

Original Article

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Author for correspondence:

J. Lopez Castroman,

E-mail: jorgecastroman@gmail.com

A comprehensive study of medically serious suicide attempts in France: incidence and associated factors

J. Corbé¹, C. Montout^{1,2,3}, A. Fares², I. Belhadj⁴, T. Boudemaghe⁴, T. Mura² 
and J. Lopez-Castroman^{1,3,5} 

¹Department of Adult Psychiatry, Nimes University Hospital, Nimes, France; ²Department of Biostatistics, CHU Nimes, Nimes University Hospital, Nimes, France; ³Institut de Génomique Fonctionnelle, Université de Montpellier, CNRS, INSERM, Montpellier, France; ⁴SIMMER, Nimes University Hospital, Nimes, France and ⁵CIBERSAM, Madrid, Spain

Abstract

Aims. People who make medically serious suicide attempts (MSSAs) share a number of features with those who die by suicide, and are at a high risk of suicide themselves. Studies to date have mostly focused on clinical samples of MSSAs. An epidemiological examination at a national level can help to identify risk profiles and pathways of care in this population.

Methods. We explored the French nationwide hospital discharge database (Programme de Médicalisation des Systèmes d'Information, PMSI) to identify any MSSA taking place between 2012 and 2019. Relevant demographic and medical information was collected about the first MSSA of each attempter. Data from 2010 and 2011 were used to verify the absence of prior attempts.

Results. First occurrences of MSSAs amounted to 81 959 cases over 8 years, with a mean age of 45.8 years, and 53.6% women. Incidence was higher in women (18.1 *v.* 17.3 per 1 00 000). The most common suicide method was deliberate self-poisoning (64.9% of cases). In comparison, violent methods associated higher mortality and comorbidity and were more frequent in men. The most common mental disorders were mood disorders (55.6%) and substance use disorders (46.2%). A minority of MSSA survivors were hospitalised in psychiatry (32.5%), mostly women.

Conclusions. MSSAs are frequent and easy to identify. There is a need to reinforce the continuity of psychiatric care for this population given the high risk of subsequent suicide, and the low rates of psychiatric hospitalisation after an MSSA even if violent methods are used. Specific care targeting this population could reduce treatment gaps.

Introduction

It is estimated that for every suicide death there are about 10–30, depending on the country, non-lethal suicide attempts (SAs) (Mościcki *et al.*, 1988; Kessler *et al.*, 2005; Han *et al.*, 2016; Bachmann, 2018). Having attempted suicide constitutes the best predictor of suicide since about 40% of victims of suicide have records of previous attempts (Hawton *et al.*, 2005; Hawton and van Heeringen, 2009), multiplying the risk of suicide in the year following an attempt by 49 (Hawton *et al.*, 2015). However, not all SAs convey the same risk.

A medically serious suicide attempt (MSSA) has been defined as an SA that would have been fatal without access to emergency care and that subsequently required hospitalisation for more than 24 h in an intensive care unit (ICU), or surgery under general anaesthesia, regardless of the violence of the act (Levi-Belz and Beautrais, 2016). MSSAs constitute a subsample of all SAs, and thus imply a potentially self-injurious behaviour, associated with at least some intent to die (Posner *et al.*, 2007). The main difference between MSSAs and other SAs (low-lethality SAs) is the medical lethality of the attempt and, correspondingly, the level of subsequent medical care needed to keep the person alive. Establishing a cut-off based on the medical lethality of the attempt has been proposed as the best method to differentiate serious SAs, i.e. those ‘that would have been lethal had it not been for the provision of rapid and effective emergency treatment’ (Gvion and Levi-Belz, 2018). Compared to low-lethality SAs, individuals who make MSSAs are phenotypically closer to those who die by suicide (Mościcki *et al.*, 1988; Beautrais, 2003a; Gvion and Levi-Belz, 2018). They are older, more likely to have prior records of SAs and report higher lethality in previous SAs compared to attempters that never made an MSSA (Giner *et al.*, 2014). Mental disorders and suicide methods in MSSAs are also half-way between suicides and SAs. Many studies report that self-poisoning is majoritarian in MSSA samples (57–79%) but violent methods such as hanging are overrepresented (10–17%) in comparison to SAs with less serious consequences

(Beautrais, 2003b; Horesh *et al.*, 2012; Sun *et al.*, 2015; Kim *et al.*, 2020). Bipolar disorder, substance misuse and eating disorder are also overrepresented in MSSA samples (Giner *et al.*, 2014). Conversely, the diagnoses of non-affective psychosis seem to be much more common in samples of suicide victims than in MSSA samples (OR = 8.5) (Beautrais, 2001).

Among suicide attempters, making an MSSA more than doubles the risk of completing suicide in the short term. One in 25 individuals (4%) die by suicide in the 18 months that follow an MSSA (Beautrais, 2004), but only 1.8% in the year after an SA (Probert-Lindström *et al.*, 2020). This is also true in the medium term (over 5 years): 5.3–7% of MSSA attempters die by suicide (Beautrais, 2003a, 2004) compared to 3.8% if we consider all the attempters (Probert-Lindström *et al.*, 2020). The overall suicide mortality after an MSSA is multiplied by 5 compared to the general population (Beautrais, 2003a). Importantly, the direct assessment of individuals who made an MSSA, and could have died by suicide, provides proxy information about mental disorders, cognitive processes or psychological traits in suicide deaths (Clark and Horton-Deutsch, 1992; Hawton *et al.*, 1998; Hawton, 2001).

We have scarce epidemiological information about MSSAs. Only some clinical studies investigated the somatic and psychiatric comorbidity associated to them. Here, we aimed to describe from a demographic and clinical standpoint the population that makes a first MSSA and what use they make of hospital care at a national level. We will also calculate the incidence of MSSAs. To our knowledge, only one study has done it before but it included suicide deaths before arrival at the hospital (Sun *et al.*, 2015). Indeed, most previous studies were conducted on clinical samples of no more than 1500 individuals (Beautrais *et al.*, 1996; Beautrais, 2001, 2004; Kim *et al.*, 2020). Our database provides exhaustive information on the entire French population admitted to hospitals between 2012 and 2019. Because of the small amount of data available on this topic and the high-risk profile of MSSA survivors, we believe that this study will provide useful information to caregivers in the management of suicidal behaviour.

Methods

Study design and data source

We conducted a nationwide observational study in French hospitals using the French nationwide hospital discharge database (*Programme de Médicalisation des Systèmes d'Information*, PMSI). The PMSI database contains synthesised and anonymised data about all the units of medical establishments providing acute care in France, which encompasses medicine, surgery and obstetrics (*Medecine, chirurgie, obstétrique*, MCO). Conventional psychiatric units are not included in the MCO sector. PMSI data are prospectively collected by all public and private hospitals in a standardised way for care reimbursement purposes. Every discharge summary contains sociodemographic information about the patient, medical information about the hospital stay and data related to the trajectory of the patient. Medical information is coded with the Tenth revision of the International Classification of Diseases (ICD-10).

National PMSI data are anonymised. Access to these data is authorised for research purposes and does not require the individual information and written consent of the patients. Approval of the National Data Protection Commission (*Commission Nationale*

Informatique et Liberté, CNIL) was obtained for this study and data were handled and analysed on the secured electronic platform of the National Agency for the Information on Hospitalisations (*Agence Technique de l'Information sur l'Hospitalisation*, ATIH).

Study population

All the inpatient admissions related to a first episode of MSSA in the acute care sector of French hospitals between 2010 and 2019 were considered for the present study. A hospital stay for an MSSA implied: (1) the presence of an intentional self-harm ICD-10 code X60–X84 in the discharge summary; (2) the admission to an ICU for somatic conditions, including critical care units; and (3) the absence of previous hospitalisations caused by an MSSA for at least the two preceding years. The 2-year period comprises the years 2010 and 2011 for MSSAs that took place in the year 2012, or the longest period available since 2010 for MSSA that took place after 2012. To ensure that we were studying a homogenous sample, only first admissions fulfilling the criteria for MSSA were selected.

