

# Clinical and epidemiological aspects of burned patients hospitalized in a Teaching Hospital

ASPECTOS CLÍNICOS E EPIDEMIOLÓGICOS DE PACIENTES QUEIMADOS INTERNADOS EM UM HOSPITAL DE ENSINO

ASPECTOS CLÍNICOS Y EPIDEMIOLÓGICOS DE PACIENTES QUEMADOS INTERNADOS EN UN HOSPITAL DE ENSEÑANZA

Samanta Flor Montes<sup>1</sup>, Maria Helena Barbosa<sup>2</sup>, Adriana Lemos de Sousa Neto<sup>3</sup>

## ABSTRACT

The objectives of this study were to characterize burned patients according to epidemiological and clinical variables and identify the treatments, invasive procedures and complications. This is a retrospective, descriptive and quantitative study. The sample consisted of 138 burned patients hospitalized in a teaching hospital from January 2003 to December 2007, in Uberaba-MG. Of the 138 hospitalized patients, 98 (71.0%) were male, and the average age was 26.1 years. The average length of stay was 16.2 days; 93 (67.4%) of the burns were caused by accidents and the main cause (68; 49.3%) was an open flame. The average burned body surface was 20.8% and most (122; 88.4%) had second degree burns. The most common topic treatment (93; 67.4%) was silver sulfadiazine. Forty-seven (34.0%) patients had indwelling catheters; 30 (21.7%) underwent tissue transplantation, and 28 (20.3%) underwent debridement; the lesions in 14 (10.1%) patients became infected.

## DESCRIPTORS

Burns  
Epidemiology  
Nursing  
Hospitals, teaching

## RESUMO

Os objetivos foram: caracterizar os pacientes queimados segundo as variáveis epidemiológicas e clínicas e identificar os tratamentos, procedimentos invasivos e as complicações. Trata-se de um estudo retrospectivo, descritivo e quantitativo. A amostra constituiu-se de 138 pacientes queimados internados em um hospital de ensino, no período de janeiro de 2003 a dezembro de 2007, de Uberaba-MG. Dos 138 pacientes internados, 98 (71,0%) eram do gênero masculino e a média de idade foi de 26,1 anos. O tempo médio de internação foi de 16,2 dias; 93 (67,4%) eram de natureza acidental e a principal causa 68 (49,3%) foi a chama aberta. A superfície corporal queimada média foi de 20,8% e a maioria 122 (88,4%) apresentou queimadura de 2º grau. A terapia tópica mais utilizada 93 (67,4%) foi a sulfadiazina de prata. A sondagem vesical de demora foi instalada em 47 (34,0%) pacientes; 30 (21,7%) foram submetidos à enxertia e 28 (20,3%) ao desbridamento; 14 (10,1%) apresentaram infecção da lesão.

## DESCRIPTORIOS

Queimaduras  
Epidemiologia  
Enfermagem  
Hospitais de ensino

## RESUMEN

Los objetivos fueron caracterizar al paciente quemado según las variables epidemiológicas y clínicas e identificar los tratamientos, procedimientos invasivos y complicaciones. Estudio retrospectivo, descriptivo, cuantitativo. Muestra de 138 pacientes quemados internados en hospital de enseñanza, en período de enero 2003 a diciembre 2007, en Uberaba-MG. De los 138 pacientes internados, 98 (71%) eran de sexo masculino, la media de edad fue de 26,1 años. El tiempo medio de internación fue de 16,2 días, 93 (67,4%) presentaban quemaduras accidentales y la principal causa, 68 (49,3%) fue la llama abierta. La superficie quemada media fue de 20,8% y la mayoría, 122 (88,4%) presentó quemaduras de segundo grado. La terapia tópica más utilizada, 93 (67,4%) fue la sulfadiazina de plata. El sondaje vesical de demora se instaló en 47 (34,0%) pacientes; 30 (21,7%) fueron sometidos a injerto y 28 (20,3%) a desbridamiento; 14 (10,1%) presentaron infección de la lesión.

## DESCRIPTORIOS

Queimaduras  
Epidemiología  
Enfermería  
Hospitales escuela

<sup>1</sup> RN. Nursing undergraduate program, Federal University of Triangulo Mineiro. Participated in scientific scholarship at the Federal University of Triangulo Mineiro. Uberaba, MG, Brazil. samanta\_flor.enf@hotmail.com <sup>2</sup> PhD in Adult Health Nursing. Professor, Federal University of Triangulo Mineiro. Uberaba, MG, Brazil. mhelena331@hotmail.com <sup>3</sup> RN. Master's student, Graduate Program at the Federal University of Triangulo Mineiro. Uberaba, MG, Brazil. adrianasneto@hotmail.com

## INTRODUCTION

Burns are cutaneous lesions caused by the direct or indirect action of heat and the main causes are direct flame, contact with boiling water or fluids, which is called scalding, contact with hot surfaces, electricity and chemical agents<sup>(1)</sup>.

