



Research Article

Factors related to mortality in patients with severe burns treated in the severe burn unit at Hubert Koutoukou MAGA national university hospital of Cotonou

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ABSTRACT

Burn injuries are a global scourge, responsible for more than 265,000 deaths per year, especially in low-income countries that account for 95% of all burned patients; among them, children are 70%. Burned patients in African countries are a real public health problem; however, they are not yet among the health priorities of these countries. In Benin, they represent a real public health concern.

Goal: Determine the predictive factors most significantly associated with the mortality in burned patients in the severe burn unit at CNHU-HKM in Cotonou.

Methods: This is a retrospective study between half, 2011 and 1st half, 2017. The study population included all the deceased severe burned patients during the study period. The variables studied are: the intrinsic data of the patients, anamnestic data, physical examination data at admission and the care data of the care. The data collected was entered into a database and the statistical analysis was carried out using Epi info software.

Results: Overall, 81 patients deceased among 246 hospitalizations. So the mortality rate was 32.9%. 10 patients (12.3% of deaths) died within 48 hours of the accident. 34 patients (42%) died between the third and seventh days and 37 patients (45.7% of deaths) died after the seventh day following the accident. The average delay of death is 15.9 days. Mortality rates are in the extreme age groups: respectively 36.40% and 72.73% in age groups less than or equal to 4 years and greater than or equal to 60 years. 50.6% of the deaths are female and 49.4% are male. The predictive factors significantly associated with the mortality were: Age \geq 60 years, the pathology history; a mechanical ventilation procedure, a stay in intensive care unit; a BBS $>$ 50%; the attainment of functional areas; a fuel inflammation burn; an index of lesions $>$ 75; hypovolemic shock; hypoproteinemia; Ionic disorders and Sepsis.

Conclusion: Burning accidents are very common in Benin. Mortality is high. The many factors associated with this mortality include: Age $>$ 60 years, comorbidity, gasoline inflammation, burned body surface area greater than 50%, ionic disorders and sepsis.

Keywords: Severe burn patients, Mortality, Relative risk, Associated factors, CNHU-HKM in Cotonou

INTRODUCTION

Burn injuries are a global scourge responsible for more than 265,000 deaths per year, especially in low-income countries that account for 95% of all burns;

among them there are 70% of children (OMS, 2017). Burning in Africa is a real public health problem; However, they are not yet among the health priorities of these countries.

In Benin, they represent a real public health problem. The risk is very high, as flame remains the main mean of cooking energy, the traffic of smuggled gasoline is intensifying and the bottles are still the only one way for stocking gas and the possibilities to alert are limited. More over there's lake of fire hydrant nearby. The aim of this study was to identify the factors that impact in hospital mortality in burned patients followed in the severe burn unit in order to identify strategies to reduce mortality.

PATIENTS AND METHODS

The study was conducted in the unit of large burns of CNHU-HKM Cotonou. This was a retrospective descriptive and analytical study that concerns all patients with severe burns hospitalized in the unit of major burns of the CNHU-HKM Cotonou between September 2011 and June 2017. The data sources used were records patients and hospital records. These data have been collected thanks to adequate collection forms. Included in the study were patients with:

Burnt skin area > 20%

Burnt skin area > 10% with deep burns (2nd degree deep or 3 degree)

Burnt skin area < 10% and severity criteria

The variables studied are: the intrinsic data of the patients (age, sex, origin, antecedents); anamnestic data (circumstances, vulnerant agent, type of burn); physical examination data at admission (BBS, degree of burn, severity score); the data of the care. The data collected was entered into a database and the statistical analysis was carried out using Epi info version 6.0 software.

RESULTS

During the study period, the number of patients treated for severe burn was 274. After removing 28 files for insufficient information or for a loss related to archiving problems and that made them unusable for this work, we selected 246 files that make up the strength of our study.

Overall mortality

Of the 246 patients managed, 81 patients had died, representing a death rate of 32.90%.

Delay before death

10 patients (12.3% of deaths) died within 48 hours of the accident; 34 patients (42% of deaths) died between the third and seventh days and 37 patients (45.7% of deaths) died after the seventh day following the accident. The average time of death is 15.9 days.