Study variables

- (1) Patients' demographics (sex and age), and comorbidities according to the Charlson index algorithm. The Charlson Comorbidity Index categorises a range of non-psychiatric comorbidities of patients based on the ICD to predict short-term mortality. The 1-year mortality rates for the different scores are: '0', 12%; '1–2', 26%; '3–4', 52%; and '>5', 85% (Charlson *et al.*, 1987).
- (2) Medical variables: primary/main and secondary diagnoses coded with the ICD-10 related to organic and psychiatric comorbidities, and method of the SA. To summarise diagnostic data, we used ICD-10 chapter codes for mental disorders (F0 to F9). Three specific diagnoses were analysed separately because of their strong association with suicide risk: bipolar disorder (F30–F31), alcohol use disorder (AUD) (F10) and schizophrenia (F20).
- (3) Variables related to the patients' intra and inter-hospital trajectory: lengths of stay, admission in ICU, origin of referral and destination, vital status at discharge.
- (4) Admission in a psychiatric hospital within 3 days of discharge from the MCO units.

Statistical analysis

We performed descriptive analyses to characterise the sample. Qualitative variables were reported with numbers and percentages; quantitative ones, with means and standard deviations (SD). Comparison between groups were carried out using the Pearson χ^2 tests for qualitative variables (or Fischer exact tests for small groups as appropriate), and using the Student *t*-test for quantitative variables.

To estimate the incidence rates of first MSSA in the French general population, we used as numerator the exhaustive number of first MSSAs in France by age, sex and year (estimated by our whole population study), and as denominator the size of the French population by age, sex and year estimated by the French 'National Institute of Statistics and Economic Studies' (INSEE). These population sizes are based on an annual national census and are directly available on the Institute's website (Papon & Beaumel, 2020).

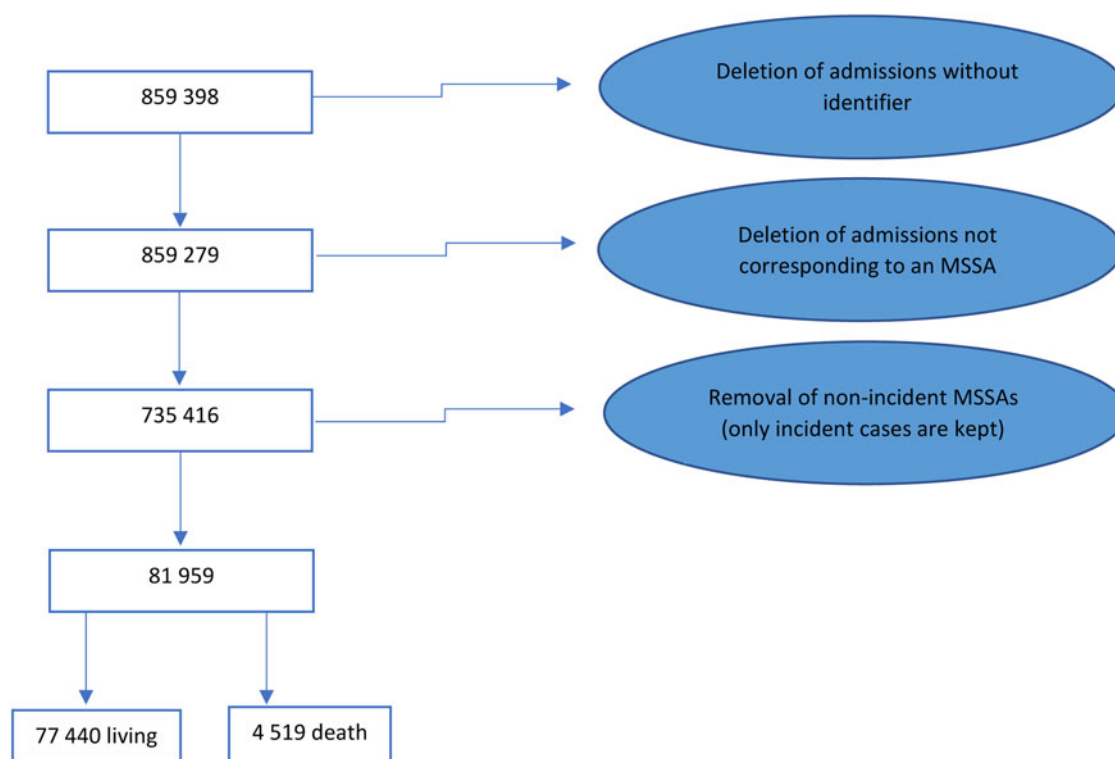


Fig. 1. Data flowchart, selection of incident MSSA.

Analyses were performed with a bilateral α level of 0.05 using the SAS Enterprise guide 7.15 (SAS Institute, Cary, North Carolina, USA).

Results

A total of 7 35 416 MSSAs were found between 1 January 2012 and 31 December 2019. Among them, 81 959 first-time MSSAs were identified and analysed (see data flowchart in Fig. 1). As we consider only the first MSSAs for the present study, one patient corresponds to one discharge summary.

Sample description by sex

Women represent about a half of MSSA cases ($N=43\,953$, 53.62%; $p < 0.0001$), and a larger majority in extreme age groups (under 25 or over 55 years) (Table 1, Fig. 2). In the age group between 25 and 55 years, which counts with the largest caseload ($N=46\,150$, 56.3%), men are overrepresented ($N=23\,258$, 50.4%). MSSAs before 15 are rare in both sexes ($N=412$, 0.5%).

Deliberate self-poisoning (DSP) by drugs is the most common method of SA in MSSA (64.9% of the cases), especially among women (72.1% compared to 56.5% among men). Men are more likely to use violent methods such as hanging (7.9 v. 1.9% in women) or firearms (3.1 v. 0.2%). Men are also more likely to die after their first MSSA (8.1 v. 3.3%).

Concerning mental disorders, the most frequent diagnoses are mood disorders (55.6%), including bipolar disorder (7.2%), and substance use disorders (SUDs) (46.2%), including alcohol dependence (34.3%). Compared to women, men seem to suffer significantly more from SUDs (56.3 v. 37.5%), particularly alcohol dependence (42.8 v. 27.1%), and schizophrenia (5.5 v. 2.1%). Conversely, women are more concerned by mood disorders (64 v. 45.8%),

including bipolar disorder (8.9 v. 5.1%). Personality disorders are balanced (approximately 3% in both genders).

The average length of stay is statistically higher for women, with 5.55 days spent in ICU compared with 4.4 days for men ($p < 0.0001$). The Charlson score is also higher in men (4.1% of men with Charlson score >3 v. 2.5% of women). Women are more likely to enter a psychiatric ward 3 days after their discharge from ICU ($N=16\,912$; 38.5% of women) than men ($N=12\,309$; 32.4% of men).

Comparison by fatal outcome

Following a first MSSA, 4519 patients died, representing 5.5% of the MSSA population (Table 2). MSSAs are significantly more lethal in men, resulting in death in 8.1% of cases v. 3.3% of women ($p < 0.0001$). On average, the deceased are older (54.69 ± 19.23 years) than the survivors (45.28 ± 17.41 years). A high case fatality rate is observed over 75 years of age, with 15% of deaths compared to 4.4% in the (25–55) age group. The proportion of fatal outcomes after an MSSA in patients admitted from psychiatry (11.4%) is higher than the same proportion in patients admitted from any other place (5.5%). The number of deaths to MSSA is stable throughout the study period (every year about 12–13% of the total).

