

LISBON BURN CENTRE EXPERIENCE WITH INTENTIONAL BURN INJURIES

BRÛLURES NON ACCIDENTELLES : EXPÉRIENCE DU CTB DE LISBONNE

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SUMMARY. Burn injury as a form of hetero or auto-aggression accounts for a significant amount of admissions to a Burn Care Unit, with epidemiologic and clinical specificities. To investigate the differences in risk factors, psychiatric comorbidities, injury severity and mortality among adult patients with accidental or intentional burns, we analyzed routinely collected data from a Central Hospital Burn Unit over a period of 6 years (January 1st, 2010 to December 31st, 2015). We identified 22 intentional burn patients (5%) among all the admissions to our Burn Unit. When compared to the accidental burns, the intentional burn patients are significantly younger (45.7 ± 14.7 vs. 54.9 ± 19.9), have a bigger percentage of body surface area burned (35% vs. 14%), have a higher incidence of inhalation burn (50% vs. 22.8%) and higher mortality (18.2% vs. 6.1%). Fifty-five percent of cases of intentional burns were self-inflicted. Self-inflicted burns have a worse prognosis than hetero-aggressions (in-hospital mortality 25% vs. 10%). Psychiatric comorbidities were largely more prevalent in the intentional burn patients (59% vs. 6.6%), namely mood disorders. Compared to patients with accidental burns, intentional burn patients have worse clinical condition and prognosis. A multidisciplinary preventive approach, looking at the specificities of the violent nature of the lesions and identifying risk groups may reduce the incidence and severity of this type of burns.

Keywords: intentional burn, psychiatric disease, auto-aggression, hetero-aggression

RÉSUMÉ. Les brûlures par suicide ou consécutives à une agression représentent une entité à part, non négligeable dans la patientèle d'un CTB. Nous avons cherché à en caractériser les facteurs de risque, les pathologies psychiatriques associées, la gravité et la mortalité, par une revue des dossiers des patients hospitalisés dans notre CTB entre 2010 et 2015. Vingt deux (5%) patients ont été victimes de brûlures non accidentelles. Elles touchent des patients plus jeunes ($45,7 \pm 14,7$ VS $54,9 \pm 19,9$ ans, sont plus étendues (35 VS 14%), l'incidence de l'inhalation de fumées y est plus élevée (50 VS 22,8%) et leur mortalité est supérieure (18,2 VS 6,1%). Les tentatives de suicide représentent 55% des brûlures non accidentelles et sont grevées d'une mortalité supérieures (25%) aux agressions (10%). Des troubles de l'humeur étaient présents dans 59% des brûlures non accidentelles (6,6% ailleurs). Les brûlures non accidentelles sont donc plus graves que les autres. Une politique préventive ciblant les groupes à risque pourrait réduire l'incidence et la gravité des brûlures non accidentelles.

Mots-clés : brûlure non accidentelle, suicide, agression, pathologie psychiatrique

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Introduction

According to the World Health Organization report on the Global Burden of Disease in 2008, burns are nowadays the 4th most frequent cause of trauma around the globe after road accidents, falls and interpersonal conflicts. Burned patient epidemiology is highly variable among different countries, cultures, and levels of development of a society. Both in low and high-income countries burns are essentially accidental. Non-accidental or intentional burns are defined as the will of someone to cause harm to another or himself by the act of burning.¹ Even though these burns are less frequent (ranging from 2-6% to 33% in high and low-income countries, respectively) we cannot neglect their existence,^{2,3} since they present specific epidemiological and clinical issues such as younger age, lower social status and lower compliance with treatment plans.⁴⁻⁷ Intentional burns can be divided according to the aggressor into auto- and hetero-aggression. These two groups present very specific characteristics around the world according to the respective culture.¹ Profound knowledge of these populations is the key to the prevention of this problem.

