

Hospitalisations due to burns in Metropolitan France based on data from the French National Hospital Discharge Database, 2011 and trends since 2008

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INTRODUCTION

Trauma caused by burns can be intentional (violence, assault, suicide, etc.) or unintentional (traffic, occupational, home and leisure injuries). These traumas can have formidable consequences and result in physical and psychological sequelae with major repercussions on the victim and his or her loved ones. The management of burns usually requires significant and particularly costly means.

There are very few epidemiological studies on burns in French. Studies more often focus on the activity of one or a handful of hospital services. The data of the French National Hospital Discharge Database (PMSI) allow, at the national level, the demographical profile and the management of hospitalised burn victims to be described, incidence rates and severity and lethality indicators to be established, and the risk factors associated with mortality due to burns in hospitals to be explored. This summary presents the results obtained from the 2011 PMSI data in Metropolitan France, and the trends since 2008.

MATERIALS AND METHODS

Data source

The data used for this study are those obtained from the PMSI for 2011. Hospitalisations were selected that occurred in Metropolitan France with a principal diagnosis of burns with codes T20 to T32 (10th Revision of the International Classification of Diseases). These are the only codes in the ICD-10 applicable to burn victims. Codes T20 to T30 are used to describe the burn according to the body region, while codes T31 and T32 are a classification of the extent of the burn. For any one hospitalisation, a code between T20 and T30 may be used for the primary diagnosis along with an accompanying diagnosis of T31 or T32 (or vice versa).

The severity of the burns was measured according to the body surface involved (codes T31 and T32), the presence of burns of the respiratory tract (code T27) and the victim's age. Serious burns are defined as burns fulfilling one of the three following conditions:

- burns covering at least 20% of the body surface in children under 5 years of age;
- burns covering at least 30% of the body surface in individuals aged 5 and over;
- presence of burns of the respiratory tract.

The codes qualifying burn severity (T27, T31 and T32) and the codes pertaining to the location of the injury (T20 to T30) were searched for among the principal diagnoses and the twenty accompanying diagnoses available in the PMSI.

However, the surface area of the body burned was not systematically recorded for hospitalisations due to burns. In 2011, in hospitals equipped with Burn Treatment Centers (BTCs), this information was recorded for 85% of hospitalisations due to burns, against 24% in other hospitals. The study of burn severity was thus limited to stays in hospitals equipped with a BTC.

PMSI data available at the national level allow analyses to be made for individual hospitals but does not differentiate between the different services of a given hospital. For the purpose of this study, hospitalisations "in BTCs" are defined as those occurring in hospitals equipped with a BTC. Hospitalisations "in other services" are defined as those occurring in hospitals without BTCs. In 2011 in Metropolitan France, 18 hospitals were equipped with a BTC.

Statistical analyses

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

- descriptive analysis of hospitalisations due to burns. This describes the hospital stays of patients, their length and seasonal variations, etc. It concerns hospital stays as they are presented in the anonymous non data-linked discharge summaries of the PMSI;
- a descriptive analysis of burn victims. The data-linking procedure which establishes a connection between hospital stays of a given patient during 2011, allows the burn victims to be described according to their age, sex, severity and location of their injuries, etc. For patients having been hospitalised more than once during the course of the year, the first stay was taken into account. A multivariate analysis was carried out of the risk factors associated with mortality caused by burns among hospitalised individuals. "Hospital incidence rates" were calculated. These refer to the incidence rates of burn injuries of victims residing and hospitalised in Metropolitan France. Crude rates were calculated as the ratio of patients residing in Metropolitan France to the population on 1st January 2011 (estimates from the French national Institute of Economic and Statistical Information, INSEE). Age-standardised rates were calculated based on the French population recorded in the 1999 census. Regional hospital incidence rates were calculated for patients residing in a French region having been hospitalised in Metropolitan France.

A comparative table of trends in key indicators between 2008 and 2011 completes the detailed results for 2011.

