Health status of users of the Bologna local health authority drug addiction treatment services: a study of hospital admissions in the period 2004-2013

Lo stato di salute degli utenti tossicodipendenti dei servizi per le dipendenze dell'ASL Bologna. Uno studio sui ricoveri ospedalieri nel periodo 2004/2013

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INTRODUCTION

The use of psychoactive substances can have profound consequences on health, either in terms of morbidity or mortality. It is estimated that 0.5% of deaths and 1.8% of lost years of life, in the general population, are due to drug use, as a consequence of infectious diseases, in association with injective drug abuse, suicide and specific disorders of drug use [1].
With regard to opioids, epidemiological studies estimate that a rate of 2-10% mortality among a population aged 15-49 may be due to opioid consumption, and AIDS and overdoses are the most frequent causes of death [2-4]. Problematic cocaine consumption also increases the risk of morbidity, disabilities and early death. The findings of several cohort studies have shown that the mortality risk of cocaine users is four to eight times higher than that of the general population, especially for HIV-positive people and for those who inject the substances [5].
Hospital admissions data of drug addicts can be useful to identify health-related disorders which are not demonstrable from other information sources [6, 7]. In the highly developed countries, it is estimated that 5% of hospital admissions are related to illegal substance use [8]. The admissions mainly concern the departments of internal medicine, cardiology and pulmonary medicine, and refer to the blood system and respiratory disorders [9].
Hospital admission for HIV-positive drug addicts is significantly higher compared to the HIV-negatives, and it is largely due to complications arising from injective consumption [10].
Cannabis consumption also seems to have severe complications such as causing hospital admission, especially due to psychiatric disorders, acute intoxications, respiratory system and cardiovascular disorders [11].
In general, for the Italian situation, by considering equal age and gender, drug addicts are more likely to be hospitalized as compared with the general population. Furthermore, both health problems and access to treatment constitute additional problems, as a result of the gradual ageing of SERT clients.
In a study relating to the 1997-1998 period and involving a drug addict cohort of the services for drug addiction (SERT) in Bologna, the standardized hospitalization rate was 440 out of 1000 in 1997 and 438 out of 1000 in 1998, in males; for the

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same rate, in 1997 it was 237 out of 1000 and it was 212 out of 1000 in 1998, in females.
Drug addicts account for 2.7% of total admissions and for 5.5% of overall bed days. Comparing SERT clients with the general population, higher percentages of hospitalization due to infectious diseases, mental disorders and hepatic diseases can be found [12].
In a cohort study conducted on SERT clients in the 2005-2010 period in the Lazio region, where they were resident, and in which primary diagnosis of the first hospital admission was considered, the hospitalized ratios were no different from those of the general population. The ratios were significantly higher than the value of the population, only because of specific reasons, for instance, infectious diseases, hepatitis, liver cirrhosis, mental disorders and overdoses [13].
Other research was carried out by selecting the drug-related diagnosis of the analysis of the hospital dismissal charts (SDO). This method has led to the development of direct markers in order to assess illegal substance consumption, which are useful in planning specific health policies [14].
In Italy, it is estimated that in 2011 there was a rate of drug-related admissions of 35.7 per 100,000 inhabitants, decreasing by 3.2% as compared with the previous year [15]. For specific populations, in studies performed in the Emilia Romagna region in the period between 1994 and 2009, we can observe an increase in the number of drug-related admissions among subjects born abroad and for cannabis abuse or addiction [16, 17].
The purpose of this study is to monitor the state of health of the users of the services for drug addiction (SERT) in the metropolitan area of Bologna by means of the analysis of the hospital dismissal charts (SDO). In particular, considering the 2004-2013 time period, the hospital admission trend will be compared with that of the general population.

