemic repercussions.^{3,5}

Furthermore, few diseases carry losses as devastating as burns. This type of lesion results in considerable morbidity due to sequelae, with functional disability being one of the most severe. This is especially true when the burn affects the hands, which may result in unsightly deformities—especially of the face—and psychosocial disabilities.^{3,6}

OBJECTIVE

Thus, the objective of this study was to outline the epidemiological profile of 0–18-year-old children treated by the Plastic Surgery and Burns Service of the Evangelical University Hospital of Curitiba.

METHODS

A cross-sectional and retrospective study was conducted by analyzing 625 hospitalization records of

children, aged 0–18, all of whom were victims of burns admitted to the Plastic Surgery and Burns Service of the Evangelical University Hospital of Curitiba, from January 2010 to December 2017. The Burns Service treats adults and children from all over the state of Paraná, and other States, with greater demand from the city of Curitiba and the metropolitan region. The study was approved by the Research Ethics Committee of the Evangelical Charity Society of Curitiba, under opinion no. 86160718.4.0000.0103.

Information was collected on age, sex, length of hospitalization, death, body region affected by burns, burned body surface area (BSA), depth of the burn, the etiological agent involved, and therapeutic approach. The data regarding the causative agent of burns were grouped as follows: chemical agent (burns caused by alkalis or acids); thermal agent (burns caused by flammable agents, hot liquids, heated surface, embers, and direct flame); and electrical agent (burns caused by electrical current).

The results are expressed as absolute numbers and percentages, in the form of tables and graphs, which were processed using Microsoft Excel 2016.

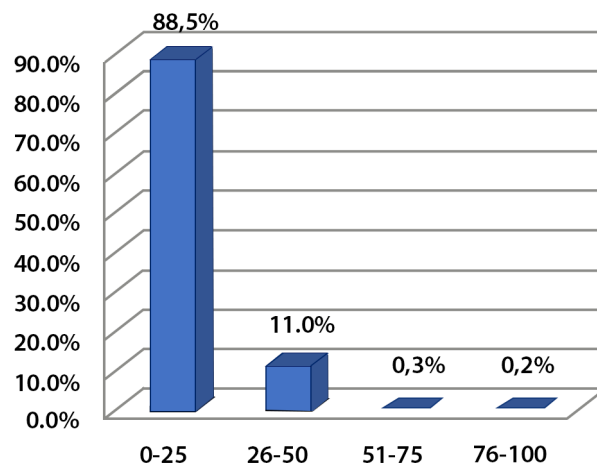
RESULTS

We evaluated a total of 625 medical records of patients aged 1 month to 18 years of age, over the last seven years. Of these, four (0.6%) died. A plurality of the sample was composed of infants (43%), followed by preschoolers (36%), adolescents (11%), and schoolchildren (10%). The mean age was 12.6 years. The most affected sex was male (60%, n = 376), and the ratio between the sexes was 1.5:1. Concerning the time of hospitalization, patients were hospitalized for 14.5 days on average, with a maximum stay of 118 days. There was no significant difference in the time of hospitalization among age groups (p = 0.61). There was also no significant difference between the sexes (p = 0.83).

In this study, 98% (612) of the burns were caused by a thermal agent—74% by hot liquids—across all

age groups (Table 1). Most burns were second-degree (61.3%), followed by third-degree (38.2%), and first-degree burns alone (0.5%).

Concerning BSA, 553 patients had 0%–25% BSA, 69 patients had 26%–50% BSA, two patients had 51%–75% BSA, and one patient had burns over >75% BSA (Graph 1). The most-affected body area was the trunk (55%), with second-degree burns in 60% of patients with trunk-area burns. Patients with >25% BSA tended to be hospitalized eight days longer than patients with up to 25% BSA (p = 0.0029).



Graph 1. BSA intervals. Source: The authors (2018)

Among the treatment modalities, 44% (272) of the patients needed surgical interventions (debridement and grafting), and dressings were the most adopted treatment.

Third-degree thermal burns were mostly caused by hot liquids (38%), in both sexes, and most children with third-degree thermal burns were preschoolers (39%). For burns involving hot liquids (Table 2), dressings (65%) and debridement (85%) were the most common treatments, whereas grafting alone was homogeneously distributed across the all types of third-degree thermal burns (p = 0.001).