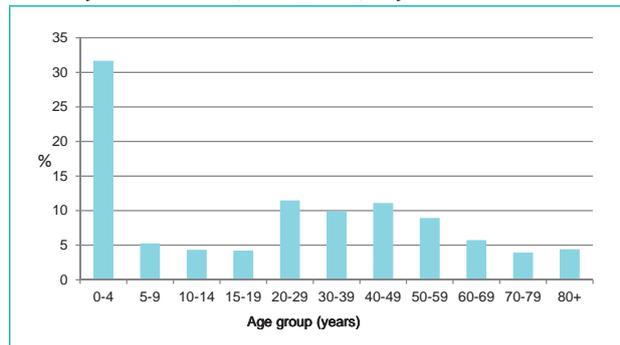
HOSPITALISATIONS DUE TO BURNS (N=11,824)

Hospitalisations by age

In 2011, there were 11,824 hospitalisations due to burns in Metropolitan France. Hospitalisations of children aged between 0 and 4 years accounted for 32% of the total (figure 1). This corresponded to a hospitalisation rate of 96 hospitalisations per 100,000 children under the age of 5. Hospitalisations of individuals aged between 15 and 59 years accounted for 45% of all hospitalisations, i.e., a hospitalisation rate for this age group of 15 per 100,000.

FIGURE 1 I

Hospitalisations due to burns by age group, PMSI-MCO, Metropolitan France, 2011 (N=11,824)

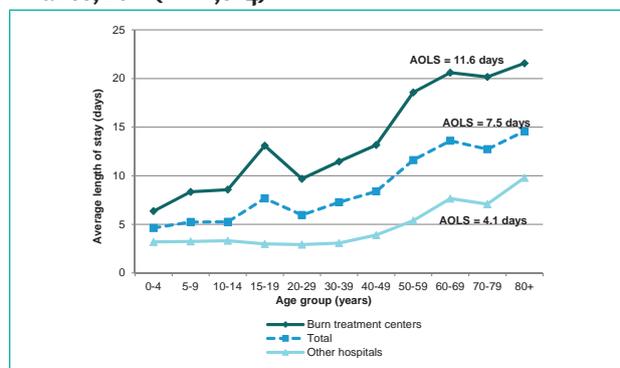


Patient management, length of stay, seasonal variation

In 2011, 45% (n=5,369) of stays took place in BTCs (as defined above) and 55% (n=6,455) were in other services. The average length of stay (ALOS) was 7.5 days, increasing significantly with age and varying from 4.6 days for the 0-4 year-olds to 14.6 days for patients aged 80 years and over (p<0.001; figure 2). It was significantly higher in the BTCs (11.6 days) than in the other services (4.1 days; p<0.001; figure 2).

FIGURE 2 I

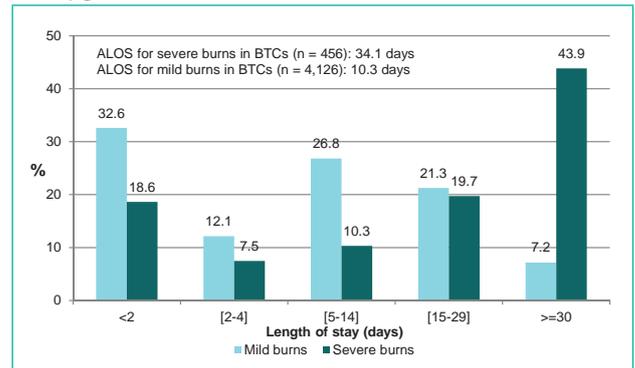
ALOS of burn victims by age group and according to the service managing the patient, PMSI-MCO, Metropolitan France, 2011 (N=11,824)



In the BTCs, hospitalisations for severe burns with long lengths of stay (≥ 30 days) accounted for 44% of the total cases of serious burns; conversely, hospitalisations for mild burns with short lengths of stay (<2 days) accounted for 33% of all hospitalisations for mild burns (figure 3).

FIGURE 3 I

ALOS for severe and mild burns for hospitalisations in BTCs, PMSI-MCO, Metropolitan France, 2011 (N=4,582*)



* Information on severity is available for 4,582 of the 5,369 hospitalisations in BTCs.