PATIENTS AND METHODS

The reference period was from 01/01/2004 to 31/12/2013; the study area was the metropolitan area of Bologna, corresponding to the local health unit of Bologna (AUSL).
All resident patients aged between 15-64 who were released from hospitals or had been treated by one of the several SERTs provided by the local health unit of Bologna, were included.
All hospital and approved private care agency admissions relating to resident subjects in the metropolitan area of Bologna were selected.
For SERT clients, separately for each year of taking in charge (broken down by year of access to the SERT) all the prevailing cases of consumption/abuse of illegal substances were included in this study.
By using the record-linkage with SDO, it was possible to recreate each patient's hospital admission history.
Data sources SERT use a regional computerized system of health records, containing data related to the date of taken care/year of SERT access, demographics, health and social data, treatments administered and primary substance of abuse. Access to the services implies the definition and the start of a therapeutic plan, which must be agreed with the user and coherent with the diagnosis. Data concerning the beginning and the end of the access to SERT services/taken care, age, gender, nationality, and primary substance of abuse, HIV and hepatitis C have been used.
For hospital admissions, data of the hospital dismissal charts have been examined and broken down into different diagnostic groups, in accordance with the ICD-IX classification.
All the data relating to the date of the admission, date of discharge, age, gender, nationality, type of admission, primary discharge diagnosis and secondary discharge diagnosis have been taken into account.
Statistical analyses Annual standardized hospitalization ratios by age have been calculated for both sexes (Standard Italia 2001) separately for SERT clients and non-SERT clients.
The number of people who had at least one hospital admission was calculated, differentiating by year, age, gender and diagnostic group.
This allowed us to estimate the likelihood of SERT clients admission, by adopting the age-adjusted odds ratio.

RESULTS

SERT clients - SERT clients increased from 2004 to 2013. Women account for a stable share, i.e. about 20%, while the average age and the percentage

of non-natives is increasing, although hepatitis C and HIV-positives are decreasing (Table 1).
For the primary substance, the percentage of subjects with diagnosis of heroin and cannabis abuse has fallen and the share of consumers of cocaine has increased.
Consumption patterns have also changed, with a decrease in intravenous injections. In fact, injective consumption of heroin fell from 68% in 2004 to 45% in 2013, and that of cocaine from 2.4% in 2004 to 0.8% in 2013.
For hospital admissions, the total number has decreased, mainly due to the drop in planned admissions. In fact, the number of unplanned admissions remained stable (433 in 2004, 412 in 2013), whereas the number of planned admissions fell from 195 in 2004 to 92 in 2013.
The drastic reduction in days of hospital admission and mean admission duration should be mentioned.
The proportion of people who had at least one hospital admission fell from 36% in 2004 to 23% in 2013. The mean age at the time of the admission rose, although the mean number of hospitalizations for each patient was stable.
Hospital admissions - For the period 2004-2013, both among the SERT clients and the general population, the proportion of people of both genders who had at least one admission decreased (Table 2). Considering the hospitalizations due to mental disorders, injury and poisoning, infectious and parasitic diseases, cardiovascular diseases, respiratory diseases and disorders of the digestive system, a higher prevalence may be observed among SERT clients, when compared with the general population.

Table 1 - Resident SERT clients aged 15-64. Prevalent cases by year of access to SERT services/taking care.