Portugal is a small European Union country with 11 million inhabitants. Burned patients are usually treated at 5 specialized units. The hospitalization rate for burns is 18.9/100.000 inhabitants/year.⁸ One of the criteria for a patient to be admitted to a Burn Unit is a social problem, namely intentional burns.⁹ This subject is not fully studied in Portugal.

The main aim of this study was to assess and compare socio-demographic data, psychiatric history, burn-related events, and clinical outcomes among patients with intentional burns or accidental burns. This knowledge allows us to compare the Portuguese population to other populations and apply some of the already-tested measures to reduce the burden of intentional burns.

Patients and methods

We retrospectively reviewed routinely collected data on the clinical records in electronic files of all adult patients admitted to Centro Hospitalar Lisboa Central's Burn Unit in the period between January

1st, 2010 and December 31st, 2015, searching for the demographic and clinical variables related to the burn event, either intentional or accidental. The patients were divided into two groups, the ones suffering from accidental burns and the ones suffering from intentional burns based on the unequivocal description of the burn by the emergency team, the patient or people who witnessed the burn. Patients admitted to the Burn Unit with other diagnoses besides burn injuries, such as toxic epidermal necrolysis and necrotizing fasciitis, were excluded from the study, as well as those patients in whom there was some doubt around the circumstances of the burn. The following parameters were collected: demographic features (age and sex), etiology and place of burn, location where the burn happened, % total body surface area (TBSA), inhalation injury, number of surgeries (considering the need for anaesthetic support as a surgery: dressing changes, mechanical debridement, chemical debridement, skin grafts, flaps, amputations), length of stay, in-hospital mortality, emergency escharotomies, past medical and psychiatric history, and the aggressor for the intentional burns group.

Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences 24.0 (SPSS INC. 2011, Chicago, Illinois, USA). Continuous variables were presented as mean (standard deviation) or median (minimum-maximum), as applicable. Two independent groups were assessed using Student's t-test or Wilcoxon rank-sum test, as applicable. Paired data were compared using paired Student's t-test or Wilcoxon signed rank-test, as appropriate. Comparisons between more than two groups were performed using analysis of variance (ANOVA) or Kruskal-Wallis test, as applicable. Categorical samples were expressed as number and percentage and compared using Fisher's exact test. A p-value of less than 0.05 was considered significant.

Results

During the 6 years of the study, 431 patients were admitted to the Burn Unit. Sixteen patients were excluded because they did not meet the in-

clusion criteria (12 patients diagnosed with toxic epidermolysis and 4 patients with necrotizing fasciitis). A total of 415 patients were included in this study - 393 were defined as accidental burns and 22 as intentional burns. Most patients in both groups were male (59% and 68.2%), however patients with intentional burns were significantly younger (46±15 vs. 55±20 years old, p=0.03). Burn etiology was not statistically different in both groups.

Mean percentage of total body surface area (%TBSA) (30% vs. 10%, p<0.001), presence of inhalation injury (50% vs. 23%, p=0.04), number of surgical procedures [median=16 (IQA=16) vs. 8 (IQA=10) p=0.03], need for emergency escharotomies (50% vs. 14%, p<0.001) and length of stay (LOS) (44 vs. 21 days, p=0.01) were all bigger and more frequent in the intentional burns group when compared to the accidental burns group. However, in-hospital mortality did not reach statistical difference between the groups (Table I).

Among the accidental burns, only 6.6% of the

Table I - Demographic and clinical data of patients suffering from accidental and intentional burns

