1. Introduction

Trauma caused by burns can be intentional (violence, assault, suicide, etc.) or unintentional (traffic injuries, occupational injuries, home and leisure injuries). Such traumas can have dreadful consequences and may lead to major physical and psychological after-effects on both the individual and the people living around him or her. Care and treatment for burns usually requires significant and particularly costly resources.

The French National Health Insurance Fund estimated in 1992 that there were 700 burns per 100,000 inhabitants, i.e. more than 400,000 burns per year (regardless of severity and care and treatment). There are very few epidemiological studies on burns in the French language. The findings are rarely available in France and most often involve the activities of one or a handful of hospital services.

Based on data from the French Hospital Discharge Database (PMSI) the purpose of this study is to describe the demographic profile as well as the care and treatment provided to burn victims, to establish the incidence rates and indicators for severity and lethality, and finally to explore the risk factors associated with mortality caused by burns among patients who have been hospitalised.

2. Materials and methods

2.1 Data source

The data used for this study is that of PMSI (acute care hospitalisations) for 2008. Cases selected involve hospitalisations with a principal diagnosis of burns coded from T20 to T32 and taking place in Metropolitan France.

The severity of burns was measured according to the extent of body surface involved (codes T31 and T32), the presence of burns of the respiratory tract (T27) and age bracket. Severe burns were defined as burns that meet one of the three following conditions:

- burns covering at least 20% of the body surface among children under 5;
- burns covering at least 30% of the body surface among people over 5;
- presence of respiratory burns.

2.2 Statistical analysis

The findings of the statistical analysis are presented in two parts:

- a descriptive analysis focusing on hospitalisations due to burns outlining patients’ stay in hospitals, length of stay, diagnostics, severity, seasonal variations, etc.;
- a descriptive analysis focusing on burn victims. The data linking procedure, which establishes a connection between hospital stays of a given patient during 2008, helps to describe burn victims by age, gender, severity, seasonality, etc. and then to calculate the incidence rates of people residing in Metropolitan France who have suffered from burns. A multivariate analysis was carried out focusing on risk factors associated with mortality caused by burns among people who have been hospitalised.

3. Hospitalisations due to burns (N=12,778)

3.1 Breakdown by age and gender

In 2008, there were 12,778 hospitalisations due to burns in Metropolitan France. Hospitalisations of children between 0 and 4 accounted for 33% of the total (figure 1), which represents nearly 110 hospitalisations for 100,000 children under 5. Among the adult population, hospitalisations for people between 15 and 59 accounted for 46% of all hospitalisations (figure 1), i.e. a hospitalisation rate of 16 for 100,000 people in that age bracket.
3.2 Care and treatment, length of stay, seasonality

In 2008, the 20 hospitals in Metropolitan France equipped with a Burn Treatment Centre (BTC) handled 41% (n=5,227) of those hospital stays, while hospitals without a BTC handled 59% (n=7,551) of stays.

The number of hospitalisations for burn patients varied between 1 and 43 over the calendar year and more than 80% of patients were hospitalised only once. Children were more often readmitted for burns than the other age brackets. Those who were hospitalised only once during the year due to burns were admitted to a non-specialised service in 63% of cases, and these break down evenly between hospital stays under two days and over two days. For those hospitalised in BTCs (37%), the length of stay was over two days in most cases (82%).

The average length of stay (ALOS) was 7.5 days and increased significantly with age, from 2.9 days among children aged 0 to 4 to 10.5 days among patients aged 65 and above (p<0.001; figure 2). The ALOS was significantly higher in BTCs (11.8 days) than in the other services (4.5 days; p<0.001; figure 2) and nearly five times higher for severe burns (29 days) than for mild burns (6 days).

In BTCs hospitalisations for severe burns with extended stays (≥30 days) accounted for nearly 50% of all severe burns; conversely, hospitalisations for mild burns with short lengths of stay (<2 days) accounted for 38% of all hospitalisations for mild burns (figure 3). The breakdown of ALOS for severe and mild burns was identical in non-specialised services, with a higher rate of hospital stays under two days (figure 4).

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**Figure 2**

Breakdown of ALOS by age group and by service providing care and treatment, PMSI, Metropolitan France, 2008

**Figure 3**

Breakdown of ALOS for severe and mild burns in BTCs, PMSI, Metropolitan France, 2008

**Figure 4**

Breakdown of ALOS for severe and mild burns in other services, PMSI, Metropolitan France, 2008
4. Burn victims admitted to a hospital (N=8,944)

4.1 Breakdown by age and gender

The data linking procedure, which connects hospital admissions for a given patient, was carried out on patients residing in Metropolitan France. The data shows that 8,944 residents in Metropolitan France were hospitalised for burns in the country in 2008. Men (5,739 or 64%) outnumbered women (3,205 or 36%), i.e. a gender ratio of 1.8. The breakdown of patients by age brackets can be found in figures 5 and 6. The average age of patients was 29.9 years (29.4 for men and 30.9 for women, p<0.001). The median age was 27 (28 for men and 26 for women).