FIGURE 4 I

Seasonal variation of hospitalisations due to burns, PMSI-MCO, Metropolitan France, 2011 (N=11,824)

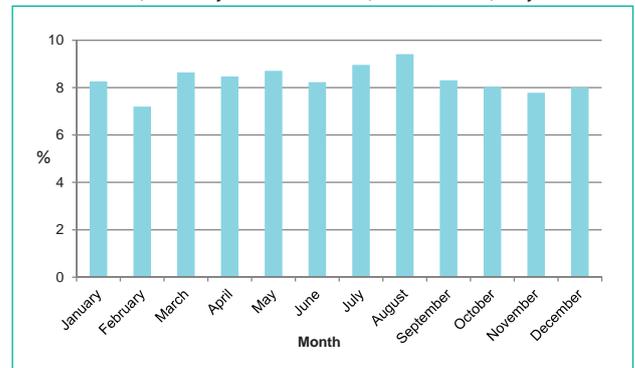
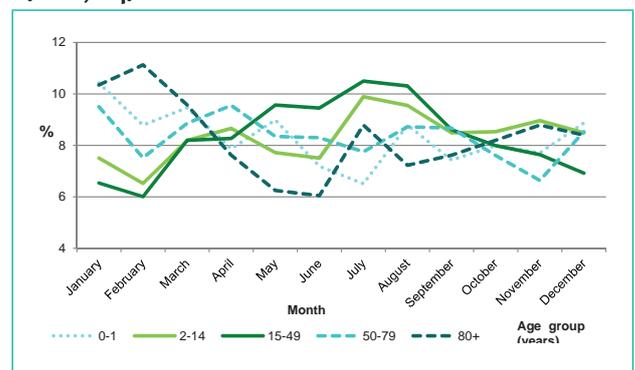


FIGURE 5 I

Seasonal variation of hospitalisations due to burns by age group, PMSI-MCO, Metropolitan France, 2011 (N=11,824)



Hospitalisations due to burns during the summer months slightly increased (figure 4) from May to August (with 35% of stays occurring during these months; p<0.001). This seasonal variation shows significant differences according to age (figure 5). Indeed, children under the age of 2 years and individuals aged 50 years and over were more likely to suffer burns between November and March. Individuals aged between 2 and 49 years were more likely to suffer burns between May and September.

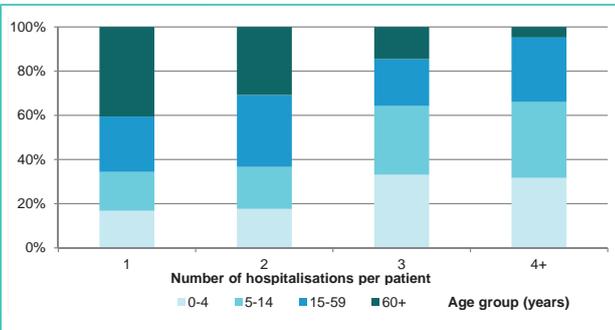
HOSPITALISED BURN VICTIMS (N=8,670)

Number of hospitalisations per patient

Linking the data of 11,824 hospitalisations has made it possible to confirm that 8,670 individuals residing in Metropolitan France were hospitalised due to burns in the said area in 2011. The number of hospitalisations due to burns per patient ranged from 1 to 16 within the calendar year, over 80% of patients having been hospitalised only once. Children under the age of 15 were most likely to be readmitted to hospital due to burns than patients in any other age group (figure 6). They accounted for a third of individuals hospitalised only once within the year whereas they accounted for three-quarters of individuals hospitalised at least 4 times within the year. Individuals hospitalised due to burns only once within the year were hospitalised in a non-specialised service in 57% of cases and in a BTC in 43% of cases.

FIGURE 6

Patients by age group and according to the number of hospitalisations due to burns within the year, PMSI-MCO, Metropolitan France, 2011



Breakdown by age and by sex

There were more male burn victims (5,465 men; 63%) than female victims (3,205 women; 37%), giving a sex ratio of 1.7. Children aged 0 to 4 years accounted for over a quarter of the individuals hospitalised (27%; figure 7). Of these, half were one year old (figure 8). The 50-79 years age group accounted for 20% of the total number of patients.

The average age of the patients was 30.4 years: 29.8 years for the men and 31.4 years for the women ($p < 0.001$). The median age was 27 years: 27 years for the men and 26 years for the women.

