

Research Paper

General hospital admissions in young and middle-aged people who use psychoactive substances: Impact of Covid-19 lockdowns



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ABSTRACT

Backgrounds: The Covid-19 pandemic offered a unique opportunity to investigate trends in hospitalizations related to psychoactive substance intoxication, since the usual health burden of social use at parties and gatherings was likely to be decreased during lockdowns and curfew periods. Since young adults are the main users of psychoactive substances for experimental and recreational purposes, this study identified and compared hospitalization trends in young adults and adults over 30 years old.

Methods: This national cohort study was conducted using the French hospital discharge database. An interrupted time-series analysis for the period between 2014 and 2020 was performed in two groups: young (age 18–29) and other adults (30+) to ascertain the trends in the monthly incidence of hospitalization related to psychoactive substance intoxication (opiates, cocaine, benzodiazepines, psychostimulants, alcohol and cannabis). Hospitalization characteristics during the first and second lockdown and the period between them were compared to the reference period (from 01/01/2014 to 29/02/2020).

Results: Among 1,358,007 stays associated with psychoactive substance intoxication, 215,430 concerned young adults. Compared with adults 30+, hospitalization trends in young adults showed a greater decrease in the number of stays during lockdown, with a maximum decrease of -39% during the first lockdown (1,566 vs. 2,576; CI95%: 2,285–2,868) versus -20% (10,212 vs. 12,894; CI95%: 12,001–13,787) in the second lockdown. Presentations for alcohol intoxication decreased throughout the pandemic, particularly during the second lockdown, while admissions for benzodiazepine intoxication increased during both lockdowns. Admissions for cannabis intoxication increased throughout the entire period.

Conclusions: Lockdowns were associated with fewer hospitalizations related to psychoactive substance intoxication in both age groups, especially among young adults, which might reflect a decrease in social use. Recreational use might therefore be an important target for prevention and risk minimization.

Introduction

The increasing accessibility of drugs and their widespread use, particularly among young people, make the use of psychoactive substances and its consequences a major public health concern. Whether their use is for experimental or recreational purposes, or whether it is related to substance use disorders (d'Angelo et al., 2017; Ghandour et al., 2012), there are potential health risks that partly depend on the psychoactive substances consumed (Nutt et al., 2007). Psychoactive substance intoxication can be a direct result of the drug (e.g. overdose, agitation) or

may be associated with drug consumption (e.g. accident, fight). It is the leading cause of hospitalization, especially in emergency and intensive care units (Mégarbane et al., 2020).

The contribution of the COVID-19 pandemic to trends in psychoactive substance use and substance use disorders is an increasing public health concern (Jager & Keyes, 2021). During the pandemic, the contexts in which psychoactive substances were used may have been strongly impacted in various ways. Firstly, the availability of psychoactive substances was disturbed, and this may have restructured the supply routes. After the temporary contraction of the psychoactive substance

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market, the offer was maintained for some substances with an increase in online shopping, shipping by boat and the increased domestic cultivation of cannabis (EMCDDA, n.d.; European Monitoring Centre for Drugs and Drug Addiction (2020), Impact of COVID-19 on patterns of drug use and drug-related harms in Europe, EMCDDA Trendspotter briefing, Lisbon., 2020). Secondly, parties and gatherings were forbidden during lockdown and curfew periods. Thirdly, the first lockdown in France from March 17th to May 10th 2020 and the second from October 30th to December 15th, 2020 led to major lifestyle changes. Known risk factors of substance use disorders worsened (Benke et al., 2020; Dumoulin et al., 2022; González-Sanguino et al., 2020; Palgi et al., 2020). For example, social contact was reduced, professional activity was limited or even ceased for many people, stress increased and many hobbies involving interaction with others tailed off. Mental health may have been rapidly impacted in such conditions and young adults are particularly vulnerable in this context (Arsandaux et al., 2021; Grebely et al., 2020).

While psychoactive substance use may have remained stable or even increased in patients with substance use disorders, experimental and recreational use may have been reduced during lockdowns due to the lack of festive and social opportunities (EMCDDA, 2022; Grau-López et al., 2022; Marsden et al., 2020). The period between the two lockdowns has also attracted attention because of the associated risk of intoxication by psychoactive substances. On the one hand, the return to a normal situation after a period of deprivation can lead to risky behavior; on the other, the risk of overdose may have been increased in users who stopped using substances for a long period and then resumed at their usual dose (Grigoletto et al., 2020). Therefore, studying the trend in hospitalizations related to psychoactive substance use during the pandemic offers a unique opportunity to estimate the usual burden of social use on these hospitalizations. Since young adults are the main users for experimental and recreational purposes (EMCDDA, 2022; Järvinen & Ravn, 2011; Perino et al., 2022), we assumed that lockdowns could have differently impacted the incidence of these hospitalizations according to age. This nationwide study assessed the impact of lockdowns on general hospital admissions due to psychoactive substance intoxication according to patients' age. The secondary objectives were to describe the characteristics of these admissions and the psychoactive substances involved.