4.2 Severity, lenght of stay, seasonality

In 5% of cases (n=448), burns were severe. Depending on the age, the portion of severe burns was significant among children under 5 and as of 20. Mild burns were most frequent among children under 5 (one quarter of mild burns). The portion of severe burns by age bracket increased with age and varied from less than 3% among children to over 7% among people over 40 (p<0.001; figure 7). The average age of severe burn victims (40 years of age; median value=41.5 years of age) was significantly higher than that of victims of mild burns (29 years of age; p<0.001; median value=26 years of age).
Seasonal breakdown (figure 9) shows an increase of burn victims during the summertime, from May to August (with 37% of victims during those months; p<0.001). This seasonal breakdown shows significant differences depending on the victim’s age (figure 10). Children under 1 and people aged 50 and above suffered more frequently from burns between November and April. Victims between ages 2 and 49 suffered more frequently from burns between May and September.

### Table 1

| Summary table of burn victims who died in a hospital, PMSI, Metropolitan France, 2008 |
|-------------------------------|-------------------------------|
| Total number of deaths | 194 |
| Number of stays in hospital | |
| 1 | 169 (87%) |
| 2 | 25 (13%) |
| Gender | |
| Men | 110 (57%) |
| Women | 84 (43%) |
| Age | |
| 0-14 | 7 (4%) |
| 15-29 | 7 (4%) |
| 30-49 | 45 (23%) |
| 50-69 | 57 (29%) |
| 70 and above | 78 (40%) |
| Hospital service | |
| BTC | 152 (78%) |
| Other services | 42 (22%) |
| Average/median age | 61 |
| ALOS* (median value) | 19 days |

* This is the average length of the patient’s last stay, the one that ended with the patient’s death.

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1 For the 25 patients who were admitted twice, the length of the 1st stay was 0 day for 22 people.

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4.3 Hospital mortality rate

In 2008 in Metropolitan France 194 burn victims (110 men and 84 women) died in a hospital (table 1). With regard to the 9,341 burn patients in Metropolitan France the lethality rate was 2.1%. The average age of those who died was 61. Two thirds of those deaths (135) occurred among people over the age of 50 and seven deaths involved children under 14, including six under 5. One hundred and fifty-two people (78%) died in a BTC and 42 (22%) died in non-specialised services. The average length of the patient’s last stay – the one that ended with the patient’s death – was 19 days. The average length of all hospitalisations in 2008 for patients who died was equivalent. For patients who did not die, the length of the last day was 11.5 days.
The analysis of causes associated with mortality due to burns was carried out on burn victims hospitalised in Metropolitan France (N=9,341) based on two patient-related variables (age and gender) and on one burn-related variable (the severity of the burn). Severe burn victims had a risk of dying 62 times higher than the other patients. Victims aged 65 and above and those aged between 50 and 65 who were admitted for burns had a risk of dying 17 and 5 times higher, respectively, than patients under 50.

4.4 Incidence rates based on age, gender and region

In 2008 throughout the country the recorded crude incidence rate reached 14.4 cases for 100,000 inhabitants (age-standardised rate: 14.0). The crude incidence rate of mild burns (13.7/100,000) was 20 times higher than that of severe burns, i.e. 0.7/100,000 (standardised rates: 13.2 and 0.7, respectively).

Crude incidence rates by age bracket (figure 11) were very high among children under 5 (61/100,000), especially for mild burns (60/100,000). The incidence of severe burns was highest at both ends of the life span, reaching 1.7/100,000 among children under 5 and 1/100,000 among people over 85.

In terms of gender the crude rate of burn victims admitted to a hospital was twice as high among men (19/100,000) compared to women (10/100,000). In terms of age (all age brackets being considered) men’s incidence rates for mild burns were higher than those of women, including for ages 0 to 4 and between 15 and 64 (figures 12A and 12B). After 65, differences between genders were less marked. With regard to severe burns there were no differences among children under 10 and findings showed the same variations between genders as those observed for mild burns between the ages of 15 and 64 (figures 12A and 12B).

The region-based incidence rates were calculated according the patient’s department of residence. The incidence of burns was not evenly distributed throughout the country (map 1). Standardised rates varied between 18/100,000 inhabitants in Lorraine to 11/100,000 inhabitants in Paris region.

The breakdown of incidence rates for mild burns was very close to that represented on map 1 for all burn due to the high hospital admission rates for mild burns. Bretagne, Languedoc-Roussillon and Nord-Pas-de-Calais recorded significantly high rates for severe burns (map 2).
5. Conclusion

These findings show how important it is to develop preventive measures to mitigate the number of burns. Among children who are very often hospitalised due to burns, prevention needs to be implemented in particular from the moment they start walking. Among older people, burns are more severe and result more often in a fatal outcome. Prevention requires the adoption of regulatory measures aimed at making the environment more secure, including the domestic environment. Two recent examples illustrate this: the mitigation of burns caused by boiling water (decree of 30 November 2005) and the obligation to install self-contained smoke detectors in all households (Act of 9 March 2010).

For further information:

Keywords: burns, trauma, epidemiological surveillance, prevention, PMSI

Suggested citation:

This summary report was translated from French into English by Alpha Omega Translations with the help of the Editorial Support Unit (Ceve), Scientific Direction, InVS.