FIGURE 7

Individuals hospitalised due to burns by age group, PMSI-MCO, Metropolitan France, 2011 (N=8,670)

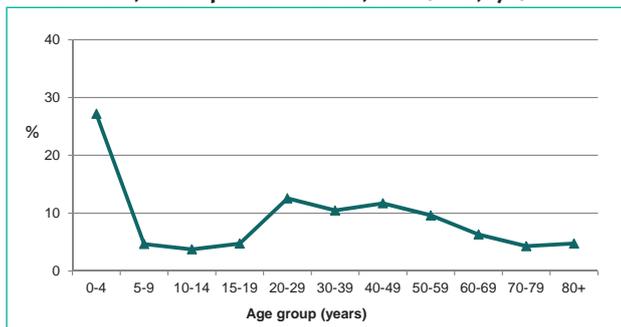
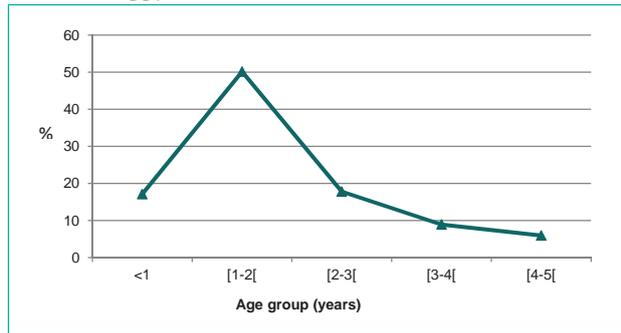


FIGURE 8

Individuals hospitalised for burns by age for children under 5 years of age, PMSI-MCO, Metropolitan France, 2011 (N=2,357)



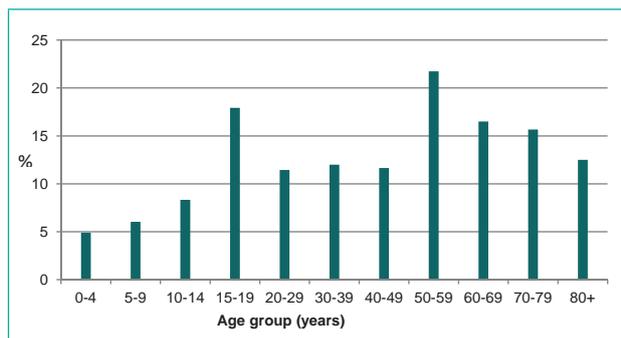
Severity, length of stay and body region injured

In 2011, 3,541 patients (41%) hospitalised due to burns spent their first stay (for those having had multiple stays during the year) or only stay in a BTC. The other 5,129 individuals hospitalised due to burns (59%) spent their first or only stay in another service. As indicated above, severity was only analysed for patients in BTCs for which information on the severity was available, i.e., 85% (2,999/3,541) of the patients in BTCs.

In the BTCs, 12% of patients (344) were admitted for severe burns. The share of severe burn victims within an age group increased with age, from 5% for children under 5 years of age to over 15% for individuals aged 50 to 79 years ($p < 0.001$; figure 9).

FIGURE 9

Share of severe burn victims in BTCs for each age group, PMSI-MCO, Metropolitan France, 2011 (N=344)

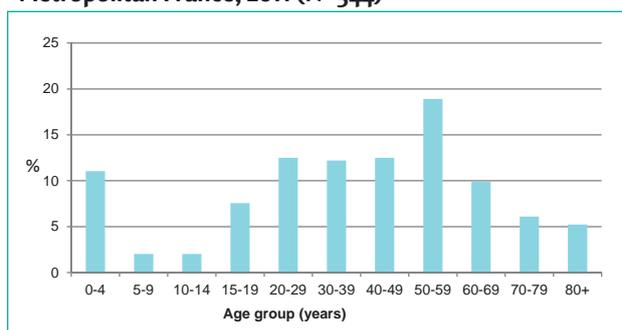


While children aged 0-4 years accounted for 27% of patients hospitalised for burns in BTCs, they accounted for only 11% of severe burn patients in BTCs (figure 10). Conversely, the 50-79 year age group, which accounted for 21% of the patients in BTCs, accounted for 35% of severe burn patients in BTCs.

The average age of severe burn victims in BTCs (40.5 years; median=43 years) was significantly higher than that of mild burn victims in BTCs (30.5 years; $p < 0.001$; median=28 years).