Methods

Data source

This study was conducted by using the French national database of the Programme de Médicalisation des Systems d'Information (PMSI). The PMSI initially served to analyze hospital activity and assist in the planning of healthcare. Since 2004, it has been used for health resource allocation with the implementation of activity-based funding policy estimates. Although not initially designed for epidemiologic research, it was rapidly considered as an important source of information on hospitalizations and has been used in various studies (Daveluy et al., 2012; de Léotoing et al., 2018). The PMSI database contains administrative (age, sex, unique patient identifier) and medical information through diagnostic codes according to the 10th revision of the World Health Organization International Classification of Diseases (ICD-10), adapted for the PMSI as primary diagnoses (the reason why the patient was admitted to hospital) and the associated significant diagnoses (complications and morbidities that could have an impact on the course of the hospitalization) (Quan et al., 2008). The PMSI covers all public and private French hospitals. This study focused on hospitalization in short-stay units. Outpatients and psychiatric hospitalization were not considered.

Study design and study population

This national historic cohort study included all patients aged 18 years and over and hospitalized in France for psychoactive substance

intoxication with a discharge date between 1st January 2014 and 31st December 2020. Stays of interest, i.e. admission (including short stays in emergency departments) and not just presentation to the hospital, were identified through the main or significant associated diagnoses coded in the PMSI database that referred to intoxication by opiates (T403, T401, T402, F110, T404), cocaine (T405, F140), benzodiazepines (T424), psychostimulants (T436), alcohol (F100, T51) and cannabis (F12). Benzodiazepines were considered as they are often misused with or without other substances (O'Brien, 2005; Votaw et al., 2019). As the focus was on stays, it was not necessary to handle duplicate patients for this analysis. According to the definition of young adults used by the National Institute for Statistics and Economic Studies (INSEE) (France, Portrait Social Édition, 2019. Les Jeunes de 18 à 29 Ans, n.d.), two populations were considered: (i) Young adults: aged < 30 years old; (ii) middle- and older-aged adults: aged \geq 30 years old.

Collection of data

The following variables were coded during the stay considered but information on their anteriority was not extracted. They were collected in both age groups: (i) psychoactive substances involved in the present hospitalization including polysubstance use (at least two psychoactive substances involved in the intoxication); (ii) characteristics of the patients: age, sex, main and associated psychiatric and non-psychiatric diagnoses, use of psychoactive substances (which could be complemented by a diagnosis of substance use disorders, if applicable) and social context (housing, social, partner's difficulties); and (iii) characteristics of the hospitalizations: severity assessed by the Acute Physiology Score (Le Gall et al., 1993), discharge modes (home, transfer to psychiatric unit, transfer to medical unit), and associated diagnoses of suicide attempt, aggression, domestic violence or road accident through codes used in the system by the caregiver. Finally, French regions of hospitalizations were described for each period of time using the Metropolitan French map function of Excel® to identify the regions the most exposed to these hospitalizations.

Statistical analyses

Monthly incidence of hospitalizations that occurred in the context of psychoactive substance intoxication was computed over the years 2014 to 2020. An interrupted time-series analysis (Mathieu et al., 2022) was performed in each group to ascertain whether trends in the monthly incidence of these hospitalizations changed during the lockdowns. We used the Unobserved Components Model to predict the monthly incidence of hospitalizations associated with psychoactive substance intoxication in 2020 on the basis of the monthly incidences observed over the previous years (2014 to 2019). The prediction was compared to monthly incidences that were really observed during the pandemic (from 2020/01/01 – 2020/10/30), using SAS 9.4 PROC UCM Software®. The six years of anteriority guaranteed a robust prediction of the model. Characteristics of patients and stays were described in terms of numbers and proportions with 95% confidence intervals (95% CI). For each psychoactive substance considered, their involvement in stays was described in both age groups by the weekly number of patients with intoxication per substance out of 1000 patients hospitalized for all cases of psychoactive substance intoxication. Values found during first lockdown (2020/03/01 – 2020/05/31), second lockdown (2020/11/01 – 2020/12/31) and the period between them (2020/06/01 – 2020/10/30) were compared via a chi-square test with the pre-pandemic data registered between 2014/01/01 and 2020/02/29 and statistical significance was expressed by the p-value. For the reference period and each period of the pandemic, the standardized incidence of stays over 30 days was represented within the French regions.