DSP by drugs is less lethal (1.9% deaths) than any other method used in MSSAs (12.2% deaths). Among the deceased, the method chosen to attempt suicide is commonly violent. Hanging/strangulation is used in 38.5% of deaths but represents only 4.7% of all MSSAs, firearms are used in 9.8% of deaths and 1.6% of MSSAs. On the contrary, DSP accounts for 67.3% of MSSAs and 22.4% of deaths.

Mortality is particularly important in patients diagnosed with mood disorders or organic mental disorders (F3 and F0) when

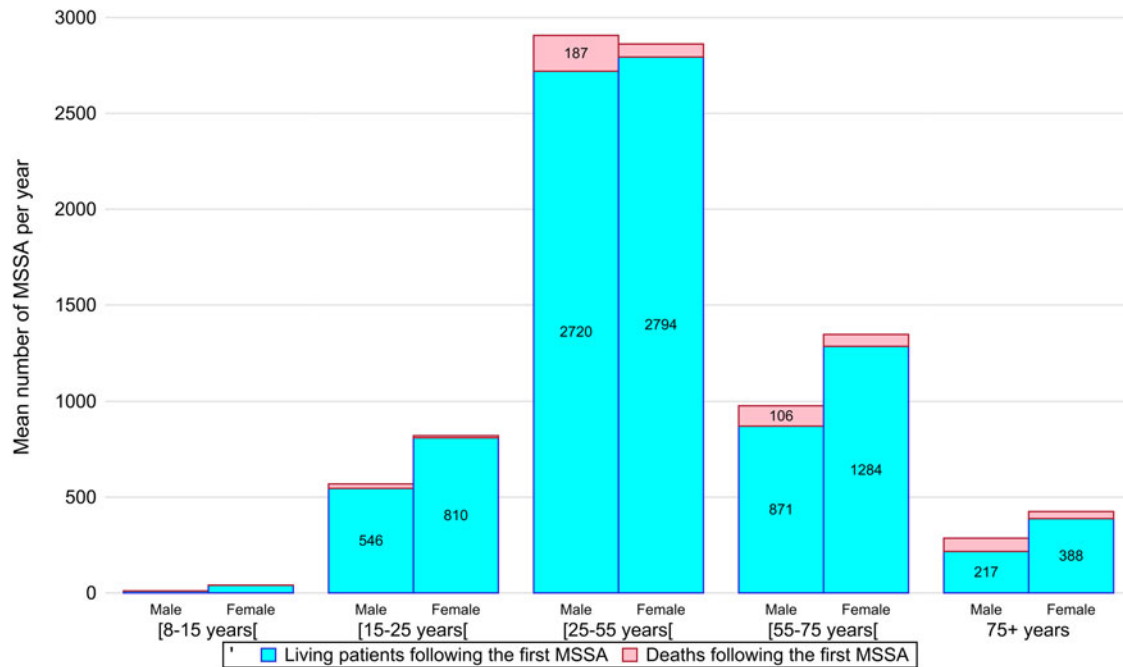


Fig. 2. Stacked column chart representing the distribution by age group and gender of the average number of first medically serious suicide attempts (MSSAs) during the study period. Deaths following the first MSSA are shown on top of the columns.

compared to any other diagnosis. On the contrary, diagnoses of SUD (F1), psychotic disorder (F2) or personality disorder (F6) are less often associated with a fatal outcome. Deceased patients have longer lengths of stay (8.57 ± 20.31 days) than survivors do (7.13 ± 13.23 days). In addition, the Charlson score is statistically higher in the decedents (15.9% with Charlson score >1 in the decedents *v.* 10.1% in the survivors).

Discharge to a psychiatric service

One-third of surviving MSSA patients are discharged directly to a psychiatric hospital ($N = 25\,177$, 32.5%), while almost half are discharged directly to their home ($N = 37\,652$; 48.6%) (Table 3). These numbers are stable over the study period. Women are more likely to be discharged to psychiatry than men. They represent 58.5% of discharges to a psychiatric hospital, whereas they constitute 54.9% of survivors. The extreme age groups are less likely to be hospitalised in psychiatry after ICU, less than 25% in the youngest and oldest age groups (8–15 years and over 75 years) compared to more than 30% in the other age groups (25–75 years).

MSSA survivors after DSP are more frequently hospitalised in psychiatry than those using different methods (34.2 *v.* 28.9%). Discharges to psychiatric hospitals after a violent MSSA, such as hanging ($N = 925$; 24%) or the use of a firearm ($N = 167$; 12.9%), are particularly infrequent.

Patients with psychotic disorder ($N = 1969$; 45.1%) or mood disorder ($N = 11\,843$; 37.4%) are more often hospitalised in psychiatry, in contrast to those with SUD ($N = 7639$; 28.7%). Nearly three-quarters ($N = 205$; 77.7%) of psychiatric inpatients are re-admitted after intensive care in a psychiatric ward. On the other hand, about one-third of MSSA survivors coming from the emergency room ($N = 17\,525$; 33.9%) or home ($N = 6928$; 29.5%) are subsequently admitted to a psychiatric hospital.

Patients who have fewer comorbidities are more often discharged to psychiatry (33.2% with Charlson score = 0 *v.* 17.7% with Charlson score >5). Patients discharged to psychiatry

wards also spend less time in intensive care than those discharged elsewhere (4.61 ± 7.2 *v.* 8.34 ± 15.17 days). Methods of attempting suicide are represented in Table 4.

Incidence

We find an overall increase in the incidence of MSSAs over the study period, from 16.57 in 2012 to 17.75 in 2019 (cases per 100 000 person-years). This tendency was particularly marked in females aged 15–25 years with a 10-point increase (Table 5). In women, the incidence is consistently higher than in men, with a trend towards a narrowing of this gap. In 2012, the incidence is 17.42 in women and 15.66 in men. In 2019, 18.14 in women *v.* 17.33 in men.

Discussion

To our knowledge, this is the largest study to date focused on MSSA. It provides an 8-year coverage of first MSSAs in the entire French population aged 8 or more and allows us to explore an important link of the ideation to action to death continuum. The resulting sample ($n = 81\,859$) comprised roughly equal percentages of men and women, with a slight female majority. The most common method of attempting suicide in both sexes was DSP, although violent methods were over-represented in men and associated with higher mortality and comorbidity. These results are in accordance with the literature (Beautrais, 2001, 2003b; Giner et al., 2014; Kim et al., 2020). More surprisingly, almost one in two MSSA went directly home after intensive care. These cases concern mainly men with psychiatric comorbidity and using violent methods. Precisely those MSSA survivors that are most at risk for suicide are the least hospitalised. For instance, one in four MSSA were discharged home after using violent methods such as firearms or jumping from a high place. Concerning psychopathology, we found an almost equal prevalence of mood disorders (55.6%) and SUDs (46.2%) in the

Table 1. Demographic and clinical features of all MSSA patients according to their sex