Table 1. Type of thermal burns by age class

Type	Infant		Pre-school Age		School Age		Adolescents	
	N	%	N	%	N	%	N	%
Flammable agent	4	2	24	11	17	27	11	17
Embers	7	3	5	2	0	0	0	0
Direct flame	4	2	29	13	15	24	15	23
Hot liquid	230	88	158	71	28	45	38	58
Hot surface	17	6	6	3	2	3	2	3
Total	262	100	222	100	62	100	66	100

Source: The authors (2018)

Table 2. Distribution of the types of third-degree thermal burns according to the therapy adopted

Therapy	Dressings		Debridement		Graft	
	N	%	N	%	N	
Type						
Flammable agent	10	9	2	4	18	24
Embers	3	3	1	2	4	5
Direct flame	18	17	4	9	15	20
Hot liquid	70	65	39	85	33	43
Hot surface	7	6	0	0	6	8
Total	108	100	46	100	76	100

Source: The authors (2018)

DISCUSSION

Historically, burns are easily preventable injuries, especially in children, and require basic care directed at parents and children themselves. This is demonstrated by the fact that 79% of burns occurred in younger than six years of age, a group with emerging neuropsychomotor development that may not possess adequate awareness of danger and safety. This finding is consistent with past studies, which found that children younger than five years are more likely to sustain burns.^{7–11} Males were more at risk for burns, with a ratio of 1.51 males for each female, in agreement with another study center that found 53.4% of burn victims were males.⁷

Among the types of burns, we found that most burns, across all age groups, were caused by hot liquids. This finding is consistent with studies performed in other Brazilian States^{7,8}, developing countries such as India^{9,12} and Iran,¹¹ as well as developed countries, such as Canada⁸ and Wales.⁷ This finding conforms to the so-called “hot kettle syndrome,” wherein a child pulls a pan or kettle with boiling water off a stove. This finding further illustrates the socio-economic situation in Brazil, in which a large number of people tend to live in a common residence, with children and adults crowding kitchen areas.

When we analyzed the regions most affected by burns, we found some interesting differences from prior studies. A Canadian study found a predominance of lesions in the hip and limbs.⁸ In contrast, Iranian researchers found a large number of burns in the limbs (47% of the total number of lesions).¹¹ However, in our analysis and other Brazilian studies,^{1,2} the most affected body region was the trunk, in contrast to other international research findings.

Regarding the time of hospitalization of these patients, our finding of an average of 14.5 days is in agreement with a study of other developing countries, which found an average hospitalization duration of 17.56 days.⁹ A mean hospitalization of two weeks was also reported by Brazilian researchers.^{2,3} School-aged children, aged 7–9 years, had the longest average hospitalization duration (17.14 days). The

standard deviation was 12.02 days because there was considerable variation in the lengths, depths, and locations of burns.

Burn depth depends on the temperature of the causal agent and the duration of contact with the agent. Children and the elderly have more sensitive skin than adults, so superficial more easily progress to deeper levels, worsening overall health status. In our sample, most (61.3%) burns were second-degree. This finding is corroborated by other studies, where second-degree burns affected 50%–70% of the patients.^{8–11}

The vast majority (89%) of our patients had 0%–25% BSA burns, with only one patient with burns over >75% of the BSA. However, patients with greater affected BSA generally incur higher hospitalization costs, with more intensive therapy needs, prolonged hospitalization, and greater attention to their wounds. In patients burned by flammable agents or embers, the most commonly used therapy was grafting. In contrast, most patients with lesions attributable to direct flame, hot liquids, and heated surfaces were treated with dressings.

CONCLUSION

A large number of children are involved in accidents caused by burns. This reinforces the importance of prevention, since such burns cause physical and psychological trauma, and are mostly irreversible. Younger children were more prone to burn injuries, and most burn-related injuries occurred at home. Simple measures, such as keeping hot liquids out of reach, using electrical appliances under supervision, and not leaving children alone in the kitchen, many help prevent future accidents. Also, specialized burn teams that are ready and able to attend to burns is critically important for improving the prognoses of these patients.

COLLABORATIONS

MVASN Conception and design study, Conceptualization, Final manuscript approval, Project Administration, Supervision, Writing - Review & Editing

SMM	Conception and design study, Conceptualization, Final manuscript approval, Project Administration, Supervision, Writing - Review & Editing
RD	Analysis and/or data interpretation, Conception and design study, Conceptualization, Data Curation, Final manuscript approval, Formal Analysis, Methodology, Project Administration, Supervision, Writing - Original Draft Preparation, Writing - Review & Editing
CSC	Analysis and/or data interpretation, Data Curation, Formal Analysis, Investigation, Methodology, Realization of operations and/or trials, Writing - Review & Editing
GLAL	Analysis and/or data interpretation, Data Curation, Formal Analysis, Investigation, Methodology, Realization of operations and/or trials, Writing - Original Draft Preparation, Writing - Review & Editing

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