These lesions can compromise different organic structures and are evaluated in degrees according to the depth of tissue trauma. A first-degree burn compromises the epidermis; the lesion presents redness (erythema), heat and pain, progresses rapidly with scaling, and its systemic impact is minimal. A second-degree burn involves not only the entire epidermis but it also affects the dermis; the lesion site presents pain, erythema, edema, blisters, erosion and ulceration; the healing process is slower and sequelae may occur such as dyschromia or scarring. The epidermis and dermis are destroyed in a third-degree burn, which may reach the subcutaneous tissue, tendons, ligaments, muscle and bones. The lesion is white or black, dry, hard and inelastic. There is no pain due to the destruction of nervous endings and no capillary return, while blood vessels are compromised by coagulation; there is no spontaneous regeneration and grafting is indicated; when it is healing, there is edge retraction<sup>(1-3)</sup>.

Another important aspect to evaluate is the Total Body Surface Area involved (TBSA), which should be evaluated as precisely as possible because it is one of the factors that has the greatest influence on systemic repercussion and patient survival<sup>(1,3-4)</sup>.

The site of lesions is also an important indicative to be considered when delivering care to patients because burns on the face, neck and hands should receive more attention to reduce aesthetic and functional impairment<sup>(1)</sup>.

Often burn victims have their airways burned by smoke inhalation, one of the main causes of mortality both due to the direct thermal action and inhalation of toxic substances and the presence of toxins on the site<sup>(1,5)</sup>.

A burn harms the integrity of the skin, the functions of which are compromised. Local response is first to the emergency of coagulative necrosis, due to thrombosis of blood vessels that eventually leads to systemic repercussions of varied intensity<sup>(1,5)</sup>.

One of the most expressive complications for burned patients is sepsis, which in many cases, leads to death<sup>(2-3,6-8)</sup>. Other complications, also common in these patients, are cardiovascular complications and renal disease directly associated with hypovolemia. Among the cardiovascular complications there are hypotension, increased heart rate and shock<sup>(5,9)</sup>.

Therefore, treatment for these patients involves both local and systemic treatments. The local treatment of the lesion includes coverage with bacterial and/or bacteriostatic action and debridement of devitalized tissue. Among the topical agents the following are highlighted: silver sulfadiazine at 1% and essential fatty acids (EFA). Natural products include papain and honey, while solutions include silver nitrate, chlorhexidine gluconate and povidone-iodine, though these are currently seldom used. Another alternative is the use of temporary skin substitutes indicated to protect the lesion until completion of a graft or only to protect it until it is healed, when it is free of infection. Skin substitutes can be of animal origin such as a homologous graft, amniotic membrane, or collagen and also synthetic such as silicone or polyurethane, and finally associated with organic matter such as collagen and silicone<sup>(2-3)</sup>.

The identification of epidemiological and clinical aspects of victims of burns can contribute to the development of care protocols to ensure the quality of care delivered to this population.

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## OBJECTIVE

To characterize inpatients, victims of burns, according to epidemiological and clinical variables, and identify the invasive treatments and procedures adopted and the main complications presented by these patients.

## METHOD

This is a retrospective and descriptive study with quantitative approach. A total of 346 medical files and forms of burn victims cared for in the emergency room of the Hospital das Clínicas at the Federal University of Triângulo Mineiro (HC/FUTM) between January 2003 and December 2007 were identified. Of these, 138 patients remained hospitalized and composed this study's sample. Data were collected from the medical files by the researchers and trained collaborators in the Medical Files and Statistic Service at the studied hospital.

Data collection was guided by an instrument addressing epidemiological and clinical data including characteristics of the lesion, the adopted invasive treatments and procedures, and complications presented by these patients. The collected data were input into an electronic spreadsheet using the Microsoft Excel program, Windows XP® and submitted to descriptive statistic analysis.

This study was approved by the Research Ethics Committee at the Federal University of Triângulo Mineiro (Protocol n. 1164/2009).

## RESULTS

A total of 346 individuals, victims of burns, were cared for between January 2003 and December 2007 in the HC-FUTM; 208 (60.1%) of these were released after being cared for in the emergency room and 138 (39.9%) were admitted to the hospital.

