



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/burns

National multicentric study on the incidence of alcohol burns during the COVID-19 pandemic

Bianca Sandi Kobarg^a, Maria Elena Echevarría Guanilo^b, Gustavo Peressoni Bernard^a, Marcos Guilherme Praxedes Barreto^c, Luiz Philipe Molina Vana^d, Joir Lima de Oliveira Junior^e, Kelly Danielle de Araújo^f, Ricardo de Lauro Machado Homem^g, Elaine Marlene Tecla^h, Fabiano Calixto Fortes de Arrudaⁱ, José Adorno^g, Alfredo Gragnani^j, Maurício José Lopes Pereima^{k,*}

^a Federal University of Santa Catarina, Brazil

^b Nursing Department, Federal University of Santa Catarina, Brazil

^c Restauração Hospital Governador Paulo Guerra, Brazil

^d July 9 de Hospital, Brazil

^e Santo Antônio de Jesus Regional Hospital Regional, Brazil

^f João XXIII Hospital, Brazil

^g North Wing Regional Hospital, Brazil

^h Vila Penteado General Hospital, Brazil

ⁱ Urgency State Hospital Governador Otávio Lage de Siqueira, Brazil

^j São Paulo Hospital, Federal University of São Paulo, Brazil

^k Pediatric Department, Federal University of Santa Catarina, Brazil

ARTICLE INFO

Article history:

Received 14 October 2021

Received in revised form 6 April 2022

2022

Accepted 15 April 2022

Available online xxxx

Keywords:

Burns

Epidemiology

SARS-CoV-2

Health policy

ABSTRACT

Background: Burns are traumatic wounds that occur when skin is exposed to an amount of energy greater than its maximum dissipation capacity. Alcohol, because it fuels flames and its vapor can cause an explosion, is one of the most common causal agents of burns in Brazil. In late 2019, the COVID-19 pandemic caused a sudden and substantial increase in the use of 70% alcohol (w/v) for antiseptics.

Objectives: To analyze the epidemiological characteristics of alcohol burns during the COVID-19 pandemic in participating Burn Treatment Centers, as well as the severity and treatment of these burns.

Method: Descriptive, cross-sectional, quantitative and retrospective study based on data obtained from medical records of patients treated in participating Burn Treatment Centers. Data collection included origin, gender, education level, occupation, circumstance of the accident, wound depth and type of treatment.

Results: Of eight participating centers, the Hospital da Restauração Gov. Paulo Guerra Burn Treatment Center experienced the highest number of alcohol burn patients (38.4%) and

* Corresponding author.

E-mail address: mauricio.pereima@ufsc.br (M. José Lopes Pereima).

<https://doi.org/10.1016/j.burns.2022.04.005>

0305-4179/© 2022 Elsevier Ltd and ISBI. All rights reserved.

male gender accounted for 53.6% of all cases. Predominant occupations were those that involve domestic activities (29%) and 48.6% of patients had not completed elementary school. The most common cause was an accident during cooking (35.5%) followed by suicide attempt (18.3%). More than half (58.6%) of the patients had concomitant second and third degree burns and wound treatment of choice was surgical (43.1%).

Conclusions: The predominant population in this study was male, had a lower level of education, resided in the northeast region and had an occupation carried out in a domestic environment. The latter may reflect the population's longer stay at home due to social constraints caused by the COVID-19 pandemic. There were a large number of second and third degree burns and, as a consequence, a high number of cases in which surgical treatment was required.

© 2022 Elsevier Ltd and ISBI. All rights reserved.

1. Introduction

Burns in Brazil, in general, have the same causes of burns found in other developing countries. However, an agent, liquid alcohol, for being a product used culturally as a domestic cleaning product, is one of the main responsible for this type of accident when infamous, and among the causal agents of burns, alcohol is one of the most common in Brazil [1–9], with the exception of the age group up to four years in which scalds are more prevalent [8]. Alcohol burns have also been associated with higher numbers of burnt body surface area (BSA) and intensive care unit (ICU) admissions and deaths, when compared to burns from other causes [9]. In 2002, the Brazilian National Health Surveillance Agency (ANVISA) banned the manufacture, sale or delivery of high-grade ethyl alcohol, aiming to reduce accidental ingestion, especially by children, and the number of burns associated with the combustion of liquid alcohol [10]. Despite the attempt, the ban did not result in a change in the number of accidents long term [9,11]. In addition, at the end of 2019 a new factor caused a sudden increase worldwide for the demand and use of alcohol in high concentration and large amounts: the 2019 coronavirus pandemic.