Results

Study population

Over the study period, there were 1358,007 stays for psychoactive substance intoxication. Among them, 215,430 concerned young adults and 1142,577 middle- and older-aged adults. The majority of patients were men, but women in the young adults group were significantly more often hospitalized during the two lockdowns (Table 1). No difference was found concerning age in the young adults (median of 23 years old (IQR, 20–26) during the reference period and after the first lockdown; median of 24 years old (IQR, 20–27) during first and second lockdown) and in middle- and older-aged adults (median of 51 years old (IQR, 42–60) during second lockdown and after first lockdown; median of 50 years old (IQR, 41–59) during first lockdown and the reference period). Over the pandemic period, problems with housing, social environment and one’s intimate partner were significantly more frequent in both age groups (Table 1). There was a higher rate of substance use disorders in middle- and older-aged adults than in young ones, but substance use disorders and psychiatric disorders were significantly increased during lockdowns, especially in young adults.

The main difference according to age concerned psychoactive substance intoxication without substance use disorder diagnosis (Table 1). Young psychoactive substance users were less often hospitalised during the two lockdowns (73.5% ($p < 0.001$) and 69.8% ($p < 0.001$) respectively vs. 77.2% during the reference period), while substance use disorders increased during the same period, suggesting a decrease in hospitalisations in the context of substance use without a diagnosis of substance use disorders (Table 1). Conversely, both substance use and substance use disorders increased during the pandemic among middle-aged and older adults. The frequency of mood and anxiety disorders increased significantly in both age groups except during the lockdown lifting period, especially in young adults. A significantly higher rate of schizophrenia was found during both lockdowns only in young adults (2.7% ($p < 0.001$) and 2.4% ($p < 0.001$) respectively vs. 1.7% during the reference period) (Table 1).

Impact of lockdowns on incidence of hospitalizations for acute psychoactive substance intoxication

The monthly incidence of hospitalizations for psychoactive substance intoxication decreased significantly during the lockdowns in both

age groups, but the decrease was greater in young adults (Fig. 1). During the first lockdown, a maximum decrease of –39% was found compared to the April forecast in this population (1566 cases vs. 2576; CI95%: 2285–2868) (Fig. 1i), while the maximum decrease in middle- and older-aged adults was –20% compared to the March and April forecasts (Fig. 1ii). A similar trend was also observed during the second lockdown with a maximum decrease of –30% in young adults vs –11% in the others.

Whereas there were no major regional changes in hospitalizations due to psychoactive substance intoxication in middle- and older-aged adults (Fig. 2ii), changes did occur in young adults. The largest decrease in hospitalizations was observed in the *Nouvelle Aquitaine* area during the 1st and 2nd lockdowns with 175 and 156 stays respectively compared to the reference of 301 stays. The Auvergne-Rhone-Alpes area was the only one where hospitalizations due to psychoactive substance intoxication increased, with an increase in young adults during the second lockdown (Fig. 2i).

Characteristics of hospitalization and psychoactive substances involved

Alcohol, benzodiazepines and cannabis were the substances mostly involved in hospitalizations due to psychoactive substance intoxication regardless of the age and the period of time (Table 2). However, while the involvement of benzodiazepines and alcohol was quite similar in both age groups before the pandemic, large differences were noted thereafter. Alcohol was used less by young adults during the pandemic and especially during the second lockdown (653 stays/ week/ 1000 patients), while it was used more by middle- and older-aged adults over the same period. On the other hand, benzodiazepines were highly involved in psychoactive substance intoxications during both lockdowns and especially in young adults, with respectively 308 and 341 stays/ week/ 1000 patients during the first and second lockdowns compared to 256 stays/ week/ 1000 patients during the baseline period, while their involvement decreased throughout the pandemic in middle- and older-aged adults (Table 2). Cannabis use was more often the cause of hospitalizations in young adults than in middle- and older-aged adults throughout the study period. However, its involvement increased strongly in young adults during the pandemic. Polysubstance use increased significantly in young adults only during the lifting of confinement ($p = 0.05$), whereas no difference was found for polysubstance use when alcohol, benzodiazepines or both were not taken into account (Table 2). Among co-diagnoses studied that reflected the rea-

Table 1
Characteristics of patients hospitalized for psychoactive substance intoxication during Covid-19 pandemic and within reference period (2014–2019) in adults according to age (<30 and 30+ years old).