I FIGURE 10 I

Severe burn victims in BTCs by age group, PMSI-MCO, Metropolitan France, 2011 (N=344)

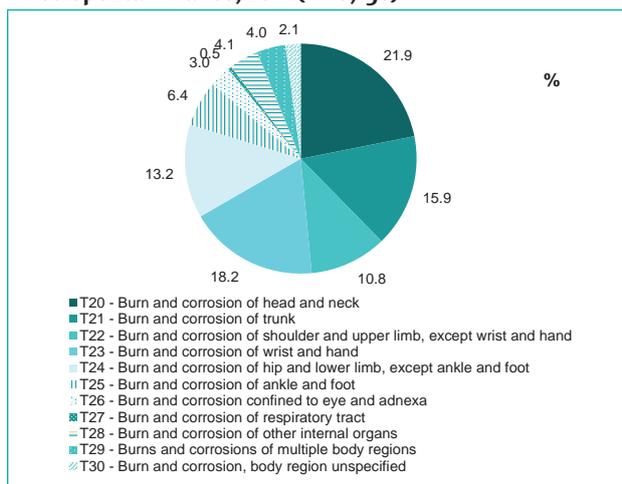


The average length of hospitalisation per patient over the whole year in 2011 was 10.4 days (against ALOS=7.5 days for all hospitalisations), and the median was 4 days. It increased significantly with age, ranging from 7 days for children aged 0-4 years and 19 days for patients aged 80 years and over ($p<0.001$). There was no significant difference according to sex. Of the patients who stayed in BTCs, the average length of hospitalisation was significantly higher for severe burns (39.9 days) than for mild burns (13.1 days). The length of hospitalisation was over 30 days for half of the severe burn victims in BTCs. Nearly a third of the mild burn victims in BTCs were hospitalised for less than 4 days.

The body regions most frequently injured (figure 11) were the head and neck (22%), the wrist and hand (18%), the trunk (16%), and the hip and lower limb, except the ankle and foot (13%).

I FIGURE 11 I

Injured body regions of burn victims, PMSI-MCO, Metropolitan France, 2011 (N=8,130)



In-hospital mortality rates

In Metropolitan France in 2011, 219 individuals died in hospital from their burns (table 1). The in-hospital case-fatality rate associated with the 8,827 burn victims in Metropolitan France was therefore 2.5% (157 patients not residing in Metropolitan

France add to the 8,670, previously described, that did). This figure included 137 men and 82 women. The average age of death was 63.7 years (61.2 years for men and 67.9 for women), over twice as high as the average age of the burn victims (30.4 years). The median age was 65 years, 62 years for men and 70 years for women. Over half of these deaths (114) occurred in individuals aged over 65 years, 22% occurred in the over 85s and three deaths involved children under 5 years of age. Three quarters (166) died in BTCs and a quarter (53) in other services. The average length of the patient's last stay, *i.e.*, resulting in death, was 16.5 days. The average length of stay of total hospitalisations within the year for patients that died was similar (17 days). For patients that survived, the length of stay was significantly shorter (10.4 days).

I TABLE 1 I

In-hospital deaths due to burns, PMSI-MCO, Metropolitan France, 2011

	Total deaths
N	219
Number of stays	
1	173 (79%)
2	43 (20%)
3	3 (1%)
Sex	
Males	137 (63%)
Females	82 (37%)
Age (years)	
0-4	3 (1%)
5-14	1 (-)
15-24	8 (4%)
25-44	26 (12%)
45-64	67 (31%)
65-74	30 (14%)
75-84	35 (16%)
85+	49 (22%)
Average-median age	64-65 years
Hospital Service	
BTC	166 (76%)
Other services	53 (24%)
Average-median length of stay *	17-7 days

*Average length of a patient's last stay (resulting in death).

Analysis of the determinants associated with mortality due to burns was carried out on burn victims hospitalised in Metropolitan France (N=8,827) using two patient-related variables (age and sex), a burn-related variable (type of management) and a variable related to seasonal variation (month). The risk of a hospitalisation due to burns resulting in death increased with age (table 2). Individuals hospitalised due to burns aged 65 to 84 years and those aged 85 years and over were 8 and 25 times more at risk of dying, respectively, than those aged between 25 to 44 years. Patients hospitalised in BTCs were 5 times more at risk of dying than patients hospitalised in other services, probably due to the difference in severity of the burns treated.