In order to slow the spread of the virus, several nations adopted measures of social isolation and hygiene care. With these restrictions, most of the population began to spend more time at home, which increases the possibility of burns because, historically, 80–90% of them occur in the home environment [3]. Furthermore, among the antiseptics recommendations is the use of alcohol in high concentrations for hand hygiene and surface disinfection [12,13]. In this context, using a temporary resolution issued in March 2020, ANVISA authorized the sale of 70% liquid alcohol [14].

Therefore, considering the importance of COVID-19 containment measures, it was envisioned that accidents caused by burns may increase, especially those caused by alcohol [15]. In view of the relevance of the topic for public health safety, the Brazilian Society of Burns (BSB), as well as several other entities, intensified preventive actions on the use of liquid alcohol, with a focus on awareness [15]. The campaigns aimed to reduce the incidence of these accidents during the pandemic, a period in which more time is spent at home and alcohol is widely used in high concentrations [7].

To this end, the BSB's analysis of data from Burn Trauma Centers (BTCs) of burns caused by alcohol in the period of liberalization of the 70% alcohol trade in addition to encouragement of its use to decrease exposure to COVID-19, showed that the confinement of populations in their homes was associated with greater exposure to alcohol and an increase in accidents and suicide attempts. Lessons learned from the data may be used to inform future decisions in similar situations involving large populations and the prevention of unintended adverse consequences.

2. Objectives

1. Analyze data and identify epidemiological characteristics of alcohol burns during the COVID-19 pandemic from the multicenter study in Brazil.
2. Describe the severity of alcohol burns and treatment undertaken in BTCs who participated in the multicenter study in relation to the depth and type of treatment performed

3. Methods

This is a study with a quantitative, descriptive, cross-sectional, temporal and retrospective approach from March 28 to November 30, 2020, based on data obtained through collection forms completed by professionals involved in care for burn victims. The Burn Treatment Centers (BTCs) in Brazil that were included in this study are listed in Table 1.

The study was approved by the Ethics Committee for Research Involving Human Beings (ECRH) of the Federal University of Santa Catarina and was coordinated by the Brazilian Society of Burns (BSB), with the Department of Pediatrics and the Department of Nursing of the Health Sciences Center of the Federal University of Santa Catarina. The BTCs that met the ECRH standards duly registered for participation in the study and applied the Institution's Statement of Science and the Declaration of Anonymous Data Transfer. Data such as origin, gender, education level, occupation, circumstance of the accident, wound depth and type of treatment were analyzed. Correlation was made regarding the circumstance of the accident. Using quantitative data, a descriptive analysis was performed by applying

Table 1 – Distribution of Burn Treatment Centers in Brazil participating in the multicenter study during the COVID-19 pandemic by State and their respective series of burns caused by liquid alcohol in number and %.

Burn Treatment Center	State	n	%
Restauração Hospital Governador Paulo Guerra	Pernambuco	112	38.4
João XXIII Hospital	Minas Gerais	57	19.5
Regional Hospital North Wing	Distrito Federal	50	17.1
Vila Penteado General Hospital	São Paulo	25	8.6
São Paulo Hospital	São Paulo	24	8.2
State Urgency Hospital Governador Otávio Lage de Siqueira	Goiás	15	5.5
Santo Antônio de Jesus Regional Hospital	Bahia	7	2.4
July 9 de Hospital	São Paulo	1	0.3
TOTAL		291	100

Source: National Survey by the Brazilian Society of Burns (BSB).

Central Position, Variability and Pearson association test. Inferential analyzes were also performed for testing hypotheses with t-test for dependent and independent samples and/or chi-square test, and Anova. The statistical significance value of $p < 0.05$ was considered and data were organized and processed using IBM SPSS Statistics Software Version 20.0.

This research did not receive any specific grants from funding agencies in the public, commercial, or not-for-profit sectors.

4. Results

The study data correspond to 291 patients, with the largest number of cases ($n = 112$; 38.4% of all cases) occurring in the State of Pernambuco in the northwest of Brazil, followed by the State of Minas Gerais ($n = 57$; 19.5%) and the Federal District ($n = 50$; 17.1%) (Table 1).

Regarding the number of burn cases by gender, the highest number of cases corresponded to males ($n = 156$; 53.6%). As for the level of education, most participants ($n = 84$; 28.9%) declared having not completed elementary school and, regarding occupation, domestic (household) activities stood out ($n = 54$; 18.5%) (Table 2).