	Accidental burns n=393 (94.5%)	Intentional burns n=22 (5.5%)	P value
Sex, n (%)			
Female	161 (41.0)	7 (31.8)	0.39
Age (years old), mean (sd)	54.9 (19.92)	45.7 (14.69)	0.03
Etiology			
Hot liquid	99 (25.4)	2 (9.1)	
Hot solid	21 (5.4)	1 (4.5)	
Fire	209 (53.6)	15 (68.2)	
Electrical	40 (10.3)	2 (9.1)	
Chemical	8 (2.1)	2 (9.1)	
Electrical Flash	5 (1.3)	0 (0.0)	
Cold	1 (0.3)	0 (0.0)	
Explosion	7 (1.8)	0 (0.0)	0.32
Place, n (%)			
Closed	280 (71.3)	19 (86.5)	
Open	80 (20.3)	2 (9)	0.27
Unknown	33 (8.4)	1 (4.5)	
Local, n (%)			
House	253 (70.1)	17 (85.0)	
Work	69 (19.1)	0 (0.0)	
Public space	38 (10.5)	2 (10.0)	
Prison	1 (0.3)	1 (5.0)	0.01
TBSA, median (IQA)	10.0 (14.0)	30.0 (35)	<0.001
Inhalation injury, n (%)	89 (22.8)	11 (50.0)	<0.001
Emergent escharotomies, n (%)	54 (13.9)	10 (50.0)	<0.001
Number of surgical procedures, median (IQA)	8,0 (10.0)	16,5 (16.0)	0.03
LOS (days), median (IQA)	21 (24)	44 (41)	<0.001
In-hospital mortality, n (%)	24 (6.1)	4 (18.2)	0.05

IQA = interquartile amplitude; LOS = length of stay; sd = standard deviation; TBSA = % total body surface area; statistically significant differences appear in bold

patients had previous records of psychiatric pathology compared to 59.1% among the intentional burns (p<0.001). Taking into consideration only patients with a psychiatric pathology, there are statistically significant differences between accidental and intentional burn patients (p=0.04). Intentional burns patients' mood disorder prevalence is significantly higher than the accidental burns patients' (61.5% vs. 30.8%) (Table II). Or-

Table II - Psychiatric history in accidental and intentional burns groups

	Accidental burns n=26 (6.6%)	Intentional burns n=13 (59.1%)	p-value*
Psychiatric comorbidities, n (%)			
Organic	6 (23.1)	0 (0.0)	
Substance abuse	9 (34.6)	4 (30.8)	
Schizophrenia	0 (0.0)	1 (7.7)	
Mood disorders	8 (30.8)	8 (61.5)	0.04
Neurotic disorders	1 (3.8)	0 (0.0)	
Mental retardation	2 (7.7)	0 (0.0)	

Statistically significant differences appear in bold

ganic, neurotic disorders and mental retardation were only described in the accidental burns group, besides a higher prevalence of substance abuse.

In the intentional burns group, the aggressors were: self (55%), non-relative (27%) and spouse (14%) (Fig. 1).

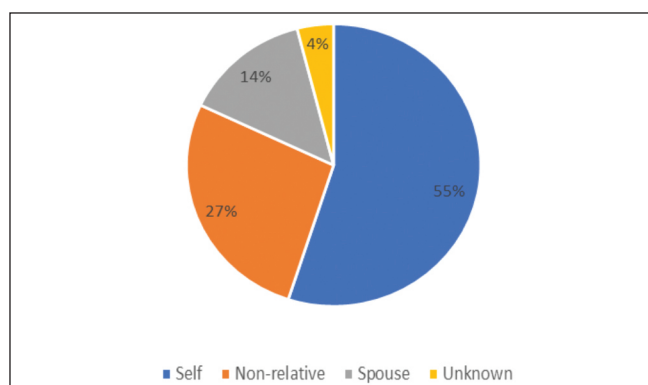


Fig. 1 - Aggressor distribution in the intentional burns group

When dividing the group of intentional burns by etiology, we found statistically significant differences in age (p=0.03), location of the aggression (p=0.01) and aggressor (p<0.001) (Table III). Intentional burns with fire were usually self-inflicted by older people at home.