Of the 138 (100.0%) hospitalized patients composing this study's sample, 98 (71.0%) were men and 95 (68.8%) originated from Uberaba, MG, Brazil; the average age was 26.1 years old (minimum age was 10 months old and maximum 76 years old), while 46 (33.3%) from 0 to 14 years old, 85 (61.6%) from 14 to 59 years old and seven (5.1%) were 60 years old or older. The average length of hospitalization was 16.2 days, varying from one to 110 days.

In relation to lesion characterization, 63 (45.7%) occurred at home, 93 (67.4%) were accidents, and the main cause for 68 (49.3%) patients was exposure to direct flame (Table 1). The main cause of burns, according to the age group, was scalding for patients zero to 14 years old and direct flame for the remaining age groups.

**Table 1** – Distribution of patients according to locale, nature and causes of burns – Uberaba, MG, Brazil – 2003 to 2007

Locale	N	%
Home	63	45.7%
Work	13	9.4%
Public areas	9	6.5%
Jail	1	0.7%
Asylum	1	0.7%
Not informed	51	37.0%
<b>Nature</b>		
Accident	93	67.4%
Violence	9	6.5%
Suicide attempt	6	4.4%
Not informed	30	21.7%
<b>Burn cause</b>		
Direct flame	68	49.3%
Scalding	41	29.7%
Hot surface	7	5.1%
Electricity	12	8.7%
Chemical agent	7	5.1%
Not informed	3	2.1%
<b>Total</b>	<b>138</b>	<b>100.0%</b>

The average TBSA was 20.8%, varying from 1.0% to 95.0%. The most affected sites were the upper limbs, in 97 (70.3%) patients (Table 2). In regard to the severity of the lesions, 60 (43.5%) presented first-degree burns, 122 (88.4%) second-degree, and 38 (27.5%) third-degree burns, while 81 (58.7%) patients concomitantly displayed lesions of distinct degrees.

**Table 2** – Distribution of patients according to the affected body area – Uberaba, MG, Brazil – 2003 to 2007

Affected body site	N	%
Head/neck	70	50.7%
Trunk	82	59.4%
Upper limbs	97	70.3%
Lower limbs	70	50.7%
Genitalia	19	13.8%
Airways	12	8.7%
<b>Total</b>	<b>*350</b>	<b>*253.6%</b>

\*average of affected body areas = 2.5 per patient

Silver sulfadiazine at 1% was the topical treatment used for 93 (67.4%) patients; sulfadiazine was used at first and then papain in 25 (18.1%) patients; other products were used in 11 (8.0%) patients such as rifamycin and fibrinolytic; and this data were not recorded in the files of nine (6.5%) patients. In regard to the invasive procedures, 53 (38.4%) underwent some type of procedure; an indwelling catheter was inserted in 47 (34%) patients (Table 3).

**Table 3** – Distribution of patients according to invasive procedures – Uberaba, MG, Brazil – 2003 to 2007

Invasive procedures	N	%
Not subjected to invasive procedures	85	61.6%
Orotracheal intubation	24	17.4%
Indwelling catheter	47	34.1%
Nasogastric/nasoenteral tube	14	10.1%
Central venous catheterization	16	11.6%
Tracheotomy	2	1.4%
<b>Total</b>	<b>*188</b>	<b>*136.2%</b>

\*average of invasive procedures = 1.9 per patient

In relation to surgical interventions, 43 (31.2%) underwent some type of procedure: 30 (21.7%) grafts, and 28 (20.3%) surgical debridement. Of these, 15 (10.9%) concomitantly submitted underwent these procedures.

Even though most of this study's subjects (113/81.9%) did not have complications, 14 (10.1%) displayed infection in the lesion (Table 4). In regard to the clinical progress, 10 (2.9%) died and of these, five (50.0%) experienced burns in their airways; eight (80.0%) had 2<sup>nd</sup> and 3<sup>rd</sup> degrees burns and the average TBSA was 49.8%, varying from 25% to 95%.

**Table 4** – Distribution of patients according to complications – Uberaba, MG, Brazil – 2003 to 2007

Complications	N	%
Did not have any complication	113	81.9%
Infection on the lesion	14	10.1%
Respiratory failure	10	7.2%
Sepsis	5	3.6%
Pneumonia	4	2.9%
Acute renal failure	2	1.5%
Hypovolemic shock	1	0.7%
<b>Total</b>	<b>*149</b>	<b>*107.8%</b>

\*average of invasive procedures = 1.4 per patient

## DISCUSSION

Male individuals were the majority among the hospitalized patients, a fact also observed in other studies<sup>(10-14)</sup>. The main cause of burns among adults was exposure to direct flame and scalding predominated among children. Similarly, a descriptive study carried out in 2001 where burn victims younger than 15 years old were hospitalized in five hospitals in Londrina, PR, Brazil verified that 44% of the sample suffered burns by exposure to boiling fluids<sup>(15)</sup>.