Regarding the circumstances by which burns occurred, most were accidents during food preparation ($n = 97$; 33.3%) followed by attempted suicide ($n = 50$; 17.2%). With regard to gender, most accidents during food preparation were by men (38% versus 33.1% women) and attempted suicide occurred more often by women (28.5% versus 9.2% men). Significant differences were identified between men and women, with men, regardless of the agent, being the most affected by burns ($p = 0.003$) (Table 3).

As for the depth of the lesions, most had both second and third degree burns ($n = 136$; 46.7%) and most were treated by applying only dressings in the care of the wound ($n = 132$; 45.5%) followed by surgical treatment ($n = 100$; 34.4%) (Table 4).

When comparing the depth of burn injuries, according to sex, no statistically significant differences were identified ($p = 0.508$). And, when the hypothesis test and ANOVA were performed, no statistically significant differences were identified.

Table 2 – Distribution of participants according to gender, level of education and occupation. Florianópolis, 2021.

Observed variables	n	%
Gender		
Male	156	53.6
Female	134	46
Not reported	1	0.3
Total	291	100
Education		
Incomplete Elementary School	84	28.9
Completed Elementary School	40	13.7
Incomplete Middle School	32	11
Completed Middle School	10	3.4
Incomplete High School	2	0.7
Completed High School	5	1.7
Not reported	118	40.5
Total	291	100
Occupation		
Domestic activities	54	18.5
Industry and construction workers	32	10.8
Unemployed	20	6.9
Child	20	6.9
Service providers and general Commerce	17	5.8
Student	13	4.5
Retiree	10	3.4
Farmer	9	3.1
Self-employed	4	1.4
Street vendor	3	1.0
Teacher	2	0.7
Regular worker	2	0.6
Not reported	105	36.1
Total	291	100

Source: National Survey by the Brazilian Society of Burns (BSB).

5. Discussion

This study was carried out during 8 months of the COVID-19 pandemic in the year 2020, and sought to examine burns caused by alcohol during this period, since this product, which was already one of the most prevalent causes of burns in our environment [16–18], was also widely publicized as an antiseptic useful in prevention and control campaigns for this disease [19–22].

Table 3 – Distribution of patients with burns caused by liquid alcohol during the COVID-19 pandemic in relation the cause of the burn in relation to the total number in % and the distribution by gender in %.

Circumstance	Total n (%)	Females n (%)	Males n (%)
Food preparation (while cooking)	97 (33.3)	43 (33.1)	54 (38)
Attempted suicide	50 (17.2)	37 (28.5)	13 (9.2)
Starting fire in barbecue grill	29 (10)	6 (4.6)	23 (16.2)
Aggression	19 (6.5)	7 (5.4)	12 (8.5)
Alcohol flame	19 (6.5)	6 (4.6)	13 (9.1)
Alcohol used as antiseptic	15 (5.1)	9 (6.9)	6 (4.2)
Children playing with alcohol	13 (4.7)	7 (5.4)	6 (4.2)
Work accident	12 (4.1)	7 (5.4)	5 (3.5)
Smoking / alcoholism	8 (2.7)	4 (3.1)	4 (2.8)
Others	10 (3.4)	4 (3.1)	6 (4.2)
Not reported	19 (6,5)	–	–
Total	291 (100)	130	142

Source: National Survey by the Brazilian Society of Burns (BSB).

Table 4 – Distribution of patients according to the depth of lesions and treatment. Florianópolis, 2021.

Depth and treatment	Total n (%)	Famale n (%)	Male n (%)
Degree of burn			
2° degree	88 (30.2)	38 (35.2)	50 (40.7)
2° and 3o. degree	136 (46.7)	65 (60.2)	70 (56.9)
3° degree	8 (2.7)	5 (4.6)	3 (2.4)
Not reported	59 (20.3)	–	–
p = 0.508			
Total	291 (100)	108 (100)	123 (100)
Treatment			
Conservative use of only dressings	132 (45.4)	–	–
Surgical with excision and skin coverage	100 (34.4)	–	–
Not reported	59 (20.3)	–	–
Total	291 (100)	–	–

The BTCs that participated in the national multicenter study reported their experiences specifically for burns caused by alcohol during this period (Table 1). They represent 2 from the Northeast region, 2 from the Midwest and 4 from the Southeast. Among the participating centers, there is a higher incidence of burns caused by alcohol in the Midwest and Northeast regions of Brazil. The northeast region is a famous agricultural producer of sugar cane, the raw material used in the production of alcohol, and is where the Restauraç ão Hospital Governor Paulo Guerra is located, in the city of Fortaleza, State of Pernambuco [23].