	Male N = 38 006 N (%)	Female N = 43 953 N (%)	Total N = 81 959 N (%)	p-Value ^a
Age (mean ± s.d.)	45.04 ± 16.81	46.45 ± 18.31	45.8 ± 17.64	<0.0001
Age in five classes				<0.0001
[8 years; 15 years]	89 (0.2%)	323 (0.7%)	412 (0.5%)	
[15 years; 25 years]	4550 (12%)	6570 (14.9%)	11 120 (13.6%)	
[25 years; 55 years]	23 258 (61.2%)	22 892 (52.1%)	46 150 (56.3%)	
[55 years; 75 years]	7817 (20.6%)	10 766 (24.5%)	18 583 (22.7%)	
75+ years	2292 (6%)	3402 (7.7%)	5694 (6.9%)	
Drug poisoning (X60–X64)	21 472 (56.5%)	31 695 (72.1%)	53 167 (64.9%)	<0.0001
Death because of the attempt	3090 (8.1%)	1429 (3.3%)	4519 (5.5%)	<0.0001
Admission				
From the emergency room	25 073 (66%)	29 185 (66.4%)	54 258 (66.2%)	0.31
From a psychiatric hospital	134 (0.4%)	164 (0.4%)	298 (0.4%)	
From home	11 731 (30.9%)	13 443 (30.6%)	25 174 (30.7%)	
Other	1048 (2.8%)	1147 (2.6%)	2195 (2.7%)	
Discharge				
Home	17 638 (46.4%)	20 014 (45.5%)	37 652 (45.9%)	<0.0001
To a psychiatric hospital	10 456 (27.5%)	14 721 (33.5%)	25 177 (30.7%)	
Other	6822 (17.9%)	7789 (17.7%)	14 611 (17.8%)	
Days in intensive care (mean ± s.d.)	5.55 ± 10.12	4.4 ± 7.39	4.93 ± 8.78	<0.0001
Charlson score				
0 (1-year mortality = 12%)	33 553 (88.3%)	39 839 (90.6%)	73 392 (89.5%)	<0.0001
1–2 (1-year mortality = 26%)	2897 (7.6%)	3041 (6.9%)	5938 (7.2%)	
3–4 (1-year mortality = 52%)	1035 (2.7%)	652 (1.5%)	1687 (2.1%)	
5+ (1-year mortality = 85%)	521 (1.4%)	421 (1%)	942 (1.1%)	
ICD 10 codes for mental and behavioural disorders ^b				
F01–F09	1212 (4.4%)	1187 (3.7%)	2399 (4.1%)	<0.0001
F10–F19	15 423 (56.3%)	11 923 (37.5%)	27 346 (46.2%)	<0.0001
F20–F29	2698 (9.8%)	1814 (5.7%)	4512 (7.6%)	<0.0001
F30–F39	12 548 (45.8%)	20 339 (64%)	32 887 (55.6%)	<0.0001
F40–F48	2989 (10.9%)	4942 (15.6%)	7931 (13.4%)	<0.0001
F50–F59	101 (0.4%)	573 (1.8%)	674 (1.1%)	<0.0001
F60–F69	908 (3.3%)	1139 (3.6%)	2047 (3.5%)	0.07
F70–F79	79 (0.3%)	51 (0.2%)	130 (0.2%)	0.0009
F80–F89	37 (0.1%)	22 (0.1%)	59 (0.1%)	0.01
F90–F98	344 (1.3%)	497 (1.6%)	841 (1.4%)	0.002
F99	293 (1.1%)	422 (1.3%)	715 (1.2%)	0.004
Alcohol use disorder	11 733 (42.8%)	8593 (27.1%)	20 326 (34.3%)	<0.0001
Bipolar disorder	1407 (5.1%)	2843 (8.9%)	4250 (7.2%)	<0.0001
Schizophrenia	1504 (5.5%)	681 (2.1%)	2185 (3.7%)	<0.0001
Psychiatric admission in the 3 days following discharge	12 309 (32.4%)	16 912 (38.5%)	29 221 (35.7%)	<0.0001

^ap-Value for comparison between males and females, we used the Pearson χ^2 tests for qualitative variables and the Student *t*-test for quantitative variables.

^bF00–F09: organic, including symptomatic, mental disorders; F10–F19: mental and behavioural disorders due to psychoactive substance use; F20–F29: schizophrenia, schizotypal and delusional disorders; F30–F39: mood (affective) disorders; F40–F48: neurotic, stress-related and somatoform disorders; F50–F59: behavioural syndromes associated with physiological disturbances and physical factors; F60–F69: disorders of adult personality and behaviour; F70–F79: mental retardation; F80–F89: disorders of psychological development; F90–F98: behavioural and emotional disorders with onset usually occurring in childhood and adolescence; F99: unspecified mental disorder.

Bold text indicates *p*-values ≤ 0.5 .

Table 2. Demographic and clinical features of all MSSA patients by living v. deceased status

	Living following first MSSA N = 77 440 N (row percentage)	Died following first MSSA N = 4519 N (row percentage)	Total N = 81 959 N (column percentage)	p-Value ^a
Male	34 916 (91.9%)	3090 (8.1%)	38 006 (46.4%)	
Female	42 524 (96.7%)	1429 (3.3%)	43 953 (53.6%)	
Age (mean ± s.d.)	45.28 ± 17.41	54.69 ± 19.23	45.8 ± 17.64	<0.0001
Age in five classes				
[8 years; 15 years]	398 (96.6%)	14 (3.4%)	412 (0.5%)	<0.0001
[15 years; 25 years]	10 848 (97.6%)	272 (2.4%)	11 120 (13.6%)	
[25 years; 55 years]	44 111 (95.6%)	2039 (4.4%)	46 150 (56.3%)	
[55 years; 75 years]	17 242 (92.8%)	1341 (7.2%)	18 583 (22.7%)	
75+ years	4841 (85%)	853 (15%)	5694 (6.9%)	
Admission				
From emergency room	51 636 (95.2%)	2622 (4.8%)	54 258 (66.2%)	<0.0001
From a psychiatric unit	264 (88.6%)	34 (11.4%)	298 (0.4%)	
From home	23 456 (93.2%)	1718 (6.8%)	25 174 (30.7%)	
Other	2053 (93.5%)	142 (6.5%)	2195 (2.7%)	
Discharge				<0.0001
To home	37 652 (100%)	0	37 652 (45.9%)	
To psychiatric unit	25 177 (100%)	0	25 177 (30.7%)	
Other	14 611 (100%)	0	14 611 (17.8%)	
MSSA mechanism				
Drug poisoning (X60–64)	52 155 (98.1%)	1012 (1.9%)	53 167 (64.9%)	<0.0001
Other (X65–X84)	25 285 (87.8%)	3507 (12.2%)	28 792 (35.1%)	
Days in intensive care (mean ± s.d.)	7.13 ± 13.23	8.57 ± 20.31	7.21 ± 13.72	<0.0001
Charlson score				
0 (1-year mortality = 12%)	69 592 (94.8%)	3800 (5.2%)	73 392 (89.5%)	<0.0001
1–2 (1-year mortality = 26%)	5513 (92.8%)	425 (7.2%)	5938 (7.2%)	
3–4 (1-year mortality = 52%)	1509 (89.4%)	178 (10.6%)	1687 (2.1%)	
5+ (1-year mortality = 85%)	826 (87.7%)	116 (12.3%)	942 (1.1%)	
Alcohol SUD	19 754 (97.2%)	572 (2.8%)	20 326 (34.3%)	<0.001
Bipolar disorder	4118 (96.9%)	132 (3.1%)	4250 (7.2%)	0.13
Schizophrenia	2111 (96.6%)	74 (3.4%)	2185 (3.7%)	0.74
ICD 10 codes for mental and behavioural disorders ^b				
F01–F09	2291 (95.5%)	108 (4.5%)	2399 (4.1%)	0.007
F10–F19	26 593 (97.2%)	753 (2.8%)	27 346 (46.2%)	<0.0001
F20–F29	4368 (96.8%)	144 (3.2%)	4512 (7.6%)	0.22
F30–F39	31 624 (96.2%)	1263 (3.8%)	32 887 (55.6%)	<0.009
F40–F48	7773 (98%)	158 (2%)	7931 (13.4%)	<0.0001
F50–F59	657 (97.5%)	17 (2.5%)	674 (1.1%)	0.19
F60–F69	2025 (98.9%)	22 (1.1%)	2047 (3.5%)	<0.0001
F70–F79	126 (96.9%)	4 (3.1%)	130 (0.2%)	1
F80–F89	58 (98.3%)	1 (1.7%)	59 (0.1%)	–
F90–F98	822 (97.7%)	19 (2.3%)	841 (1.4%)	0.047

(Continued)

Table 2. (Continued.)