	Males										*Females*									
	2004	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*
Number of subjects	1396	1414	1371	1256	1786	1783	1812	1765	1738	1727	364	361	358	349	489	496	489	466	463	444
Mean age	36.1	36.6	37.4	38.0	37.6	38.3	38.8	39.5	40.2	40.7	35.3	35.8	36.7	37.3	36.3	36.6	37.3	38.1	38.7	39.4
% Non-native	5.4	7.3	9.0	9.7	9.6	8.9	8.5	8.6	9.1	9.8	3.8	5.3	4.2	3.7	5.5	6.5	6.1	5.4	5.0	5.2
% HIV+	11.7	11.6	11.5	11.8	9.0	9.1	8.3	8.4	8.7	8.8	18.1	17.2	15.9	16.0	12.5	10.9	11.9	12.7	12.5	12.8
% HepC+	49.7	46.7	47.2	49.2	40.2	41.1	42.1	42.9	43.4	43.5	56.3	53.7	53.4	52.1	41.1	38.7	42.9	45.1	47.3	49.8
% Primary substance heroin	75.1	74.7	75.2	78.6	74.5	75.6	74.8	75.2	75.3	72.8	82.4	82.5	84.9	83.1	82.6	82.7	83.8	82.8	82.9	83.6
% Primary substance cocaine	9.9	10.6	12.3	9.6	12.9	12.3	12.1	11.4	11.8	13.3	5.2	5.8	5.3	6.0	8.0	8.3	6.5	6.0	6.9	6.5
% Primary substance cannabis	9.9	10.5	8.5	8.3	8.8	8.2	8.0	8.5	8.8	9.2	5.8	5.5	5.0	6.3	5.1	4.6	4.3	4.7	4.5	4.1
% Other primary substance	5.1	4.2	4.1	3.5	3.7	3.9	5.0	4.8	4.1	4.7	6.6	6.1	4.7	4.6	4.3	4.4	5.3	6.4	5.6	5.9
Hospital admissions	447	413	413	418	383	360	389	374	343	376	181	176	167	196	204	153	146	138	155	128
Subjects hospitalized	265	240	222	225	226	207	240	209	215	207	99	89	87	95	107	87	80	71	81	71
Mean hospitalitazion/ each subject	1.7	1.7	1.9	1.9	1.7	1.7	1.6	1.8	1.6	1.8	1.8	2.0	1.9	2.1	1.9	1.8	1.8	1.9	1.9	1.8
Days of hospitalization	10075	9856	7779	7786	7346	6025	6976	5739	4319	4732	3262	2561	2742	4517	3534	2053	2292	1918	1981	1511
Mean hospitalization (days)	22.5	23.9	18.8	18.6	19.2	16.7	17.9	15.3	12.6	12.6	18.0	14.6	16.4	23.0	17.3	13.4	15.7	13.9	12.8	11.8

Table 2 - Male hospital admissions by diagnostic group – Values related to 1,000 residents *(*)*.

	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013	
	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop
Subjects with at least one admission	189.8	78.2	169.7	77.7	161.9	76.0	179.1	75.1	128.0	74.1	116.1	72.3	132.5	71.2	118.4	66.5	123.7	63.6	119.9	61.9
Infectious and parasitic diseases (1/139)	94.6	4.5	101.1	4.8	85.3	4.7	86.0	4.5	49.3	4.4	29.7	4.1	35.3	4.4	35.7	3.8	24.7	3.7	21.4	3.6
Mental disorders (290/319)	165.5	7.0	126.6	7.1	152.4	7.1	160.0	6.7	92.9	6.3	71.2	5.6	90.0	5.5	91.2	5.0	97.2	5.2	95.5	5.1
Cardiovascular disorders (390/459)	22.9	24.4	33.9	25.0	34.3	23.9	35.8	23.3	29.4	22.7	25.8	22.1	31.5	22.3	31.7	20.2	27.0	18.6	24.9	18.3
Respiratory system disorders (460-519)	25.1	10.3	25.5	10.4	18.2	9.8	27.1	9.8	22.1	9.4	24.1	9.6	23.2	9.2	28.3	8.5	16.7	8.1	16.2	7.7
Digestive system disorders (520/579)	50.9	18.5	53.7	19.0	42.3	18.8	61.3	18.0	50.4	17.1	51.6	17.0	55.2	17.4	52.1	16.5	47.8	15.0	63.7	14.3
Injury and poisoning (800/999)	34.4	13.2	31.1	13.2	36.5	13.0	36.6	12.3	26.6	12.4	33.7	11.8	32.0	11.8	30.0	11.0	26.5	10.6	26.6	10.9

(*) SERT clients were ruled out from the general population.

Table 3 - Female hospital admissions by diagnostic groups – Values related to 1,000 residents *(*)*.