The prevalence of males in this study (Table 2) reflects a greater exposure of this group to situations that predispose them to burns caused by alcohol, although, compared to literature, this circumstance is most often reported for females. The predominance of this gender is also reported in several other studies on this type of burn [9,24,25], and is supported by data for the year 2020 provided by the National Information System of the Unified Health System - DATASUS - concerning hospitalizations according to the coding used for exposure to combustion of highly flammable substance [26].

The proportion of burns in patients with education equivalent to incomplete or complete elementary school

(Table 2) was higher than those found in literature, where the inverse relationship between level of education and burns has already been described [27,28]. Our study demonstrated a more significant percentage which may be attributed to an intensification of socioeconomic disparities in the country as a result of the COVID-19 pandemic such as influences due to increased unemployment and negative effects on the economy due to widely publicized social restrictions on the population [29,30].

Thus, due to its availability and low cost, liquid alcohol was already routinely used as a cleaning product in homes and was already an important cause of burns in our environment [9,11], however, with the beginning of the COVID-19 pandemic it contributed to an increased incidence of burns in people who were not only engaged in domestic activities, but also workers who lost their jobs, and children and students who stopped attending school during the pandemic. The data in Tables 2 and 3, therefore, suggest the predominance of burns in individuals who spent most of their time in the home environment and, consequently, in contact with liquid alcohol due to the increased use and promotion of this agent as a sanitizer in the domestic environment since the beginning of the pandemic [19–22]. It should also be understood that reinstatement of sales, which was previously restricted [14], and its inclusion in the basic food basket provided by the government in some cities, such as in Rio de Janeiro [31], fueled the increase in burn injuries. The large number of burns during cooking food may also be related to the socioeconomic crisis, since the increase in the price of liquefied petroleum gas (LPG) leads the population to seek other alternatives to prepare food, which raises the index burns caused by flammable liquids, including alcohol [32,33]. This type of accident was especially frequent among patients treated at the BTC of the Restauraç ão Hospital Governor Paulo Guerrain northeastern Brazil, accounting for 49% of cases of burns caused by alcohol in that institution. It is also noteworthy that it was the BTC with the highest incidence of burns among all participants, representing 38.4% of the total (Table 2). This factor can be associated with the large use of liquid alcohol as fuel in the kitchen in that state [16]. In addition to the high frequency of burns during cooking in general, there was an unexpected participation of males in this

category of accidents, accounting for more than half of the cases, although females are usually more readily associated with burns during preparation of food and in the kitchen environment [34–36]. This male predominance may be related to the increase in unemployment during the pandemic, which reached the highest rate in the country since the beginning of such registrations in 2012 [37], as well as the increase in home office work activities [38], that constrained the male population to the domestic environment and to activities that were previously performed predominantly by the other gender.

Another cause of alcohol burn that stood out was the attempt at suicide [47]. This represented a percentage of cases higher than that found in other studies on burns [39–42], but similar to that found in a specific study on burns caused by alcohol [9]. This can be justified considering that most attempts at suicide by burns use alcohol as the inflammatory agent [43,44]. However, it is possible that the increase in these numbers is a consequence of the relationship between uncertainty, social isolation and economic problems caused by COVID-19 and the increased incidence of depression and anxiety due to social isolation and suicide attempts [45,46]. The prevalence of females in cases of burns caused by attempted suicide found in the study is consistent with what is found in the literature [39,48].

Regarding the severity of burns caused by alcohol, the profile of second and third degree injuries found in most patients (Table 4) was consistent with that expected for burns caused by alcohol, since these injuries are mostly flame burns [9,25] with more extensive and deeper lesions [34,49]. Physically, the combustion of alcohol leads to the release of a large amount of heat due to its high calorific value and also due to its explosive power [50], resulting in an anatomopathological lesion characterized by coagulation necrosis, with complete destruction of the epidermis and variable parts of the dermis, from deep second degree burns with destruction of the proximal dermis to third degree burns with complete destruction of both the epidermis and the dermis [51,52].