	Age group	Reference period	First lockdown	Pvalue*	Between lockdowns	Pvalue*	Second Lockdown	Pvalue*
		N<30 = 193,570 N30+ = 1018,498	N<30 = 5700 N30+ = 34,232		N<30 = 12,517 N30+ = 67,180		N<30 = 3643 N30+ = 22,667	
		n (%)	n (%)		%		n (%)	
Sex : Female	<30	70,745 (36.5)	2180 (38.2)	0.008	4619 (36.1)	0.43	1473 (40.4)	<0.001
	30+	366,603 (36.0)	12,251 (35.8)	0.43	22,921 (34.1)	<0.001	8121 (35.8)	0.60
Depression and bipolar disorders	<30	42,122 (21.8)	1524 (26.7)	<0.001	2801 (22.4)	0.105	1073 (29.5)	<0.001
	30+	324,333 (31.8)	10,367 (30.3)	<0.001	19,236 (28.6)	<0.001	7146 (31.5)	0.309
Anxiety disorder	<30	10,135 (5.2)	399 (7.0)	<0.001	703 (5.6)	0.065	256 (7.0)	<0.001
	30+	61,474 (6.0)	2610 (7.6)	<0.001	4374 (6.5)	<0.001	1605 (7.1)	<0.001
Schizophrenia	<30	3232 (1.7)	152 (2.7)	<0.001	191 (1.5)	<0.001	88 (2.4)	<0.001
	30+	33,874 (3.3)	1220 (3.6)	0.016	2245 (3.3)	0.824	758 (3.3)	0.880
Substance use disorder	<30	20,010 (10.3)	805 (14.1)	<0.001	1484 (11.9)	<0.001	487 (13.4)	<0.001
	30+	260,790 (25.6)	9767 (28.5)	<0.001	18,332 (27.3)	<0.001	6291 (27.8)	<0.001
Psychoactive substance use	<30	149,502 (77.2)	4191 (73.5)	<0.001	9604 (76.7)	0.191	2542 (69.8)	<0.001
	30+	823,107 (80.8)	28,371 (82.9)	<0.001	55,994 (83.3)	<0.001	18,604 (82.1)	<0.001
Difficulties with housing	<30	2957 (1.5)	153 (2.7)	<0.001	275 (2.2)	<0.001	84 (2.3)	<0.001
	30+	29,534 (2.9)	1294 (3.8)	<0.001	2611 (3.9)	<0.001	802 (3.5)	<0.001
Difficulties with social environment	<30	2038 (1.1)	99 (1.7)	<0.001	220 (1.8)	<0.001	75 (2.1)	<0.001
	30+	26,614 (2.6)	1637 (4.8)	<0.001	3012 (4.5)	<0.001	1091 (4.8)	<0.001
Difficulties with partner	<30	10,013 (5.2)	430 (7.5)	<0.001	790 (6.3)	<0.001	284 (7.8)	<0.001
	30+	56,265 (5.5)	2355 (6.9)	<0.001	4326 (6.4)	<0.001	1659 (7.3)	<0.001

* pvalue of the comparison to the reference period proportion in each group.