Table III - Differences in the intentional burns group by etiology of the lesion

	Intentional burns				P value
	Total	Hot liquid/solid	Fire	Electrical/chemical	
	22 (100%)	3 (13.6%)	15 (68.2%)	4 (18.2%)	
Sex, n (%)					
Female	7 (31.8)	0 (0)	6 (40.0)	1 (25.0)	0.24
Age (years old), mean (sd)	45.7 (14.6)	27.0 (3.4)	50.2 (13.2)	43.0 (15.2)	0.03
Local, n (%)					0.01
Home	18 (81.9)	2 (66.7)	15 (100.0)	1 (25)	
Work	0	0	0	0	
Public space	2 (9.1)	0	0	2 (50)	
Prison	1 (4.5)	1 (33.3)	0	0	
Unknown	1 (4.5)	0	0	1 (25)	
Aggressor, n (%)					<0.001
Non-relative	6 (27.3)	3 (100.0)	1 (6.7)	2 (50.0)	
Self	12 (54.5)	0	11 (73.3)	1 (25.0)	
Spouse	3 (13.6)	0	3 (20.0)	0	
Unknown	1 (4.5)	0	0 (0.0)	1 (25.0)	

sd = standard deviation; statistically significant differences appear in **bold**

Differences were also found in the intentional burns group after classification into auto- or hetero-aggression in terms of etiology ($p=0.03$) and location of the aggression ($p=0.04$) (*Table IV*).

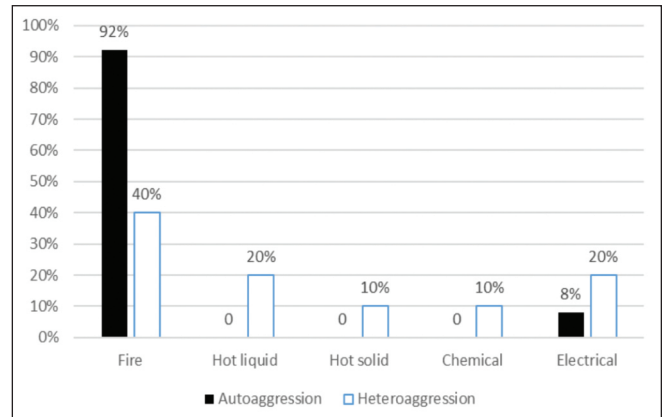
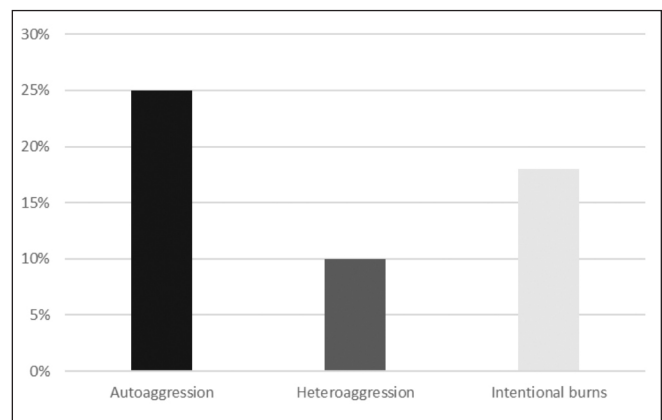
Table IV - Differences in patients suffering auto- and hetero-aggression

	Auto-aggression (self)	Hetero-aggression (non-relative, spouse, unknown)	p-value
	12 (54.5%)	10 (45.5%)	
Etiology, n (%)			0.03
Hot liquid	0	2 (20.0)	
Hot solid	0	1 (10.0)	
Fire	11 (91.7)	4 (40.0)	
Electrical	1 (8.3)	1 (10.0)	
Chemical	0	2 (20.0)	
Local, n (%)			0.04
Home	12 (100.0)	5 (50)	
Work	0	0	
Public space	0	3 (30)	
Prison	0	1 (10)	
Unknown	0	1 (10)	
% TBSA, median (IQA)	32.5 (41)	17.5 (34)	0.28
Number of surgical procedures needed, median (IQA)	15.0 (15.0)	11.0 (21.0)	0.80
LOS, median (IQA)	45.5 (39)	24.5 (42)	0.38
In-hospital mortality	3 (25.0)	1 (10.0)	0.05

IQA = interquartile amplitude; LOS = length of stay; TBSA = % total body surface area; statistically significant differences appear in **bold**

Auto-aggressions were more common with fire at home, while hetero-aggressions had a more equitable distribution of etiologies and occurred at home, in a public space or prison (*Fig. 2*).