The type of treatment performed is directly related to the depth of the burn: superficial and deep second degree burns are usually conservatively re-epithelialized using wound dressings that promote an ideal environment for re-epithelialization, usually in 21–28 days, from the migration of keratinocytes from the dermal adnexa in the depth of the dermis. On the other hand, in third degree burns, there is complete destruction of all skin layers, including the dermal appendices, which prevents re-epithelialization and indicates the need for surgical treatment with excision of the burned tissue and skin grafting [53,54]. The high number of patients undergoing this type of treatment (Table 4) corroborates the severity of burns caused by alcohol, which, due to its high heat release value, with flames, causes deep burns [9,25,34,49].

The present study has a limitation regarding the BTCs that responded to the study, which totaled 8, representing 3 regions of the country (Northeast, Midwest and Southeast.) The latter has the largest population, but the data is lacking representation of the South, where there are some burn treatment centers, and the North, where the number of burn centers is small.

On the other hand, the quality of the study is high because it provides useful data from the BTCs, where the incidence of burns caused by use of alcohol as a disinfectant can be examined and associated with economic influences and social distancing mandates that affected the population during the pandemic study period. It revealed a higher risk profile for certain socioeconomic levels, such as those with an incomplete basic education, for groups that spent more time primarily in their homes, and it demonstrated that food preparation activities, such as barbecues, contributed significantly to burns. Men predominated for injuries occurring when cooking but only by a small margin. Women represented 46% of the total reports and, for the two most prevalent circumstances resulting in burns; women significantly led involvement in suicide attempts that used alcohol as a propellant and they closely followed men in burns associated with food preparation.

Therefore, as greater learning for future experiences such as a pandemic or other type of catastrophe in the health or socio-environmental area that affects the entire population, economic collapse and social distancing both lead to longer stays at home and can contribute to a higher incidence of burns caused by alcohol, in particular, while cooking and when attempting suicide. In preparing for moments like these, both civil society and specialty societies, in particular the Brazilian Society of Burns, may aid public health and safety by increasing awareness using comprehensive campaigns that provide guidance to prevent and reduce accidents. Alcohol use is prevalent in several countries, such as Brazil, and these guidelines are suitable for countries with low and medium levels of socioeconomic development, it being the role of ISBI to increase these guidelines.

6. Conclusions

The data obtained through this study elucidates the profile of the population at risk for alcohol burns in Brazil, that was evidenced during the COVID-19 pandemic, in addition to demonstrating the most common circumstances in which these accidents occur. This information is a valuable resource when creating health policies aiming burn prevention and awareness, which are extremely important in this singular time our people are facing. In addition, further studies are needed to assess how these conditions have evolved over the course of the pandemic, which persists to this day, but with new characteristics that are constantly changing.

Conflict of interest

I declare that the authors of this article have no conflicts of interest.

REFERENCES

-
- [1] Silva IKM, Leandro JM, Amaral LEF, Silva ACA, Marçal MLP, Fantinati AMM, et al. Análise de pacientes de 0 a 12 anos atendidos no Pronto Socorro para Queimaduras de Goiânia em 2011 e 2012. *Rev Bras Queimaduras* 2015;14(1):14–7.