Age

Mortality rates are in the extreme age groups: respectively 36.40% and 72.73% in age groups less than or equal to 4 years and greater than or equal to 60 years.

Sex of patients

50.6% of the deaths are female and 49.4% are male.

The stay or not in intensive care

Of the 246 patients, 44 stayed in intensive care. The 70.5% (31 patients) of patients who had resuscitated died; they account for 38.3% of deaths. The 24.75% of patients who did not stay in intensive care died; they account for 61.73% of deaths.

The extent of the burn

The death rate by burn range class showed 95.45% for SCB greater than or equal to 70% of total body surface area. No deaths are observed for SCBs below 20%.

The mean SCB in the deceased patients was 57.16% compared to 29.22% in the survivors (Figure 1).

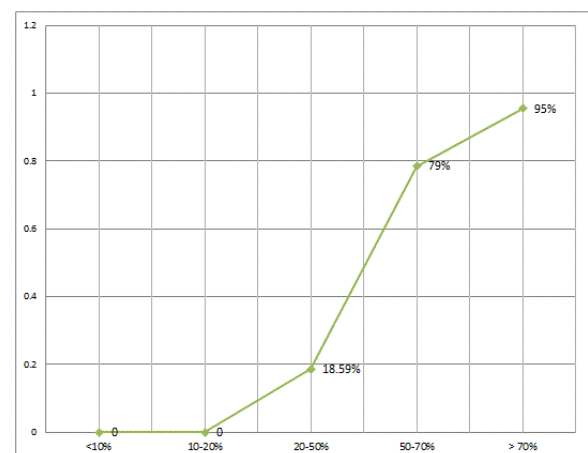


Figure 1. Deaths broken down by BBS class

The depth of the burn

The mortality increases with the degree of depth of the burn. It was 25% for superficial burns, 31.3% for deep second degree burns and 43.10% for third degree burns.

The Index of Leases

The death rate is rising with the Leases index. The 95.80% of patients with a Leases index greater than 100 died as against 51.90% when the Leases index is between 75 and 100; 17.90% when the Leases index is less than 75 (Figure 2).

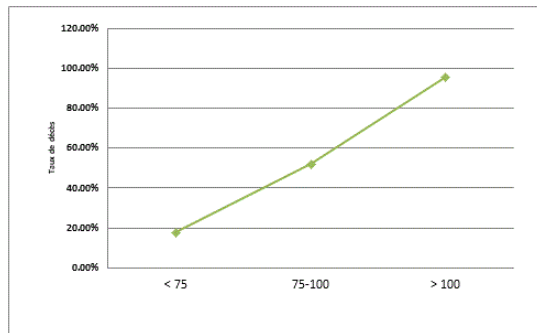


Figure 2. Distribution of deaths by class of lease index

Type of burn and causal agent

In our study all deceased patients were those with thermal burns. 62 deceased patients (76.50% of the deaths) had a burn by flame whose essence is the cause in 36 patients (45,60% of the deaths) (Figure 3).

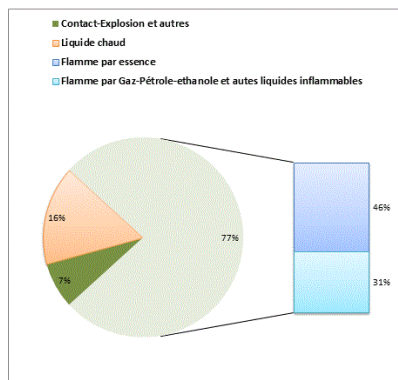


Figure 3. Distribution of deaths according to the vulnerable agent in question

Patients history

Among the 25 patients with burn-related history, 14 patients (56% of this category) died from 67 patients (30.32% of patients without associated terrain) (Table 1).

Table 1. Breakdown by History

History	Total	Deceased	survivors
HT	12	8	4
HT+Diabetes	3	2	1
Asthma	2	1	1
Pregnancy	5	3	2
Epilepsy	3	0	2

Total	25	14	11
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Complications

The death rate is higher in patients who had a complication during hospitalization (Figure 4).



Figure 4. Complications

Prognostic factors

Prognostic factors are discussed as shown in Table 2.