	2004		2005		2006		2007		2008		2009		2010		2011		2012		2013	
	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop	SERT	Pop
Subject with at least one admission	272.0	121.7	246.5	119.8	243.0	119.1	272.2	117.1	218.4	116.8	175.4	109.7	163.6	103.9	152.4	98.1	174.9	97.2	159.9	93.0
Infectious and parasitic diseases (1/139)	159.3	3.4	97.0	3.2	106.1	3.4	157.6	3.1	136.7	3.0	40.3	2.6	22.5	3.0	34.3	2.9	21.6	3.1	31.5	2.7
Mental disorders (290/319)	250.0	8.8	238.2	8.1	237.4	8.1	252.1	8.3	171.4	7.0	149.2	6.1	137.0	5.9	154.5	5.3	159.8	5.8	139.6	5.4
Cardiovas-cular disorders (390/459)	44.0	16.9	41.6	16.4	27.9	15.9	65.9	15.4	40.8	15.0	22.2	13.9	20.4	13.7	36.5	12.5	25.9	11.5	24.8	10.7
Respiratory system disorders (460-519)	35.7	7.3	30.5	7.2	33.5	7.0	40.1	7.2	55.1	7.3	30.2	7.4	24.5	6.8	27.9	6.4	34.6	5.8	33.8	6.1
Digestive system disorders (520/579)	52.2	13.8	44.3	13.2	67.0	13.4	63.0	13.7	55.1	13.2	34.3	12.5	53.2	12.2	47.2	12.2	32.4	11.9	58.6	11.5
Injury and poisoning (800/999)	27.5	8.1	44.3	8.6	30.7	7.9	34.4	6.7	42.9	7.0	24.2	6.8	16.4	6.9	17.2	6.4	28.1	6.9	13.5	6.4

(*) SERT clients were ruled out from the general population.

Table 4 - Hospital admission odds. SERT clients versus general population (*). Odds age-adjusted ratio, CI 95%.

		Males		*Females*	
		OR	*CI 95%*	*OR*	*CI 95%*
All causes	2004	3.16	2.76-3.62	2.50	1.98-3.16
	2013	2.08	1.79-2.40	1.83	1.42-2.36
Infectious and parasitic diseases	2004	21.36	16.95-26.92	46.22	32.84-65.05
	2013	6.83	4.72-9.88	10.84	5.75-20.41
Mental disorders	2004	27.55	22.78-33.31	33.19	24.30-45.33
	2013	17.06	13.70-21.25	21.59	14.70-31.70
Cardiovascular disorders	2004	1.59	1.08-2.34	4.05	2.25-7.29
	2013	1.44	1.02-2.03	2.35	1.16-4.76
Digestive system disorders	2004	2.78	2.06-3.76	4.61	2.74-7.77
	2013	2.94	2.26-3.83	3.47	2.03-5.92
Injury and poisoning	2004	3.32	2.46-4.46	3.62	1.70-7.68
	2013	2.39	1.71-3.34	2.71	1.21-6.10

(*) SERT clients were ruled out from the general population.

The prevalence in all diagnostic groups decreases over time, except that of the cardiovascular diseases, among males, and that of digestive system disorders among both genders, in which the prevalence increases (Tables 2 and 3).

Hospital admission odds ratios: SERT clients versus general population - Relating to 2004 and 2013 and considering all the subjects who had at least one hospitalization, to estimate the probability of SERT clients, compared to non-SERT clients, odds age-adjusted ratios on the total and for each diagnostic group were calculated (Table 4).

The incidence of hospital admission is always higher for SERT clients than for the general population, even though the odds ratio was lower in 2013 than in 2004, for both males and females, most notable in the infectious diseases and in the mental disorders groups. The same reduction is also apparent in the cardiovascular disorders and injuries groups. For the digestive system disorders, the odds ratio slightly increases for the male group and decreases for the females.

Hospital admission rates - For both genders, SERT clients and general population, standardized hospital admissions ratios decreased over the period. Among SERT clients the decrease is more significant, as compared with that of general population, for both males, among whom in 2013 the figure dropped by 35% (general population 25%) compared to 2004, and females, among whom from 2004 to 2013 the figure fell by 48% (general population 33%). Data are given in Table 5.