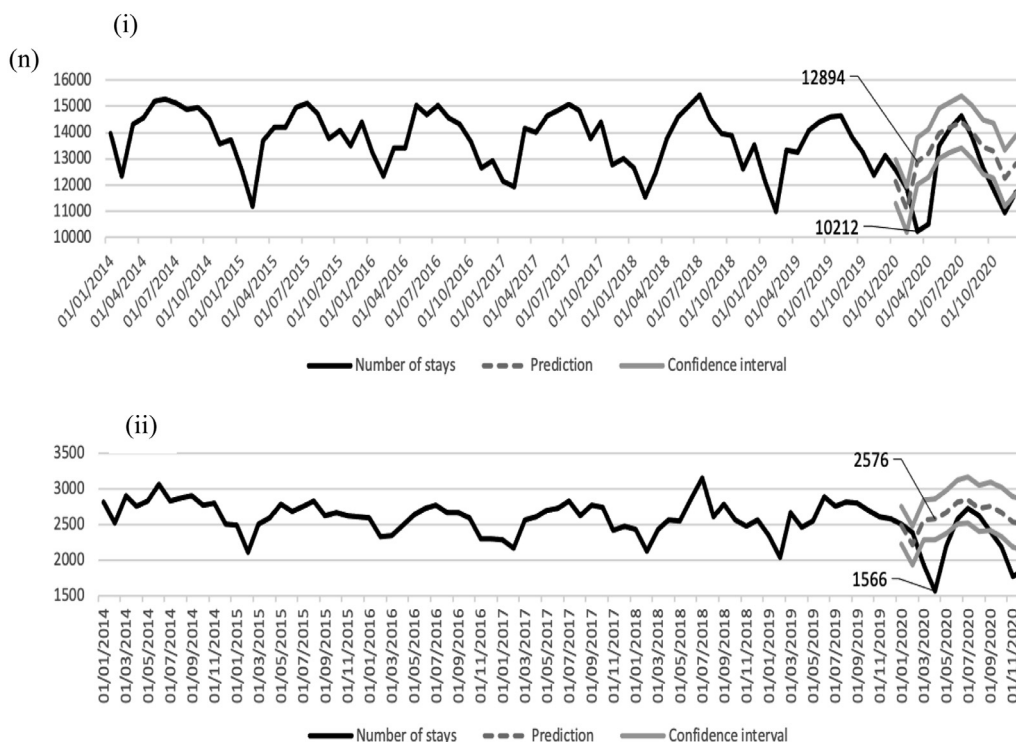


Fig. 1. Interrupted time series of incidence of hospitalizations due to psychoactive substance intoxication in patients aged under 30 years old (i) and 30 years and over (ii).

son for hospital admission, the proportion of suicide attempts increased specifically among young adults during the lockdowns, whereas the rate was even slightly decreased in middle- and older-aged adults between the lockdowns (Table 3). Domestic violence increased throughout the pandemic period in both age groups, and rates of aggressions and road accidents were also higher in both age groups between the lockdowns. The proportion of serious hospitalizations was increased during the first lockdown and between lockdowns in both age groups. However, the rates of discharge to home were reduced in young adults and the rates of transfer to psychiatric units increased in young adults, particularly during the second lockdown (17.1% versus 11.4% during the reference period; $p < 0.001$) (Table 3).

Discussion

We estimated the significant burden of social use leading to admission to general hospital in France by comparing the COVID-19 pandemic period and previous years. In line with the prevalence of substance use in France and the increase in benzodiazepine prescription during the pandemic, alcohol, benzodiazepines and cannabis were the substances mostly involved in hospitalizations due to psychoactive substance intoxication (Douchet, 2022; *Drogues et Addictions, Chiffres Clés - OFDT, n.d.*). In young adults, a large decrease in hospitalizations due to psychoactive substance intoxication was observed during the lockdowns, so social use probably accounted for up to four hos-

Table 2
Types of psychoactive substance involved in hospitalization during Covid-19 pandemic in adults according to age (<30 and 30+).

Psychoactive substance	Age group	Reference period $n_{<30} = 193,570$ $n_{30+} = 1018,498$		First Lockdown lifting $n_{<30} = 12,517$ $n_{30+} = 67,180$		p-value	First lockdown $n_{<30} = 5700$ $n_{30+} = 34,232$		p-value	Second Lockdown $n_{<30} = 3643$ $n_{30+} = 22,667$		p-value
		n	time-person (/1000)	n	time-person (/1000)		n	time-person (/1000)		n	time-person (/1000)	
Alcohol	<30	144,760	748	3936	691	0.005	9198	735	0.507	2378	653	<0.001
	30+	803,981	789	27,445	802	0.471	54,263	808	0.290	18,030	795	0.741
Cannabis	<30	9009	47	372	65	0.008	713	57	0.31	222	61	0.166
	30+	12,256	12	613	18	0.270	1138	17	0.350	390	17	0.350
Psychostimulant	<30	640	3	26	5	0.479	58	5	0.479	20	5	0.479
	30+	575	1	34	1	NA	57	1	NA	20	1	NA
Benzodiazepine	<30	49,516	256	1755	308	0.010	3234	258	0.918	1242	341	<0.001
	30+	245,862	241	7828	229	0.527	14,495	216	0.183	5188	229	0.527
Cocaine	<30	3963	20	175	31	0.119	334	27	0.301	119	33	0.070
	30+	7300	7	353	10	0.465	709	11	0.344	259	11	0.344
Opiates	<30	2538	13	83	15	0.703	173	14	0.846	61	17	0.461
	30+	10,086	10	362	11	0.826	760	11	0.826	241	11	0.826
Polysubstance use	<30	11,741	61	449	79	0.115	832	66	0.650	305	84	0.050
	30+	72,512	71	2658	78	0.551	4769	71	NA	1700	75	0.731

*pvalue of the comparison to the reference period proportion in each group; NA: not applicable.