Table 2. Prognostic factors

Factors	Dead (n=81)	Vivants	RR	Valeur P
Age<5 years	16	28	1,1	0,59242
Age ≥ 60 ans	8	3	2,34	0,00405
Female	41	76		0,50124
Prior hyperglycemia	10	10	1,59	0,09006
History	14	16	1,85	0,00959
Ventilation mecanique	9	5	2,31	0,00183
Lengh of stay in ICU	31	13	2,85	0,00000
SCB ≥ 50%	54	10	5,69	0,00000
3rd degree burn	28	37	1,44	0,05493
Attainment of functional areas	65	112	2,04	0,00333
Fuel burn patients	36	49	1,59	0,01013
Leases index >75	51	27	3,66	0,00000
Hypovolemic shock	12	2	2,88	0,00002
Hypoprotidemia	10	2	2,75	0,00014
Anemia	56	38	1,17	0,39608
Ionic disorders	35	39	1,77	0,00165

Sepsis	37	53	1,46	0,03801
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DISCUSSION

Mortality related to burns remains a challenge in our context. The death rate due to severe burns remains very high in relation to those found in studies in developed countries (Rigou A and Th  lot B, 2014) but remains similar to the rates reported by Edmond KK, which is 35% in Abidjan (Edmond KK, 2013) and Boukind in the Maghreb (Boukind L, 1995) who found 27%. This rate steel lower than that reported by B  yiha et al. whose rate reaches 40% (Beyiha G, 2000). In this series we have tried to identify the predictive factors of this mortality in order to improve burn management in the future. The mortality rate was high at extreme ages as reported in the literature. The analysis of these factors shows a significant difference when the age is greater than or equal to 60 years ($p < 0.05$). But age under 5 does not show a significant difference. There is a rate also higher than the average rate in females as reported also by Boukind et al. but the difference is not significant when compared to male (Griffe O, 2001; Boutonnet M, 2015).

Among hospitalized patients, there was a very high mortality in the group of patients who were admitted in ICU (70%) with a significant difference. Among these patients who have been resuscitated are those who have received mechanical ventilation. This factor multiplies the risk of death by 2.31 with a significant p-value ($p < 0.05$). The combination of other chronic pathologies to burn also significantly increases mortality, it increases the risk of death by 1.85 and requires special attention when dealing with severe burns. The analysis of the death distribution curve according to the burned body surface reveals an increase in mortality following BBS, a BBS greater than 50% of the TBS. An increase in mortality according to the depth of burn was also observed. Thus, mortality in patients with 3rd degree burn was 43%, but the link with mortality is not significant. On the other hand, the attainment of functional areas such as the face, hands, neck and perineum shows a significant difference and is therefore a factor to consider in the management of severe burns in our context.

With regard to the wounding agents, the burn by essence requires particular attention not only because of its frequency in our environment but also because this type of burn significantly influences the mortality. The prevention of burns in our context and the reduction of its mortality in our context must go through the control of flammable liquids, especially gasoline. Several authors report the link between hyperglycemia at admission and the occurrence of mortality (Steven EW, 1998; Elkafssaoui S, 2014; Thourani VH, 2003). In our series 50% of patients with hyperglycemia on

admission died, but this increase in mortality rate in this group does not show a significant influence on the occurrence of death in our context.

Hyperglycemia on admission is a common complication in burns. It is observed within 48 hours of burning in 8% of patients. It is a factor of morbidity particularly infectious with *Pseudomonas aeruginosa* (Morand A and Morand JJ, 2017; Ainaud P, 2012) and excess mortality in these patients. Intensive insulin therapy would control glucose levels and improve the prognosis of these patients. The occurrence of complications such as hypovolemic shock, hypoprotidemia, anemia and ionic disorders have also shown a negative influence on mortality in our series. These complications occur during hospitalization and increase the prognosis in these patients. Great efforts should be made in the management of burns to prevent the occurrence of these complications at home.

CONCLUSION

Burning accidents are very common in Benin. Mortality is high. The many factors associated with this mortality include: Age > 60 years, comorbidity, gasoline inflammation, burned body surface area greater than 50%, ionic disorders and sepsis.

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