	Living following first MSSA N = 77 440 N (row percentage)	Died following first MSSA N = 4519 N (row percentage)	Total N = 81 959 N (column percentage)	p-Value ^a
F99	697 (97.5%)	18 (2.5%)	715 (1.2%)	0.15
Psychiatric admission in the 3 days following discharge	29 221 (100%)	0	29 221 (35.7%)	

^ap-Value for comparison between living v. deceased status, we used the Pearson χ^2 tests for qualitative variables, and the Student t-test for quantitative variables.

^bF00–F09: organic, including symptomatic, mental disorders; F10–F19: mental and behavioural disorders due to psychoactive substance use; F20–F29: schizophrenia, schizotypal and delusional disorders; F30–F39: mood (affective) disorders; F40–F48: neurotic, stress-related and somatoform disorders; F50–F59: behavioural syndromes associated with physiological disturbances and physical factors; F60–F69: disorders of adult personality and behaviour; F70–F79: mental retardation; F80–F89: disorders of psychological development; F90–F98: behavioural and emotional disorders with onset usually occurring in childhood and adolescence; F99: unspecified mental disorder.

Bold text indicates p-values ≤ 0.5 .

sample. They were by large the most common psychiatric disorders and showed a clear gender pattern, women were more often diagnosed with mood disorders and men with SUDs.

One in 20 MSSA attempters died in our sample, which represents more than fivefold the death rate by any SA leading to hospitalisation in France between 2004 and 2011 (Chee and Jezewski-Serra, 2014). Similar to suicide victims (Värnik *et al.*, 2008; Cibis *et al.*, 2012; Bachmann, 2018), the profile of MSSA attempters who die corresponds to a man over 65 years that used hanging as a method. MSSA attempters are older compared to other suicide attempters (Horesh *et al.*, 2012; Giner *et al.*, 2014; Kim *et al.*, 2020), but younger than suicide victims (Beautrais, 2001).

The ‘gender paradox’ in suicide posits that women make more attempts but men die more often (Canetto and Sakinofsky, 1998; Schrijvers *et al.*, 2012). In our study, men represent 68.4% of deaths, spend more time in intensive care and have more somatic conditions than women. These differences could be explained by the choice of more lethal methods in men (Beautrais, 2003b) but even comparing similar methods men have higher mortality rates in our sample. However, the risk of suicide among women seems to be particularly high after an MSSA (Beautrais, 2004).

Two out of three MSSAs used DSP as a method for suicide. Similar results were found in previous studies with intoxications accounting for 57–79% of MSSAs (Beautrais, 2003b; Horesh *et al.*, 2012; Sun *et al.*, 2015; Kim *et al.*, 2020). SA methods in our sample are thus closer to those of low-lethality SAs than to suicides if we compare with previous studies: (i) 81.7% of suicides used a highly lethal method against 17.6% in MSSAs (Beautrais, 2003b), (ii) DSP accounts for approximately two out of three SAs not requiring intensive care (Cibis *et al.*, 2012), but (iii) DSP accounts only for 12.7% of suicides in Europe (Värnik *et al.*, 2008).

One in 10 patients with MSSA (10.5%) had multiple somatic comorbidities. Indeed, physical illnesses can precipitate MSSAs (Kim *et al.*, 2020). Patients with somatic pathology are 2–3 times more likely to die by suicide compared to the general population in Taiwan (Cheng *et al.*, 2000), even more so in case of multiple co-morbidities or social isolation (Ahmedani *et al.*, 2017; Kennedy and Garmon-Jones, 2017). In the same vein, intensive care survivors have more risk of suicide after discharge than other inpatients (Fernando *et al.*, 2021). According to a national population study, the interaction of psychiatric and somatic illnesses increases the risk of suicide (Qin *et al.*, 2014), and this trend seems to be particularly significant in elderly men (Blasco-Fontecilla *et al.*, 2010). Somatic conditions often

precipitate suicidal acts in the elderly, which present an elevated fatality rate post-MSSA. Physical pain interacts with psychological pain, cognitive impairments and loneliness facilitating more severe attempts in this age group (Conejero *et al.*, 2018). It should also be noted that the physical consequences of an MSSA may increase suicide risk and can hinder psychiatric care, especially after a violent SA (Persett *et al.*, 2018). Overall mortality is sharply increased after violent self-harm, especially during the first year, and also among men and physically vulnerable persons (Chen *et al.*, 2011; Bergen *et al.*, 2012; Stenbacka and Jokinen, 2015; Goldman-Mellor *et al.*, 2019; Vuagnat *et al.*, 2019).

High levels of psychopathology increase the susceptibility to make an MSSA (Beautrais, 2003b). The diagnostic profile of MSSA patients (mood disorders, SUDs) in our study is similar to previous reports by Beautrais’s group, which found high rates of current and lifetime mental disorders (around 90%), and previous SAs (23.6–52.7%) (Beautrais *et al.*, 1996, 1998; Beautrais, 2001). Post-traumatic stress disorder (PTSD) was also more prevalent among MSSA survivors (Lopez-Castroman *et al.*, 2015). Consistently with previous studies (Beautrais *et al.*, 1999; Gvion and Levi-Belz, 2018), SUDs and particularly AUDs were very frequent in our sample, one in three MSSA survivors (31.1%) had an AUD in the previous month (Beautrais *et al.*, 1999). Alcohol dependence more than doubles the risk of making an MSSA compared to the general population (Conner *et al.*, 2003a), and drinking within 3 h of an SA causes a sixfold increase in the risk of MSSA (Powell *et al.*, 2001). In a prior study, the comorbidity of a mood disorder with alcohol dependence conveyed lower odds of an MSSA compared to a mood disorder alone (OR = 6 v. 17), but alcohol-dependent patients making MSSAs were more likely to have a mood disorder (Conner *et al.*, 2003a, 2003b). Other SUDs, such as cannabis or tobacco dependence, have been strongly associated with MSSAs (Beautrais *et al.*, 1999; Lopez-Castroman *et al.*, 2016).

The psychiatric profiles of suicide victims and MSSAs present strong similarities. Mood disorders, SUDs and anxiety disorders are very frequent in both groups compared to the general population (Beautrais, 2001; Arseneault-Lapierre *et al.*, 2004). Nevertheless, suicide victims appear to be several times more likely to present non-affective psychoses compared to MSSA survivors that in turn would be more likely to present anxiety disorders and mood disorders (Beautrais, 2001, 2003b). Compared with SAs not requiring critical care, psychotic disorders, bipolar disorder, eating disorders, SUDs and SA recidivism are overrepresented in MSSAs (Giner *et al.*, 2014; Kim *et al.*, 2020).

Table 3. Demographic and clinical features of patients discharged to a psychiatric service after their first MSSA (*n* = 77 440 patients)