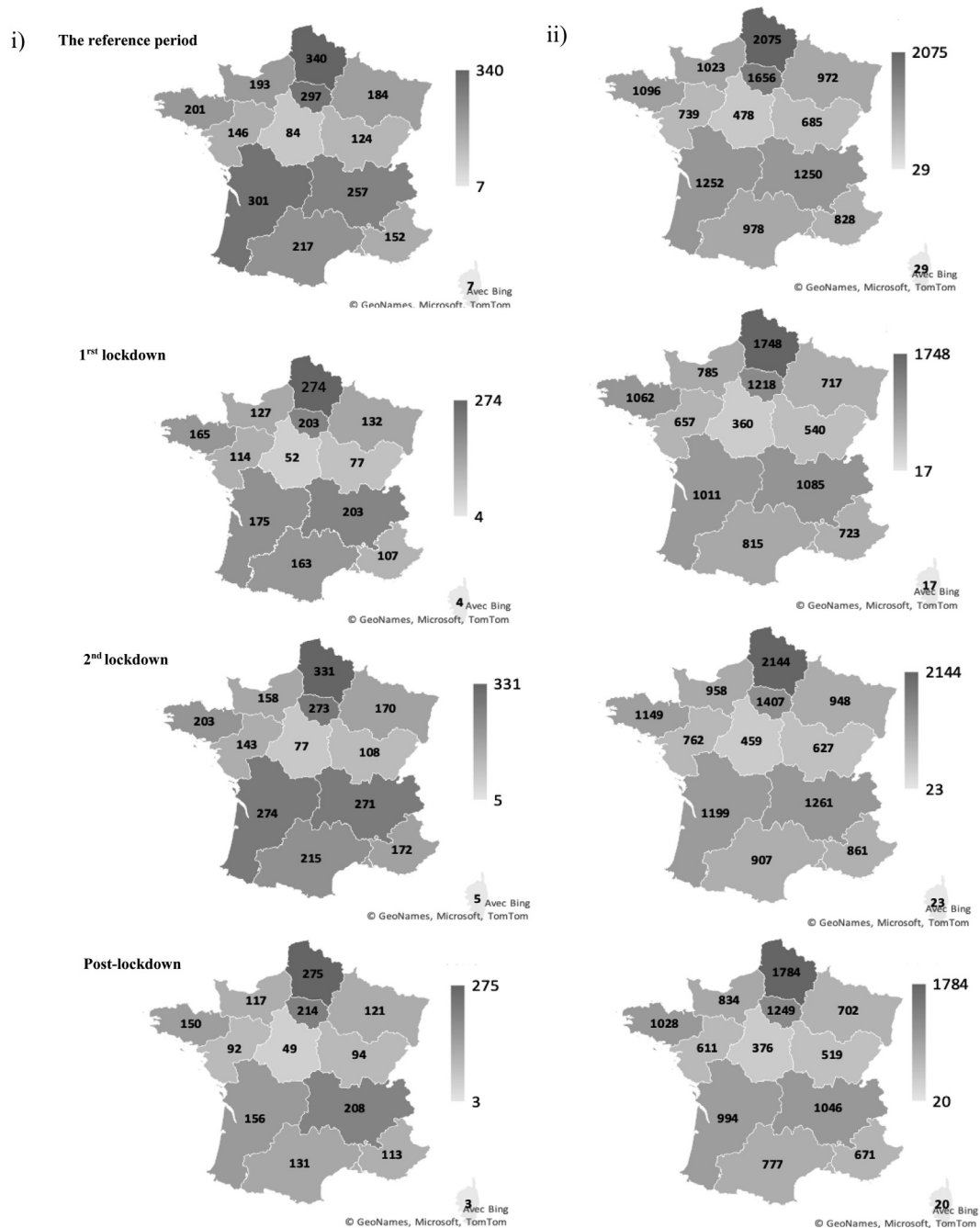


Fig. 2. Distribution of hospitalizations standardized on 30 days associated with psychoactive substance intoxication in Metropolitan French regions according to period in young adults (i) and middle or older-aged adults (ii).

pitalizations out of ten. The characteristics of patients and the reasons for their admission to hospital in this context were quite different within the pandemic period, with higher rates of inpatients presenting with psychiatric disorders, substance use disorders and suicidal behaviors.

A significant number of admissions to general hospital for acute psychoactive substance intoxication may have been due to recreational use in young adults which often occurred in a social context (EMCDDA, 2022). This hypothesis is supported by some of the present findings. First, the number of hospitalizations for acute psychoactive substance intoxication decreased during the lockdowns, especially in young adults. Second, the proportion of psychoactive substance users among patients hospitalized also decreased, i.e. patients known to use psychoactive substances without a diagnosis of substance use disorders.