- [2] Garcia AP, Pollo V, Souza JA, Araujo EJ, Feijó R, Pereima MJL. Análise do método clínico no diagnóstico diferencial entre queimaduras de espessura parcial e total. *Rev Bras Queimaduras* 2011;10(2):42-9.
- [3] World Health Organization, Fact sheet on burns. 2018: (<https://www.who.int/news-room/fact-sheets/detail/burns>). Accessed: 21 June 2021.
- [4] Ministério da Saúde. Queimados, 2017. (<https://www.saude.gov.br/component/content/article/842-queimados/40990>). Accessed: 21 June 2021.
- [5] Arruda FCF, Castro BCO, Medeiros JF, Valadão Jr. WJ, Reis GMD. Análise epidemiológica de 2 anos na Unidade de Queimados do Hospital de Urgências Governador Otávio Lage de Siqueira, Goiânia. *Bras Rev Bras Cir Plást* 2018;33(3):389-94.
- [6] Souza TJA, Bastos PRHO. Perfil sociodemográfico e etiológico de pacientes internados em um centro de referência para tratamento de queimados em Mato Grosso do Sul. *Rev Bras Cir Plást* 2015;30(3):391-7.
- [7] Dias LDF, Oliveira AF, Juliano Y, Ferreira LM. Burn Care Unit of São Paulo Federal University: an epidemiological profile. *Rev Bras Cir Plást* 2015;30(1):86-92.
- [8] Cruz BF, Cordovil PBL, Batista KNM. Perfil epidemiológico de pacientes que sofreram queimaduras no Brasil: revisão de literatura. *Rev Bras Queimaduras* 2012;11(4):246-50.
- [9] Aldunate JLCB, Ferrari Neto O, Tartare A, Araujo CAL, Silva CC, Menezes MAJ, et al. Análise de 10 anos de casos de queimaduras por álcool com necessidade de internação em hospital quaternário. *Rev Bras Queimaduras* 2012;11(4):220-5.
- [10] Agência Nacional de Vigilância Sanitária (ANVISA). Resolução de Diretoria Colegiada - RDC Nº 46, de 20 de fevereiro de 2002. (http://portal.anvisa.gov.br/documents/10181/2718376/RDC_46_2002_COMP.pdf/172719b2-114a-413f-82b7-7272feaca832) Accessed: 21 June 2021/05/2020.
- [11] Pereima MJ, Mignoni ISP, Bernz LM, Schweitzer CM, Souza JA, Araújo EJ, et al. Análise da incidência e da gravidade de queimaduras por álcool em crianças no período de 2001 a 2006: impacto da Resolução 46. *Rev Bras Queimaduras* 2009;8(2):51-9.
- [12] Centers for Disease Control and Prevention, Infection Control Guidance for Healthcare Professionals about Coronavirus (COVID-19). Disponível em (<https://www.cdc.gov/coronavirus/2019-ncov/hcp/hand-hygiene.html>). Acesso em 18 mai 2020.
- [13] Coronavírus COVID-19 - Como se proteger? - Ministério da Saúde, Disponível em: (<https://coronavirus.saude.gov.br/sobre-a-doenca#como-se-proteger>) Accessed: 21 June 2021.
- [14] AGÊNCIA NACIONAL DE VIGILÂNCIA SANITÁRIA . Resolução - RDC nº 350, de 19 de março de 2020. Diário Oficial da União. Brasília, DF. 20 mar 2020. Ed 55, seção 1, p. 154.
- [15] SBQ mobiliza entidades sobre riscos do uso indiscriminado de álcool - Sociedade Brasileira de Queimaduras, Disponível em: (<http://sbqueimaduras.org.br/noticia/sbq-mobiliza-entidades-sobre-riscos-do-uso-indiscriminado-de-alcool>). Accessed: 21 June 2021.
- [16] Santos GP, Freitas NA, Bastos VD, Carvalho FF. Perfil epidemiológico do adulto internado em um centro de referência em tratamento de queimaduras. *Rev Bras Queimaduras* 2017;16(2):81-6.
- [17] Souza AA, Mattar CA, Almeida PCC, Faiwichow L, Fernandes FS, Neto EC A, et al. Perfil epidemiológico dos pacientes internados na Unidade de Queimaduras do Hospital do Servidor Público Estadual de São Paulo. *Rev Bras Queimaduras* 2009;8(3):87-90.