	Discharge to a psychiatric unit: 0 <i>N</i> = 52 263 <i>N</i> (row percentage)	Discharge to a psychiatric unit: 1 <i>N</i> = 25 177 <i>N</i> (row percentage)	Total <i>N</i> = 77 440 <i>N</i> (column percentage)	<i>p</i> -Value ^a
Male	24 460 (70.1%)	10 456 (29.9%)	34 916 (45.1%)	<0.0001
Female	27 803 (65.4%)	14 721 (34.6%)	42 524 (54.9%)	
Age (mean ± s.d.)	45.13 ± 17.93	45.58 ± 16.27	45.28 ± 17.41	0.0006
Age in five classes				
[8 years; 15 years]	317 (79.6%)	81 (20.4%)	398 (0.5%)	<0.0001
[15 years; 25 years]	7735 (71.3%)	3113 (28.7%)	10 848 (14%)	
[25 years; 55 years]	29 390 (66.6%)	14 721 (33.4%)	44 111 (57%)	
[55 years; 75 years]	11 099 (64.4%)	6143 (35.6%)	17 242 (22.3%)	
75+ years	3722 (76.9%)	1119 (23.1%)	4841 (6.3%)	
Admission				
From emergency room	34 111 (66.1%)	17 525 (33.9%)	51 636 (66.7%)	<0.0001
From a psychiatric unit	59 (22.3%)	205 (77.7%)	264 (0.3%)	
From home	16 528 (70.5%)	6928 (29.5%)	23 456 (30.3%)	
Other	1541 (75.1%)	512 (24.9%)	2053 (2.7%)	
Discharge				
To home	37 652 (100%)	0	37 652 (48.6%)	<0.0001
To psychiatric unit	0	25 177 (100%)	25 177 (32.5%)	
Other	14 611 (100%)	0	14 611 (18.9%)	
MSSA mechanism				
Drug poisoning (X60–64)	34 296 (65.8%)	17 859 (34.2%)	52 155 (67.3%)	<0.0001
Other (X65–X84)	17 967 (71.1%)	7318 (28.9%)	25 285 (32.7%)	
Days in intensive care (mean ± s.d.)	8.34 ± 15.17	4.61 ± 7.2	7.13 ± 13.23	<0.0001
Charlson score				
0 (1-year mortality = 12%)	46 460 (66.8%)	23 132 (33.2%)	69 592 (89.9%)	<0.0001
1–2 (1-year mortality = 26%)	3955 (71.7%)	1558 (28.3%)	5513 (7.1%)	
3–4 (1-year mortality = 52%)	1168 (77.4%)	341 (22.6%)	1509 (1.9%)	
5+ (1-year mortality = 85%)	680 (82.3%)	146 (17.7%)	826 (1.1%)	
Alcohol SUD	14 142 (71.6%)	5612 (28.4%)	19 754 (34.6%)	<0.0001
Bipolar disorder	2130 (51.7%)	1988 (48.3%)	4118 (7.2%)	<0.0001
Schizophrenia	1120 (53.1%)	991 (46.9%)	2111 (3.7%)	<0.0001
ICD 10 codes for mental and behavioural disorders ^b				
F01–F09	1735 (75.7%)	556 (24.3%)	2291 (4%)	<0.0001
F10–F19	18 954 (71.3%)	7639 (28.7%)	26 593 (46.6%)	<0.0001
F20–F29	2399 (54.9%)	1969 (45.1%)	4368 (7.7%)	<0.0001
F30–F39	19 781 (62.6%)	11 843 (37.4%)	31 624 (55.4%)	<0.0001
F40–F48	5456 (70.2%)	2317 (29.8%)	7773 (13.6%)	<0.0001
F50–F59	441 (67.1%)	216 (32.9%)	657 (1.2%)	<0.0001
F60–F69	1313 (64.8%)	712 (35.2%)	2025 (3.5%)	0.10
F70–F79	91 (72.2%)	35 (27.8%)	126 (0.2%)	0.18
F80–F89	36 (62.1%)	22 (37.9%)	58 (0.1%)	0.47
F90–F98	572 (69.6%)	250 (30.4%)	822 (1.4%)	0.06

(Continued)

Table 3. (Continued.)

	Discharge to a psychiatric unit: 0 N = 52 263 N (row percentage)	Discharge to a psychiatric unit: 1 N = 25 177 N (row percentage)	Total N = 77 440 N (column percentage)	p-Value ^a
F99	440 (63.1%)	257 (36.9%)	697 (1.2%)	0.06
Psychiatric admission in the 3 days following discharge	8093 (27.7%)	21 128 (72.3%)	29 221 (37.7%)	<0.0001

^ap-Value for comparison according to the decision of discharge to a psychiatric unit or otherwise, we used the Pearson χ^2 tests for qualitative variables and the Student *t*-test for quantitative variables.

^bF00–F09: organic, including symptomatic, mental disorders; F10–F19: mental and behavioural disorders due to psychoactive substance use; F20–F29: schizophrenia, schizotypal and delusional disorders; F30–F39: mood (affective) disorders; F40–F48: neurotic, stress-related and somatoform disorders; F50–F59: behavioural syndromes associated with physiological disturbances and physical factors; F60–F69: disorders of adult personality and behaviour; F70–F79: mental retardation; F80–F89: disorders of psychological development; F90–F98: behavioural and emotional disorders with onset usually occurring in childhood and adolescence; F99: unspecified mental disorder. Bold text indicates *p*-values ≤ 0.5 .

In our study, only 32.5% of MSSA survivors were subsequently admitted in psychiatric hospitals. Male sex, long ICU stays and advanced age decreased the likelihood of admission in psychiatry after critical care according to our results. Between 2004 and 2011, 20% of all SAs hospitalised in French hospitals (MCO) were subsequently admitted in psychiatry (Chee and Jezewski-Serra, 2014). These low rates are partly explained by admissions in psychiatric units within general hospitals, which are not differentiated in our study. In France, these units are mostly conceived to provide emergency psychiatric care in academic hospitals, and despite an increase in recent years they are still uncommon and most psychiatric care takes place in psychiatric clinics or hospitals (public or private). Besides, stays in psychiatric emergency units are short and most patients in our study were discharged to their homes (48.6%).

Given the low rate of psychiatric hospitalisations in our study, improving care pathways for MSSA survivors seems essential. Any intervention targeting this gap should focus on high comorbidity (especially between SUDs and mood disorders) and the male sex. Co-morbid conditions may increase attrition (Lamers *et al.*, 2012) and decrease the efficacy of treatments. For instance, the response to antidepressants is modest in AUDs with comorbid depression (Agabio *et al.*, 2018) although it can be enhanced with cognitive behavioural therapy (Moak *et al.*, 2003). Concerning gender, men have less knowledge and more stigmatizing attitudes about suicide than women do (Batterham *et al.*, 2013), which may explain their tendency to seek help less often (Calear *et al.*, 2014). The 2-year period following discharge after an SA is at high risk for suicide (Tejedor *et al.*, 1999; Parra-Urbe *et al.*, 2017). Continuous psychiatric and somatic outpatient care is very important. A 7-day follow-up after discharge from a psychiatric hospital was associated with an important decrease in suicide rates in the 3-month period following discharge (While *et al.*, 2012). Specific training or sensibilisation of non-psychiatric teams about the risk of suicide and its management is important. Less than 70% of emergency physicians know how to assess the risk of suicide (Betz *et al.*, 2013).

Non-psychiatric medical departments are not well-adapted to the management of suicide attempters (less communication, untrained teams) (Cheng *et al.*, 2009; Betz *et al.*, 2013; Chen *et al.*, 2016). Patients admitted for self-harm to non-psychiatric departments are more likely to die by suicide in the following year than those admitted to psychiatric units (Vuagnat *et al.*, 2019). Consultation-liaison psychiatry (CLP) should identify and manage these cases to reinforce continuous care (Stein

et al., 2020), but the accessibility to CLP varies widely among hospitals (Olfson *et al.*, 2014; Wood and Wand, 2014; Wand *et al.*, 2016). According to one study, when CLP intervenes only 29.2% of violent or serious attempts are discharged (Cooper-Kazaz, 2013).

The incidence rate in our study is lower (45.7 per 1 000 000 person-years) compared to a Chinese study based on the 2009–2011 public health surveillance systems of three counties. However, their incidence rate included suicide deaths happening before arrival at the hospital (Sun *et al.*, 2015). The incidence for all SAs (MSSAs included) was estimated to be 148.8 per 1 000 000 person-years in a US study (Kuo *et al.*, 2001).

Strengths and limitations of our study

The main limitation of this study is that it is based on administrative data, ICD-10 codes are mainly used for billing purposes by physicians in the hospital ward. They might vary according to the practitioner or the institution. Also, short stays, especially in services other than intensive care, may raise questions about the severity of the suicidal act, and important information such as suicidal intent or records of previous suicidality is not available in the database. Finally, the 2-year criterion we used to define a first MSSA is based on the diagnostic category of suicidal behaviour disorder, as defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM5), but it may not completely reflect true incidence. However, PMSI data provide exhaustive and updated information on all health establishments at the national level for almost 10 years. This information completes the profile of MSSA attempters outlined by clinical studies and confirms the epidemiological importance of MSSA, as well as the limitations of current approaches to ensure that survivors access psychiatric care.