This is consistent with a European survey that assessed the impact of COVID-19-related restrictions in 10,600 usual drug users with an average age of 29 years: the use of ecstasy and cocaine decreased during lockdown due to fewer opportunities (European Monitoring Centre for Drugs and Drug Addiction (2020), Impact of COVID-19 on patterns of drug use and drug-related harms in Europe, EMCDDA Trendspotter briefing, Lisbon., 2020). In another survey, most Australian people with at least monthly use of illicit stimulants and an average age of 24 years (70%) reported a decreased use of ecstasy from March 2020, mostly for social reasons (Price et al., 2021). Third, alcohol was less implicated in intoxications during the pandemic and particularly during the two lockdowns, especially in young adults. This is in line with a national study based on hospital data on acute alcohol intoxication which also reported a decrease during the pandemic (Karila et al., 2021). Further-

Table 3
 Characteristics of hospitalizations for psychoactive substance intoxication during Covid-19 pandemic and within reference period (2014–2019), in adults according to age (<30 and 30+).

	Age group	Reference period	First lockdown	P _{value} *	Between both lockdowns	P _{value} *	Second Lockdown	P _{value} *
		n (<30 = 193,570 n ₃₀₊ = 1018,498)	n (<30 = 5700 n ₃₀₊ = 34,232)		n (<30 = 12,517 n ₃₀₊ = 67,180)		n (<30 = 3643 n ₃₀₊ = 22,667)	
Suicide attempt	<30	53,001 (27.4)	2000 (35.1)	<0.001	3525 (28.2)	0.058	1349 (37.0)	<0.001
	30+	243,655 (23.9)	8232 (24)	0.595	14,840 (22.1)	<0.001	5308 (23.4)	0.078
Agression	<30	5018 (2.6)	166 (2.9)	0.135	427 (3.4)	<0.001	92 (2.5)	0.801
	30+	11,482 (1.1)	551 (1.6)	<0.001	1020 (1.5)	<0.001	297 (1.3)	0.01
Road accident	<30	8428 (4.4)	278 (4.9)	0.057	744 (5.9)	<0.001	156 (4.3)	0.833
	30+	17,268 (1.7)	604 (1.8)	0.331	1494 (2.2)	<0.001	364 (1.6)	0.301
Domestic violence	<30	6134 (3.2)	247 (4.3)	<0.001	440 (3.5)	0.033	162 (4.4)	<0.001
	30+	34,735 (3.4)	1478 (4.3)	<0.001	2596 (3.9)	<0.001	1004 (4.4)	<0.001
Serious hospitalization	<30	10,926 (5.6)	410 (7.2)	<0.001	776 (6.2)	0.009	231 (6.3)	0.0714
	30+	81,000 (8)	2842 (8.3)	0.019	5579 (8.3)	0.001	1695 (7.5)	0.009
Psychiatric unit transfer	<30	22,113 (11.4)	857 (15)	<0.001	1550 (12.4)	0.001	622 (17.1)	<0.001
	30+	120,065 (11.8)	3755 (11.0)	<0.001	7387 (11.0)	<0.001	2634 (11.6)	0.438
Medical unit transfer	<30	7244 (3.7)	262 (4.6)	0.001	564 (4.5)	<0.001	162 (4.4)	0.027
	30+	49,803 (4.9)	1834 (5.4)	<0.001	3330 (5)	0.436	1140 (5.0)	0.336
Home Discharge	<30	162,432 (83.9)	4531 (79.5)	<0.001	10,295 (82.2)	<0.001	2827 (77.6)	<0.001
	30+	813,104 (79.8)	27,412 (80.1)	0.27	54,006 (80.4)	<0.001	18,052 (79.6)	0.47

more, a cross-sectional online survey conducted in 21 European countries between 24 April and 22 July 2020 found a decrease in alcohol use, especially in heavy episodic drinking events (Kilian et al., 2021). A prospective longitudinal cohort study conducted in young Australian adults showed a 17% decline in alcohol use, and a 35% decline in the rate of alcohol-related harm over the same period compared with February 2020 (Clare et al., 2021). Fourth, the *Nouvelle-Aquitaine* area was the most concerned by this large decrease observed in young adults during the two lockdowns. In a study performed at the University Hospital of Bordeaux (main hospital in the region), the decrease in hospitalizations related to acute psychoactive substance intoxication in young adults was mainly due to the decrease in alcohol and ecstasy acute intoxications (J. Perino, H. Ramarosan, N. Ong, V. Lancelot, J. Bezin, V. Gilleron, A. Daveluy & M. Tournier, 2022). Thus, preventive interventions aimed at social and festive events could be useful. Indeed, a review of the literature on early intervention, harm reduction, and management of substance use problems in young people underlined the paucity of data regarding effective interventions in this population and encouraged research on this topic (Stockings et al., 2016).