TABLE 2 I

Logistic Regression and factors associated with in-hospital mortality due to burns, PMSI-MCO, metropolitan France, 2011

N=8,827	Deaths due to burns	
	Adjusted odds-ratio*	Confidence Interval (95%)
Age group (years)		
0-24	0,2	[0,1-0,5]
25-44	1	
45-64	3,4	[2,1-5,7]
65-84	8,4	[5,0-14,0]
85 et plus	24,8	[14,0-44,2]
Sex		
Males	1	
Females	0,7	[0,5-1,03]
Type of management		
BTC	4,6	[3,3-6,4]
Other services	1	
Time of year		
February to September	1	
October to January	1,4	[1,1-2,0]

* The odds-ratios are interpreted as relative risks given the low incidence rates.

Incidence rates by age, sex and region

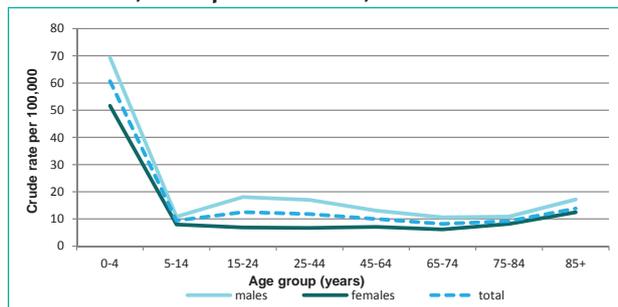
The crude incidence rate for hospitalised burn victims in Metropolitan France in 2011 was 13.7 cases per 100,000 population (13.4 after age-standardisation).

Crude incidence rates per age group (figure 12) were very high among children aged under 5 years (61/100,000). The incident rate was in the order of 10 per 100,000 children aged 5 years and over, with an increase between the ages of 15 and 24 years (13/100,000) and an increase for the highest age group (14/100,000 for patients aged 85 years and over).

Gender-wise the crude incidence rate for hospitalised burn victims was almost twice as high among male victims (18/100,000) than among female ones (10/100,000). The incidence rates were higher for male victims than for female ones in all age groups. For the under 5s, the incidence rate for boys (69/100,000) was 1.3 times higher than for girls (52/100,000). The most marked difference was observed in the 15 to 64 year age group, with an incidence rate 2.6 times higher for male victims: 18/100,000 against 7/100,000 for female victims. Over the age of 65 years, the difference between genders was less marked (e.g., incidence rate 1.3 times higher for male victims in the 75-84 year age group).

FIGURE 12 I

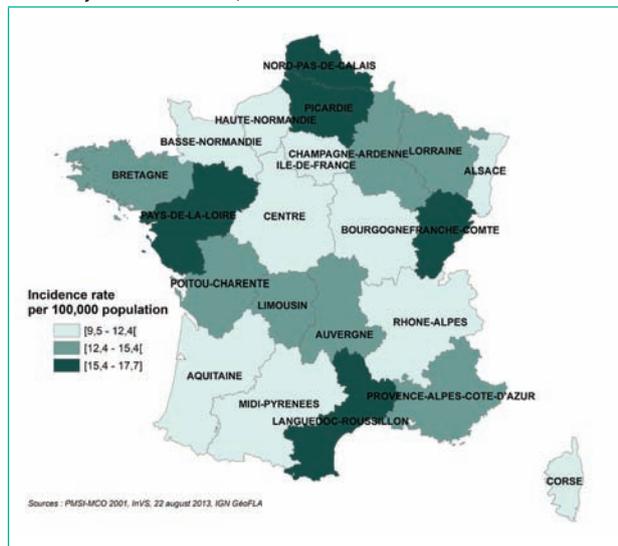
Crude incidence (per 100,000 population) of hospitalised burn victims by age group and according to sex, PMSI-MCO, Metropolitan France, 2011



The incidence of burn injuries was not evenly distributed throughout Metropolitan France (map 1). Age-standardised rates varied from 10/100,000 population in the region of Alsace to 18/100,000 population in the region of Nord-Pas-de-Calais. The regions of Alsace, Aquitaine and Ile-de-France had the lowest incidence rates of hospitalisations due to burns (between 10 and 11/100,000). The regions of Nord-Pas-de-Calais, Picardie and Languedoc-Roussillon had the highest rates (between 17 and 18/100,000).