- [18] Gimenes GA, Alferes FC, Dorsa PP, Barros ACP, Gonella HA. Estudo epidemiológico de pacientes internados no Centro de Tratamento de Queimados do Conjunto Hospitalar de Sorocaba. *Rev Bras Queimaduras* 2009;8(1):14-7.
- [19] World Health Organization, Coronavirus disease (COVID-19): Cleaning and disinfecting surfaces in non-health care settings. (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19-cleaning-and-disinfecting-surfaces-in-non-health-care-settings>) (accessed 20 May 2021).
- [20] Governo do Estado do Paraná. Coronavírus (COVID-19), Preparações antissépticas e desinfetantes. Nota Orientativa 02/2020. 2020. Disponível em: (https://www.saude.pr.gov.br/sites/default/arquivos_restritos/files/documento/2020-09/NO_02_PREPARACOES_ANTISETICAS_E_SANITIZANTES_V6.pdf). Accessed: 20 May 2021.
- [21] Instituto Federal Ceará. Entenda a COVID-19, Fortaleza: IFCE, 2020. Disponível em: (<https://portal.conif.org.br/images/cartilha-covid19-versao-final.pdf>). Accessed: 20 May 2021.
- [22] Secretaria de Estado de Saúde- Governo do Estado de Mato Grosso do Sul, Manual de Condutas para Enfrentamento do COVID-19. 2020. Disponível em: (https://www.saude.ms.gov.br/wp-content/uploads/2020/03/Manual-de-Condutas-vers%C3%A3o-2_-25.03.2020.pdf). Accessed: 20 May 2021.
- [23] Escritório Técnico de Estudos Econômicos do Nordeste, Diário Econômico do ETENE. No181. 11 Jun 2018. Disponível em: (https://www.bnb.gov.br/documents/1342439/4128151/181_06_11_2018.pdf/d1d4290d-1d9e-a214-f50a-9ce50ced36be). Accessed: 29 June 2021.
- [24] Leite VHO, Resende Lf, Souza ME, Assis IX, Borges KS, Cintra B. Análise dos acidentes por queimadura com álcool líquido em Unidade de Tratamento de Queimados em Sergipe. *Rev Bras Queimaduras* 2016;15(4):235-9.
- [25] Holmes WJ, Hold P, James MI. The increasing trend in alcohol-related burns: it's impact on a tertiary burn centre. *Burns* 2010;36(6):938-43. <https://doi.org/10.1016/j.burns.2009.12.008>
- [26] DATASUS, Informações de Saúde (TABNET). (<http://www2.datasus.gov.br/DATASUS/index.php?area=02>). Accessed: 10 June 2021.
- [27] Santos GP, Freitas NA, Bastos VD, Carvalho FF. Perfil epidemiológico do adulto internado em um centro de referência em tratamento de queimaduras. *Rev Bras Queimaduras* 2017;16(2):81-6.
- [28] Nestor A, Turra K. Perfil epidemiológico dos pacientes internados vítimas de queimaduras por agentes inflamáveis. *Rev Bras Queimaduras* 2014;13(1):44-50.
- [29] Albuquerque MV, Ribeiro LHL. Desigualdade, situação geográfica e sentidos da ação na pandemia da COVID-19 no Brasil. *Cad Saúde Pública* 2020;36(12):e00208720 <https://doi.org/10.1590/0102-311x00208720>
- [30] Travassos LRFC, Moreira RMP, Cortez RS. The virus, the disease and the inequality. *Ambient Soc* 2020;23:e0111 <https://doi.org/10.1590/1809-4422asoc20200111vu2020l3id>
- [31] Rio de Janeiro, Lei Nº 8771 de 23 de março de 2020. Diário Oficial do Executivo. Rio de Janeiro, RJ. 23 mar 2020.
- [32] Rodrigues MF, Nascimento EC, Santos Junior RA, Teles HCC, Cintra BB. Relação do preço do gás de cozinha e queimaduras por líquido inflamável. *Rev Bras Queimaduras* 2019;18(3):162-6.
- [33] Sociedade Brasileira de Queimaduras [homepage na internet], Aumento no preço do gás de cozinha eleva número de acidentes com álcool. Disponível em: (<https://www.sbqueimaduras.org.br/noticia/aumento-no-preco-do-gas-de-cozinha-eleva-numero-de-acidentes-com-alcool>). Accessed 21 June 2021.
- [34] Bailey ME, Sagiraju HKR, Mashreky SR, Alamgir H. Epidemiology and outcomes of burn injuries at a tertiary