During the lockdowns, young adults hospitalized for acute psychoactive substance intoxication presented more often with psychiatric comorbidities and substance use disorders than in the reference period. Although many teleconsultations were conducted during the lockdowns, the overall decrease in access to care in this vulnerable population corroborates these results (Chevance et al., 2020). Higher rates of suicide attempt were observed in young adults during the two lockdowns than in the older group. At the same time, high exposure to benzodiazepines was more often involved in hospitalizations during the two lockdowns in young adults than in the older group. Reasons for this benzodiazepine use over the pandemic period may be the following: i) they are often involved in intentional drug overdose, alone or in association with alcohol and other drugs; ii) the psychiatric vulnerability of young adults during the lockdowns may have led to the broad prescription of benzodiazepines in this population, making them more available and facilitating their misuse (Baldwin, 2022). This increase in prescription might have particularly concerned patients with psychiatric disorders or substance use disorders. In addition, since patients with psychiatric disorders are more likely to present with substance use disorders, this might explain their over-representation in the study population during the lockdowns (Schuckit, 2006). Thus, the higher schizophrenia rates found only in young adults hospitalized for psychoactive substance intoxication during the pandemic period might be consistent with (i) a high exposure to cannabis in this population and (ii) the harmful impact

of cannabis use on psychiatric health (Hasan et al., 2020; Johnson et al., 2021; Koskinen et al., 2010; Verdoux & Tournier, 2004; Wang et al., 2022).

The increase in road accidents and domestic violence in the context of acute psychoactive substance intoxication observed in both age groups after the lifting of the first lockdown is another concern. Use of psychoactive substances and alcohol is known to be associated with these adverse events (Lindenbaum et al., 1989). Lockdown has been associated in many studies with a considerable decrease in road accidents and domestic violence (Calderon-Anyosa & Kaufman, 2021; Jacob et al., 2020; Rhodes et al., 2020), but no study to date has reported such an increase from the end of lockdown. The sudden return to social life after a long period of isolation may have been associated with the end of cautious behavior and more risk-taking. Moreover, we hypothesize that people were less used to psychoactive substances and that drug tolerance was reduced after the lockdown, with a higher subsequent impact of acute intoxication on attention and aggression. This issue requires further investigation.

Limitations and strengths

This is the first study to assess the nationwide impact of the COVID-19 pandemic on hospitalizations for acute psychoactive substance intoxication according to age. A particular strength is the monitoring of the incidence of hospitalization, which provides an appraisal of the impact of psychoactive substance use on healthcare. Data was collected by using a national hospital database, which provided a large sample size and inclusion of the general population. However, psychiatric hospitalization data was not included, so the harmful effects of psychoactive substance use may have been underestimated. In addition, an inherent limitation of the codes used is the lack of precision and the risk of formulation errors. For example, more precise information for benzodiazepines would have thrown light on their involvement in suicide attempts. The sources of psychoactive substances were unknown, and there was no specific information on prescribed medication. Motivations and contexts of psychoactive substance use were not recorded in the database. Finally, during the lockdowns and the pandemic period, people avoided going to hospital as they were afraid of contracting the virus (Frank, 2022; Morgand et al., 2022). Hence, the study may have underestimated the monthly incidence of severe psychoactive substance intoxication over this period. However, patients with acute psychoactive substance intoxication and without hospitalization were less likely to present with severe conditions.

Conclusion

The incidence of hospitalizations for psychoactive substance intoxication decreased during the lockdowns in both age groups, but the decrease was greater in young adults. The COVID 19 lockdowns may have reduced the social use of psychoactive substances and led to fewer hospitalizations for acute intoxication among young adults. This highlights the potential burden of recreational and experimental use; which could be an important target for preventive interventions. Such interventions would need to be tailored according to age, the type of psychoactive substances and the area of residence.

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Ethics approval

This work was conducted in compliance with the French Regulations (MR005). Because this was a retrospective study using an anonymized database and had no influence on patient care, ethics committee approval was not required. The protocol of this study was declared to the Health Data Hub (registration number: F20220825095155).

Declarations of Interest

Authors have no conflicts of interest to declare.

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