MAP 1 I

Age-standardised incidence (per 100,000 population) of hospitalised burn victims by region, PMSI-MCO, Metropolitan France, 2011



TRENDS BETWEEN 2008 AND 2011

The results for 2011 are similar to those of 2008 to 2010 (tables 3A for hospitalisations and 3B for burn victims). The number of hospitalisations due to burns in France has not changed, staying at approximately 12,000 per year. The distribution by age and sex, the share of burns managed by BTCs, the characteristics of severe burn victims in BTCs and the incidence rates of hospitalisations remained stable over the four-year period.

Some trends may nevertheless be seen, in particular concerning in-hospital deaths due to burns. The number of deaths increased slightly between 2008 (194) and 2011 (219), as did the case-fatality rate (from 2.1% to 2.5%). The share of deaths involving men increased from 57% to 63% (with figures of 58% for 2009 and 54% for 2010); the average age of death reached 63.7 years in 2011 against 60.8 in 2008. The incidence rate of hospitalisations due to burns is also increasing in the 85 year and over age group (rising from 11.6 in 2008 to 13.9 per 100,000 population in 2011).

TABLE 3A I

Trends in the characteristics of hospitalisations due to burns, PMSI-MCO, Metropolitan France, 2008-2010

	2008	2009	2010	2011
HOSPITALISATIONS	12,778	11,984	12,035	11,824
Breakdown by age				
Share of hospitalisations involving children aged 0-4 years (%)	33.0	31.3	33.4	31.6
Hospitalisation rate for children aged 0-4 years (per 100,000) ¹	110.9	97.5	101.0	96.1
Share of children in the 0-4 year age group aged over 1 year (%)	55.0	50.1	50.3	51.6
Hospitalisation rate for children aged over 1 year (per 100,000) ¹	299.5	246.0	254.5	249.6
Share of hospitalisations involving individuals aged 15-59 years (%)	45.8	47.1	44.9	45.2
Hospitalisation rate for individuals aged 15-59 years (per 100,000) ¹	15.7	15.2	14.6	14.5
Patient management, length of stay, seasonal variation				
Stays in burn treatment centres (BTCs) ²	5,227 (41%)	5,524 (46%)	5,576 (46%)	5,369 (45%)
Stays in other services	7,551 (59%)	6,460 (54%)	6,459 (54%)	6,455 (55%)
Average length of stay (ALOS) (days)	7.5	7.9	7.6	7.5
ALOS in a BTC (days)	11.8	12.0	11.3	11.6
ALOS in other services (days)	4.5	5.2	4.5	4.1
Share of hospitalisations between May and August (%)	36.3	35.4	36.7	35.3
Severity of hospitalisations in BTCs³				
Stays for severe burns in BTCs	421 (10%)	456 (10%)	417 (9%)	456 (10%)
ALOS for severe burns in BTCs (days)	37.2	40.6	40.4	34.1
ALOS for mild burns in BTCs (days)	10.5	10.7	9.7	10.3

¹ Hospitalisations due to burns as a primary diagnosis in Metropolitan France (MF) based on the population of MF on 1st January 2011.

² Stays in hospitals equipped with a BTC. Detailed data for 2008 concerning the sites of Marseille's AP-HM hospital group (Assistance publique - Hôpitaux de Marseille) are unavailable. Marseille's BTCs could therefore not be identified and the AP-HM was considered as an "other service".

³ Indicators pertaining to burn severity in BTCs concern about 85% of stays/patients in BTCs; the values for the remaining 15% are missing.

I TABLE 3B I

Trends in characteristics of burn victims hospitalised and residing in Metropolitan France, PMSI-MCO, 2008-2011