Conclusions

MSSA survivors use more violent methods and have more serious somatic and psychiatric pathologies than low-lethality attempters. They are also at high risk of subsequent somatic complications or suicide. Very often they are discharged home instead of receiving inpatient psychiatric care, particularly those that are most at risk: men using violent methods or presenting comorbidities. The incidence of MSSAs is high, similar to that of suicides, and it seems essential to improve care pathways for MSSA survivors. This study needs to be extended with prospective data in order to

Table 4. Demographic and clinical features of MSSA patients according to the main method used in the suicide attempt

	Intentional self-poisoning with drugs (X60–X64) N = 53 167 N (%)	Intentional self-poisoning with other substances (alcohol, solvents, pesticides, chemicals) (X65–X69) N = 7673 N (%)	Intentional self-harm by hanging, strangulation and suffocation (X70) N = 3857 N (%)	Intentional self-harm by drowning and submersion (X71) N = 256 N (%)	Intentional self-harm by firearm (X72–X74) N = 1297 N (%)	Intentional self-harm by smoke, fire and flames (X75–X77) N = 609 N (%)
Male	21 472 (56.5%)	4359 (11.5%)	3010 (7.9%)	102 (0.3%)	1196 (3.1%)	399 (1%)
Female	31 695 (72.1%)	3314 (7.5%)	847 (1.9%)	154 (0.4%)	101 (0.2%)	210 (0.5%)
Age in five classes						
[8 years; 15 years]	265 (64.3%)	30 (7.3%)	23 (5.6%)	1 (0.2%)	1 (0.2%)	2 (0.5%)
[15 years; 25 years]	7446 (67%)	875 (7.9%)	375 (3.4%)	12 (0.1%)	64 (0.6%)	56 (0.5%)
[25 years; 55 years]	29 926 (64.8%)	4471 (9.7%)	2452 (5.3%)	63 (0.1%)	490 (1.1%)	381 (0.8%)
[55 years; 75 years]	11 905 (64.1%)	1900 (10.2%)	769 (4.1%)	129 (0.7%)	462 (2.5%)	154 (0.8%)
75+ years	3625 (63.7%)	397 (7%)	238 (4.2%)	51 (0.9%)	280 (4.9%)	16 (0.3%)
Admission						
From emergency room	36 254 (66.8%)	5000 (9.2%)	2191 (4%)	161 (0.3%)	801 (1.5%)	217 (0.4%)
From a psychiatric unit	165 (55.4%)	20 (6.7%)	52 (17.4%)	2 (0.7%)	2 (0.7%)	4 (1.3%)
From home	15 425 (61.3%)	2432 (9.7%)	1527 (6.1%)	89 (0.4%)	445 (1.8%)	337 (1.3%)
Other	1306 (59.5%)	215 (9.8%)	86 (3.9%)	3 (0.1%)	48 (2.2%)	51 (2.3%)
Missing	17	6	1	1	1	0
Discharge						
To home	26 324 (69.9%)	4293 (11.4%)	674 (1.8%)	65 (0.2%)	324 (0.9%)	104 (0.3%)
To psychiatric unit	17 859 (70.9%)	1903 (7.6%)	925 (3.7%)	82 (0.3%)	167 (0.7%)	54 (0.2%)
Other	7972 (54.6%)	1183 (8.1%)	516 (3.5%)	44 (0.3%)	362 (2.5%)	314 (2.1%)
Death because of the attempt	1012 (22.4%)	294 (6.5%)	1742 (38.5%)	65 (1.4%)	444 (9.8%)	137 (3%)
Charlson score						
0 (1-year mortality = 12%)	47 569 (64.8%)	6788 (9.2%)	3589 (4.9%)	226 (0.3%)	1102 (1.5%)	542 (0.7%)
1–2 (1-year mortality = 26%)	3943 (66.4%)	584 (9.8%)	183 (3.1%)	21 (0.4%)	118 (2%)	51 (0.9%)
3–4 (1-year mortality = 52%)	1061 (62.9%)	185 (11%)	59 (3.5%)	5 (0.3%)	45 (2.7%)	13 (0.8%)
5+ (1-year mortality = 85%)	594 (63.1%)	116 (12.3%)	26 (2.8%)	4 (0.4%)	32 (3.4%)	3 (0.3%)
ICD 10 codes for mental and behavioural disorders ^a						
F01–F09	1178 (49.1%)	220 (9.2%)	113 (4.7%)	17 (0.7%)	80 (3.3%)	13 (0.5%)
F10–F19	17 690 (64.7%)	3678 (13.4%)	853 (3.1%)	42 (0.2%)	292 (1.1%)	139 (0.5%)
F20–F29	2600 (57.6%)	247 (5.5%)	115 (2.5%)	15 (0.3%)	34 (0.8%)	101 (2.2%)
F30–F39	22 376 (68%)	2419 (7.4%)	1429 (4.3%)	121 (0.4%)	503 (1.5%)	209 (0.6%)

(Continued)

Table 4. (Continued.)

	Intentional self-poisoning with drugs (X60–X64) N = 53 167 N (%)	Intentional self-poisoning with other substances (alcohol, solvents, pesticides, chemicals) (X65–X69) N = 7673 N (%)	Intentional self-harm by hanging, strangulation and suffocation (X70) N = 3857 N (%)	Intentional self-harm by drowning and submersion (X71) N = 256 N (%)	Intentional self-harm by firearm (X72–X74) N = 1297 N (%)	Intentional self-harm by smoke, fire and flames (X75–X77) N = 609 N (%)
F40–F48	5539 (69.8%)	578 (7.3%)	261 (3.3%)	30 (0.4%)	88 (1.1%)	63 (0.8%)
F50–F59	486 (72.1%)	38 (5.6%)	17 (2.5%)	0	4 (0.6%)	3 (0.4%)
F60–F69	1292 (63.1%)	101 (4.9%)	86 (4.2%)	6 (0.3%)	22 (1.1%)	28 (1.4%)
F70–F79	78 (60%)	11 (8.5%)	3 (2.3%)	1 (0.8%)	1 (0.8%)	3 (2.3%)
F80–F89	31 (52.5%)	3 (5.1%)	3 (5.1%)	1 (1.7%)	0	2 (3.4%)
F90–F98	516 (61.4%)	78 (9.3%)	30 (3.6%)	3 (0.4%)	17 (2%)	3 (0.4%)
F99	128 (17.9%)	14 (2%)	6 (0.8%)	1 (0.1%)	3 (0.4%)	2 (0.3%)
Alcohol use disorder	12 595 (62%)	3259 (16%)	646 (3.2%)	39 (0.2%)	238 (1.2%)	101 (0.5%)
Bipolar disorder	3054 (71.9%)	281 (6.6%)	86 (2%)	11 (0.3%)	35 (0.8%)	35 (0.8%)
Schizophrenia	1293 (59.2%)	103 (4.7%)	50 (2.3%)	5 (0.2%)	19 (0.9%)	42 (1.9%)
Missing	14 487	1998	1596	73	503	201
	Intentional self-harm by sharp or blunt object (X78–X79) N = 2308 N (%)	Intentional self-harm by jumping from a high place (X80) N = 2386 N (%)	Intentional self-harm by collision (X81–X82) N = 316 N (%)	Intentional self-harm by other specified or unspecified means (X83–X84) N = 10 090 N (%)	Total N = 81 959	
Male	1462 (3.8%)	1214 (3.2%)	209 (0.5%)	4583 (12.1%)	38 006 (46.4%)	
Female	846 (1.9%)	1172 (2.7%)	107 (0.2%)	5507 (12.5%)	43 953 (53.6%)	
Age in five classes						
[8 years; 15 years]	16 (3.9%)	29 (7%)	0	45 (10.9%)	412 (0.5%)	
[15 years; 25 years]	329 (3%)	508 (4.6%)	68 (0.6%)	1387 (12.5%)	11 120 (13.6%)	
[25 years; 55 years]	1171 (2.5%)	1287 (2.8%)	181 (0.4%)	5728 (12.4%)	46 150 (56.3%)	
[55 years; 75 years]	554 (3%)	390 (2.1%)	55 (0.3%)	2265 (12.2%)	18 583 (22.7%)	
75+ years	238 (4.2%)	172 (3%)	12 (0.2%)	665 (11.7%)	5694 (6.9%)	
Admission						
From emergency room	1551 (2.9%)	1392 (2.6%)	203 (0.4%)	6488 (12%)	54 258 (66.2%)	
From a psychiatric unit	15 (5%)	6 (2%)	0	32 (10.7%)	298 (0.4%)	
From home	696 (2.8%)	873 (3.5%)	100 (0.4%)	3250 (12.9%)	25 174 (30.7%)	
Other	44 (2%)	111 (5.1%)	13 (0.6%)	318 (14.5%)	2195 (2.7%)	
Missing	2	4	0	2	34	
Discharge						