- burn care center in Bangladesh. *Burns* 2019;45(4):957–63. <https://doi.org/10.1016/j.burns.2018.12.011>
- [35] Kumar S, Ali W, Verma AK, Pandey A, Rathore S. Epidemiology and mortality of burns in the Lucknow Region, India—A 5 year study. *Burns* 2013;39(8):1599–605. <https://doi.org/10.1016/j.burns.2013.04.008>
- [36] Iqbal T, Saaiq M, Ali Z. Epidemiology and outcome of burns: Early experience at the country's first national burns Centre. *Burns* 2013;39(2):358–62. <https://doi.org/10.1016/j.burns.2012.07.011>
- [37] Instituto Brasileiro de Geografia e Estatística - IBGE, Pesquisa Nacional por Amostra de Domicílios Contínua - Principais destaques da evolução do mercado de trabalho no Brasil 2012–2020. Disponível em: (https://ftp.ibge.gov.br/Trabalho_e_Rendimento/Pesquisa_Nacional_por_Amostra_de_Domicilios_continua/Principais_destaque_PNAD_continua/2012_2020/PNAD_continua_retrospectiva_2012_2020.pdf).
- [38] Sociedade Brasileira de Queimaduras [homepage na internet], Especialistas fazem alertas para evitar acidentes domésticos. (<https://www.sbqueimaduras.org.br/noticia/especialistas-fazem-alertas-para-evitar-acidentes-domesticos>). Accessed: 21 June 2021.
- [39] Duarte DW, Neumann CR, Weber ES. Intentional injuries and patient survival of burns: a 10-year retrospective cohort in southern Brazil. *Burns* 2015;41(2):271–8. <https://doi.org/10.1016/j.burns.2014.07.019>. Epub 2014 Oct 6. PMID: 25300754.
- [40] Caine PL, Tan A, Barnes D, Dziewulski P. Self-inflicted Burns: 10 year review and comparison to national guidelines. *Burns* 2016;42(1):215–21. <https://doi.org/10.1016/j.burns.2015.09.018>. Epub 2015 Oct 23. PMID: 26603912.
- [41] Seoighe DM, Conroy F, Hennessy G, Meagher P, Eadie P. Self-inflicted burns in the Irish National Burns Unit. *Burns* 2011;37(7):1229–32. <https://doi.org/10.1016/j.burns.2011.04.011>. Epub 2011 Jul 2. PMID: 21726948.
- [42] George S, Javed M, Hemington-Gorse S, Wilson-Jones N. Epidemiology and financial implications of self-inflicted burns. *Burns* 2016;42(1):196–201. <https://doi.org/10.1016/j.burns.2015.10.010>. Epub 2015 Dec 5.
- [43] Oliveira RA, Andrade ES, Leão CEG. Epidemiologia das tentativas de autoextermínio por queimaduras no estado de Minas Gerais. *Rev Bras Queimaduras* 2012;11(3):125–7.
- [44] Carvalho ID, MCVF Serra, Macieira Jr L. Queimadura: tentativa de autoextermínio. Análise de uma década no Hospital do Andaraí - RJ: 2000-2010. *Rev Bras Queimaduras* 2011;10(2):57–60.
- [45] Sher L. The impact of the COVID-19 pandemic on suicide rates. *QJM* 2020;113(10):707–12. <https://doi.org/10.1093/qjmed/hcaa202>
- [46] Hossain MM, Tasnim S, Sultana A, Faizah F, Mazumder H, Zou L, McKyer ELJ, Ahmed HU, Ma P. Epidemiology of mental health problems in COVID-19: a review. *F1000Res* 2020;23(9):636. <https://doi.org/10.12688/f1000research.24457.1>. PMID: 33093946; PMCID: PMC7549174.
- [47] Pera A. Depressive Symptoms, Anxiety Disorder, and Suicide Risk During the COVID-19 Pandemic. *Front Psychol* 2020;15(11):572699. <https://doi.org/10.3389/fpsyg.2020.572699>. PMID: 33384638; PMCID: PMC7769944.
- [48] Parvareh M, Hajizadeh M, Rezaei S, Nouri B, Moradi G, Esmail, Nasab N. Epidemiology and socio-demographic risk factors of self-immolation: A systematic review and meta-analysis. *Burns* 2018;44(4):767–75. <https://doi.org/10.1016/j.burns.2017.08.013>. Epub 2017 Oct 9.
- [49] Cheng W, Shen C, Zhao D, Zhang H, Tu J, Yuan Z, Song G, Liu M, Li D, Shang Y, Qin B. with the Epidemiological Study Group of Burns. The epidemiology and prognosis of patients with massive burns: A multicenter study of 2483 cases. *Burns* 2019;45(3):705–16. <https://doi.org/10.1016/j.burns.2018.08.008>. Epub 2019 Mar 2.
- [50] Van Wylen GJ, Sonntag RE, Borgnakke C. *Fundamentos da Termodinâmica*. São Paulo: Editora Edgard Blucher LTDA,; 2003.
- [51] Pham TN, Gibran NS, Heimbach DM. Evaluation of the burn wound: management decisions. In: Herndon DN, editor. *Total Burn Care*. Third edition., Philadelphia: Saunders - Elsevier; 2007. p. 119–26.
- [52] Júnior EML, Novaes FN, Piccolo NS, Serra MCVF. *Tratado de queimaduras no paciente agudo*. São Paulo: Editora Atheneu,; 2008.
- [53] Bessey PQ. Wound care. In: Herndon DN, editor. *Total Burn Care*. Third edition., Philadelphia: Saunders - Elsevier; 2007. p. 127–33.
- [54] Pereima MJL, Cunha FC. *Tratamiento Quirúrgico de Quemaduras en Niños*. In: Bolgiani A, Júnior EML, Serra MCVF, editors. *Quemaduras: conductas clínicas y quirúrgicas*. São Paulo: Editora Atheneu; 2013.