	2008	2009	2010	2011
PATIENTS	8,944	8,825	8,846	8,670
Breakdown by age and by sex				
Males	5,739 (64%)	5,710 (65%)	5,619 (64%)	5,465 (63%)
Females	3,205 (36%)	3,115 (35%)	3,227 (37%)	3,205 (37%)
Sex ratio	1.8	1.8	1.7	1.7
Average age (years)	29.9	29.9	30.0	30.4
Average age of male victims (years)	29.4	29.2	29.3	29.8
Average age of female victims (years)	30.9	31.2	31.1	31.4
Median age/males/females(years)	27/28/26	27/27/26	26/27/26	27/27/26
Length of hospitalisation				
Average length of hospitalisation in the year (days)	11.7	10.8	10.6	10.4
Median length of hospitalisation in the year (days)	4	4	5	4
Severity of burns in BTCs³				
Severe burn victims in BTCs	305 (11%)	335 (11%)	341 (11%)	344 (11%)
Share of males/females among severe burn victims in BTCs (%)	67/33	68/32	63/37	69/31
Average age of severe burn victims in BTCs (years)	40.5	40.7	40.6	40.5
Median age of severe burn victims in BTCs (years)	43	42	42	43
Average age of mild burn victims in BTCs (years)	29.9	29.5	29.4	30.5
Median age of mild burn victims in BTCs (years)	28	26	27	28
Average length of hospitalisation in the year of severe burn victims in BTCs (days)	42.9	48.3	43.1	39.9
Average length of hospitalisation in the year of mild burn victims in BTCs (days)	13.8	14.2	12.9	13.1
In-hospital mortality rates				
Number of in-hospital deaths	194	208	209	219
Case-fatality rate (No. of deaths/No. of patients) (%)	2.1	2.3	2.3	2.5
Deaths for males	110 (57%)	121 (58%)	112 (54%)	137 (63%)
Deaths for females	84 (43%)	87 (42%)	97 (46%)	82 (37%)
Average age of death (years)	60.8	60.2	63.1	63.7
Average age of death for males (years)	56.0	57.3	59.5	61.2
Average age of death for females (years)	67.1	63.7	67.3	67.9
Median age of death/males/females (years)	62/56/71	62/59/66	67/59/76	65/62/70
Deaths ≥50 years	135 (70%)	144 (69%)	152 (73%)	166 (76%)
Deaths ≥85 years	27 (14%)	37 (18%)	43 (21%)	49 (22%)
Deaths for children ≤15 years	7	7	5	4
Deaths for children aged 0-4 years	6	2	5	3
Deaths in BTCs	152 (78%)	177 (85%)	167 (80%)	166 (76%)
ALOS of the last stay (days)	18.5	19.1	14.7	16.5
Incidence rates by age, sex and region (per 100,000)⁴				
Standardised rate	14.0	13.7	13.7	13.4
Crude rate <5 years	61.3	60.4	62.1	60.7
Crude rate ≥85 years	11.6	12.6	13.1	13.9
Crude rate males/females	19.1/10.0	18.9/9.7	18.5/10.0	17.9/9.9
Highest/lowest standardised regional rate	18.2/10.9	17.7/10.8	18.0/11.2	17.7/9.6

⁴ Population of MF on 1st January of year n for the crude rates, and population on 1st January 1999 for the standardised rates.

CONCLUSION

The data of the PMSI are exhaustive. The codes characterising burns are few in number and clearly defined in the ICD-10. The use of the codes T20 to T32 allows results pertaining to the epidemiology of burns to be obtained. Regular yearly analyses enable trends in these hospitalisations over time to be revealed. These analyses will be continued and diversified.

For the study of burn causes, the French society for the study and treatment of burns (SFETB), the InVS and the Agency for information on hospitalisations (ATIH) created a thesaurus which was made available in March 2011. The coding of burn causes using this thesaurus was made mandatory by the ATIH as from 1st January 2013. Data feedback will make it possible to study burn causes in the future.

The significant number of hospitalisations due to burns and the seriousness of some of these (over 200 in-hospital deaths each year) confirm the importance of developing preventive action to reduce these figures. For children, who are very often hospitalised for burns, prevention must start as soon as the child starts to walk. In the elderly, burns are generally more severe and more frequently result in death. Prevention is achieved by adopting regulatory measures aimed at creating a safer environment, especially in the home. The decree of 30 November 2005, limiting the temperature of hot water, is a step in this direction. The law of 9 March 2010, rendering the installation of self-contained smoke detectors mandatory in all residential buildings by 8 March 2015, is expected to significantly reduce the number of hospitalisations and deaths due to burns.

For further information

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Available at:

<http://www.invs.sante.fr/Dossiers-thematiques/Maladies-chroniques-et-traumatismes/Traumatismes/Accidents/Brulures-Incendies>

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

Suggested citation:

Pasquereau A, Thélot B. Hospitalisations due to burns in Metropolitan France based on data from the French National Hospital Discharge Database, and trends since 2008 – Summary. Saint-Maurice: French Institute for Public Health Surveillance; 2014. 8 p. Available at: <http://www.invs.sante.fr>