There was no statistical difference for the in-hospital mortality rate between the auto- and hetero-aggression groups (*Fig. 3*).

**Fig. 2** - Distribution of etiology in the groups of auto- and hetero-aggression**Fig. 3** - In-hospital mortality in the intentional burns group

Discussion

Intentional burns are believed to be the cause of 2-6% of the admissions to Burn Units across Europe and the USA.¹⁰ Although far from the numbers in some low-income countries,¹¹ the importance of this topic should not be overlooked in the developed world.

In our study, we present a thorough analysis of the clinical characteristics of this group of patients. Our results for incidence rate, age and sex are in line with previous studies in Occidental countries and with the previous descriptions in Portugal.^{9,12} Similar to developing countries, most intentional burns occurred with fire and presented with clinical markers of severity like bigger %TBSA and inhalation injury rates, bigger LOS and higher in-hospital mortality rate when compared with the group of accidental burns.

In this cohort, self-inflicted burns (55%) occurred with fire, at home, and caused bigger %TBSA and a higher mortality rate, also in line with other studies.¹⁰ A previous study in our institution relates the psychopathological process to clinical measures and consistently divides this population into three groups with prognostic significance (typical, delirious and reactive).¹² A notorious difference was also noted on the prevalence of psychiatric history between both groups. Undoubtedly, prevention may be the key to solving these cases, as successfully achieved elsewhere with particular attention to patients suffering from depression and other mood disorders, the typical perpetrators of this kind of injury.¹³ A community-based approach should focus on the 3 stages of the burn: prevent, event, and post-event. However, the principal emphasis should be on the pre-event, with the recognition of the population at risk, essentially those receiving psychiatry attention.¹¹ The prevalence of psychiatric disorder¹⁴ in this group of patients is well known, and both constitutes a risk factor and worsens the prognosis through several factors like low adherence, and physiologic interference to healing by stress hormones and recurrence.¹² There has been some focus on the prevalence and the impact of psychiatric disorder in the burn patient population.^{11,12,15,16} In these studies, substance abuse is accounted for as the most prevalent psychiatric disorder in the intentional burn cohort. Although present in this population, substance abuse is not the most common. The definition of intentional burns supposes the will to harm,¹ so accidental burns caused by the negligence of an intoxicated person were not accounted for in the intentional burn population in our study. Depression has a prevalence of 61.5% in the intentional burns cohort. Besides playing a role as a risk factor for

intentional burn, mood disorders surely impart the recovery period, so they should be considered pivotal in the management of these cases.

Most of the studies in this field look only at the self-inflicted burns. In our study, we incorporated the hetero-aggression group, which corresponded to 45% of the cases. The Literature describes these burns as a result of interpersonal conflicts, marital problems, and organized crime.¹ This is the first time that the subject has been studied in a Portuguese population. We found that these burns were perpetrated by non-relatives and the spouse, generally at home. This suggests that, in our population, these burns are the result of interpersonal problems or a marital situation. There was only one burn occurring at a prison, and this is in sharp contrast with a previous description in the United Kingdom.¹⁰ A typical description of hetero-aggression divides it as an impulse when it occurs with hot liquid or solid, or on the other hand, as premeditated when occurring with fire or chemicals.¹ In our population, these burns occurred in 3 and 6 cases, respectively. It is generally accepted that a deliberate act to harm another is based on a psychopathological problem. An effort to decrease these cases should rely on primary care providers who deal with the general population and psychiatric support for risk groups. Further studies should also focus on this subset of patients and look for approaches for prevention and follow up in this very special group.

Despite being a retrospective study and having a relatively small number of patients, this work provides additional information about the topic of intentional burn in Portugal. More studies are needed to describe this population so that priorities can be assumed and measures taken.

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