(Continued)

Table 4. (Continued.)

	Intentional self-harm by sharp or blunt object (X78–X79) N = 2308 N (%)	Intentional self-harm by jumping from a high place (X80) N = 2386 N (%)	Intentional self-harm by collision (X81–X82) N = 316 N (%)	Intentional self-harm by other specified or unspecified means (X83–X84) N = 10 090 N (%)	Total N = 81 959
To homea	892 (2.4%)	576 (1.5%)	98 (0.3%)	4302 (11.4%)	37 652 (45.9%)
To psychiatric unit	826 (3.3%)	298 (1.2%)	60 (0.2%)	3003 (11.9%)	25 177 (30.7%)
Other	510 (3.5%)	1300 (8.9%)	142 (1%)	2268 (15.5%)	14 611 (17.8%)
Death because of the attempt	80 (1.8%)	212 (4.7%)	16 (0.4%)	517 (11.4%)	4519 (5.5%)
Charlson score					
0 (1-year mortality = 12%)	2000 (2.7%)	2197 (3%)	299 (0.4%)	9080 (12.4%)	73 392 (89.5%)
1–2 (1-year mortality = 26%)	186 (3.1%)	132 (2.2%)	10 (0.2%)	710 (12%)	5938 (7.2%)
3–4 (1-year mortality = 52%)	79 (4.7%)	41 (2.4%)	6 (0.4%)	193 (11.4%)	1687 (2.1%)
5+ (1-year mortality = 85%)	43 (4.6%)	16 (1.7%)	1 (0.1%)	107 (11.4%)	942 (1.1%)
ICD 10 codes for mental and behavioural disordersa					
F01–F09	78 (3.3%)	170 (7.1%)	13 (0.5%)	517 (21.6%)	2399 (4.1%)
F10–F19	698 (2.6%)	725 (2.7%)	97 (0.4%)	3132 (11.5%)	27 346 (46.2%)
F20–F29	247 (5.5%)	454 (10.1%)	36 (0.8%)	663 (14.7%)	4512 (7.6%)
F30–F39	1006 (3.1%)	814 (2.5%)	124 (0.4%)	3886 (11.8%)	32 887 (55.6%)
F40–F48	241 (3%)	198 (2.5%)	30 (0.4%)	903 (11.4%)	7931 (13.4%)
F50–F59	20 (3%)	18 (2.7%)	0	88 (13.1%)	674 (1.1%)
F60–F69	114 (5.6%)	65 (3.2%)	12 (0.6%)	321 (15.7%)	2047 (3.5%)
F70–F79	5 (3.8%)	10 (7.7%)	1 (0.8%)	17 (13.1%)	130 (0.2%)
F80–F89	2 (3.4%)	6 (10.2%)	0	11 (18.6%)	59 (0.1%)
F90–F98	29 (3.4%)	30 (3.6%)	4 (0.5%)	131 (15.6%)	841 (1.4%)
F99	8 (1.1%)	17 (2.4%)	2 (0.3%)	534 (74.7%)	715 (1.2%)
Alcohol use disorder	492 (2.4%)	516 (2.5%)	70 (0.3%)	2370 (11.7%)	20 326 (34.3%)
Bipolar disorder	132 (3.1%)	134 (3.2%)	14 (0.3%)	468 (11%)	4250 (7.2%)
Schizophrenia	114 (5.2%)	248 (11.4%)	20 (0.9%)	291 (13.3%)	2185 (3.7%)
Missing	521	537	88	2779	22 783

^aF00–F09: organic, including symptomatic, mental disorders; F10–F19: mental and behavioural disorders due to psychoactive substance use; F20–F29: schizophrenia, schizotypal and delusional disorders; F30–F39: mood (affective) disorders; F40–F48: neurotic, stress-related and somatoform disorders; F50–F59: behavioural syndromes associated with physiological disturbances and physical factors; F60–F69: disorders of adult personality and behaviour; F70–F79: mental retardation; F80–F89: disorders of psychological development; F90–F98: behavioural and emotional disorders with onset usually occurring in childhood and adolescence; F99: unspecified mental disorder.

Table 5. Incidence of the first MSA per 100 000 person-years by age group and sex

Age in five classes	2012			2013			2014			2015			2016			2017			2018			2019			
	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	
[8 years; 15 years]	0.31	1.63	0.95	0.41	1.19	0.79	0.44	1.68	1.05	1.24	0.82	0.33	1.47	0.89	0.40	1.15	0.77	0.43	1.57	0.43	1.57	0.99	0.27	1.50	0.87
[15 years; 25 years]	13.07	17.30	15.16	12.14	18.55	15.29	15.74	20.58	18.12	19.49	16.33	13.48	19.00	16.19	13.54	21.73	17.55	15.74	25.19	20.37	25.19	20.37	16.51	28.13	22.21
[25 years; 55 years]	22.29	22.55	22.42	22.08	21.57	21.82	24.41	24.65	24.53	21.71	22.31	22.23	21.06	21.63	23.31	21.69	22.49	24.27	22.06	23.15	24.34	23.15	24.34	21.79	23.05
[55 years; 75 years]	12.42	17.51	15.08	12.87	16.65	14.85	13.85	18.03	16.04	17.66	15.97	12.81	17.03	15.02	15.11	18.17	16.72	14.54	17.24	15.96	15.10	15.96	15.10	16.85	16.02
75+ years	12.05	11.08	11.44	11.65	9.29	10.17	12.68	11.35	11.85	11.47	11.78	12.77	11.91	12.24	12.29	11.24	11.65	13.05	12.04	12.43	11.25	11.25	11.25	11.25	11.25
All ages ^a	15.66	17.42	16.57	15.48	16.68	16.10	17.30	18.84	18.10	17.33	16.84	15.68	16.90	16.31	16.67	17.67	17.19	17.25	18.11	17.70	17.33	17.70	17.33	18.14	17.75

Incidence rates were estimated using the exhaustive number of first MSA in France by age, sex and year as the numerator and the French population size by age, sex and year as the denominator. The population size is based on an annual national census performed by the French 'National Institute of Statistics and Economic Studies' (INSEE) and are directly available on the Institute's website (<https://www.insee.fr/statistiques/1913143?sommaire=1912926>).

^aIncidence in the population over 8 years old.

better understand the consequences of MSA and adapt care management.

Data. The data are not publicly available but will be provided upon request with the permission of the French Ministry of Health.

Author contributions. Jorge Lopez Castroman conceived and designed the study. Julien Corbé drafted the manuscript and managed the literature searches and analyses. Christine Montout and Thibault Mura performed the statistical analysis and analysed and interpreted the data. All authors revised the article critically. All authors read and approved the final manuscript. No one else fulfils the criteria but has not been included as an author. Christine Montout had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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