Various studies<sup>(10-13)</sup> indicate that greatest part of hospitalized victims of burns is made up of children, which does not agree with the findings of this study. The existence of a hospital specializing in caring for children in this city may explain the result found; it is possible that many juvenile victims of burns, are cared for in this facility. The results indicated that scalding is most common among children and exposure to direct flame is most common among adults, which is also evidenced in other studies<sup>(13)</sup>. The primary place where the event occurred was at home and accidents predominated, which also corroborates the findings of other studies<sup>(10-11,13)</sup>.

The average TBSA was 20.8%, which is in agreement with other studies, whose findings vary from 14% to 21%<sup>(11-14,16)</sup>. The most affected body area was the upper limbs and the most frequent level of severity was 2<sup>nd</sup> degree, also verified in another study with a similar methodology, though the frequency of third-degree burns was higher than that found in this study, evidencing more severe cases<sup>(10)</sup>.

In regard to the adopted topical therapy, silver sulfadiazine at 1% was the most frequently used. Silver sulfadiazine is frequently used in the treatment of burns due to its bactericidal power since the loss of protection once conferred by the skin, especially in second and third-degree burns, predisposes patients to develop local and systemic infections. Papain is also recommended to promote chemical debridement<sup>(2,6)</sup>.

One aspect that drew attention was in relation to invasive procedures; indwelling catheters, orotracheal intubation, central venous catheterization, and nasogastric or nasoenteral tube were identified in this study. It is important to keep in mind that even though these are essential to contribute to the recovery of these patients, the use of three or more catheters or probes represent a risk factor for the development of sepsis, as it breaks protection barriers and encourages colonization and infection; hence the prolonged use of these devices is not recommended<sup>(7)</sup>.

It is important to highlight that invasive devices were identified among the patients of this study who displayed sepsis, while no sepsis was identified among those who presented infection in the lesion, which also corroborates the results of other studies that point to an association between invasive devices and sepsis in burned patients<sup>(7)</sup>.

The occurrence of sepsis in this study was also below that found in a study carried out in a burn unit of a public facility. However, this complication is more frequent in more severe cases, which in general are cared for in more specialized facilities<sup>(7,14)</sup>.

The surgical procedures of graft and debridement found in this study were less frequent than in other studies. It may be related to the low occurrence of third-degree lesions, since graft and debridement are most common for second and third degree lesions due to greater tissue destruction. The excision of devitalized tissue and early grafting on the burn are currently recommended<sup>(14)</sup>.

Even though most of this study's patients did not have complications, infection in the lesion was the main complication identified, though less frequently found than in other studies<sup>(11,14)</sup>. A study conducted in the burn unit of a hospital in Brasília, Brazil, which in addition to the clinical evaluation of cases performed microbiological exams of the lesions, identified infection in 16.2% of the results. It shows that evaluation, including microbiological exams of lesion samples, is essential to the precise identification of infections<sup>(14)</sup>.

Respiratory failure and pneumonia represent the most frequently observed pulmonary complications, corroborating the findings of other studies<sup>(11)</sup>. One of the major risk factors for these complications is the presence of airway injury by smoke inhalation<sup>(5)</sup>.

The rate of mortality was lower than that of other studies<sup>(11-12,15)</sup>. Predictive studies addressing mortality in burn patients showed factors such as burns over large areas, lesion by smoke inhalation, and burned body surface area<sup>(12,15)</sup>. Although this study did not aim to address these factors, the results corroborate the findings of other studies<sup>(12,15)</sup>.

## CONCLUSION

This study's results allowed showing that men were prevalent among the studied population (71.1%) and the average age was 26.1 years old. In relation to the categorization of lesions: 45.7% of burns occurred at home; 67.4% were accidents, and 49.3% were caused by exposure to direct flame. The average TBSA was 20.8% and the most (70.3%) affected regions were the upper limbs. In regard to the severity of lesions, most (88.4%) were second-degree. Silver sulfadiazine at 1% was the most (67.4%) used topical therapy. In relation to invasive procedures, 34.0% were received an indwelling catheter and the following surgical interventions were performed: 21.7% received grafts and 20.3% underwent debridement. A total of 10.1% displayed infection in the lesion and 2.9% died.

It is worth noting that a lack of records in the patients' files was a limitation in this study. Another aspect evidenced was the need to implement care protocols, treatment and care for burn patients, which will certainly contribute to the quality of care delivered to this population.

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