DISCUSSION

The field of drug addiction has evolved significantly for both the epidemiological context and the reorganization of health assistance.

Several problems, such as the diversified composition of the substances placed on the market, the changes in the target population who benefit from measures, and the chronicity of drug addiction, are added to the evaluation problems related to the illegal and hidden nature of the consumption. Hence, the knowledge and the constant monitoring of this changing phenomenon is prioritized, along with the characteristics of the subjects, health and the social emerging problems, in order to devise specific measures.

Table 5 - Standardized hospitalization ratios /1,000 residents (Standard Italia 2001)

	Males				*Females*			
	SERT		*Population (*)*		*SERT*		*Population (*)*	
	Rate	*CI 95%*	*Rate*	*CI 95%*	*Rate*	*CI 95%*	*Rate*	*CI 95%*
2004	330.165	302.03-358.30	109.49	108.30-110.68	547.60	490.67-604.53	161.40	160.00-162.80
2005	285.616	259.85-311.38	107.08	105.90-108.26	515.63	464.13-567.14	155.17	153.79-156.55
2006	271.931	246.85-297.01	103.72	102.56-104.89	485.39	432.08-538.70	151.23	149.87-152.59
2007	336.236	308.20-364.27	101.11	99.97-102.26	539.48	486.56-592.41	148.36	147.01-149.70
2008	221.797	201.84-241.75	99.367	98.24-100.50	460.88	417.79-503.97	148.11	146.77-149.44
2009	199.709	180.64-218.77	96.723	95.61-97.84	337.28	294.25-380.30	146.61	145.28-147.93
2010	217.435	197.83-237.04	94.779	93.68-95.88	305.03	263.91-346.15	138.45	137.16-139.73
2011	212.636	193.41-231.86	86.286	85.25-87.32	295.11	254.14-336.09	131.47	130.20-132.74
2012	191.952	173.21-210.69	82.428	81.41-83.44	324.90	282.80-366.99	131.31	130.04-132.58
2013	215.907	195.81-236.01	82.157	81.13-83.18	283.20	242.20-324.21	124.38	123.15-125.60

(*) SERT clients were ruled out from the general population.

Limitations - This study presents several limitations, mostly attributable to the epidemiological use of data originally created for administrative purposes.
It is worthwhile mentioning the lack of prior "case definitions" as well as unavoidable accuracy and precision errors, also in the reproducibility of the medical codification [18].
Reports - For the overall framework, while a reduction of substance use among the general population is reported by other sources, a few studies show a gradual increase in hospital admissions related to substance abuse, concurrently with the economic crisis. This fact may involve both an increased frequency of related-problems and a higher severity of these, which should have required more intensive care interventions [19, 20].
For the results of our study, over time the change in the characteristics of SERT clients, whose average age is increasing year by year and among whom the share of non-natives is growing, should be noted. Significant changes may also concern the primary substances of abuse (*i.e.*, less heroin, more cocaine) and the consumption patterns, with a decrease in the injective use. The number of hepatitis C and HIV-positives is constantly decreasing, although it remains significant.
This has an impact on the observed drop in the SERT client hospitalization ratios; they are decreasing more radically, even though they remain higher than that of the general population.
The same trend can be observed by analyzing the odds of hospitalization which, although more elevated than that of the general population, are decreasing with time, in particular the hospital admissions due to infectious diseases.
That result may be partly attributable to the delivery of SERT services and to the local healthcare system that partially averts and replaces hospitalization. The identification of the SERT client as a "sick" person also contributes to increasing the attention towards his/her own state of health, leading to abandonment of dangerous lifestyles and the adoption of a "normal" life.
All these findings are closely linked to each other, and they will require need further targeted research in the future.

CONCLUSIONS

On the one hand, the findings describe the characteristics of the subjects who decided to turn to a health care system in order to solve their addiction problems, by changing their lifestyles and their risk-taking behaviors, as a consequence. On the other, this study highlights the results of a health care local system that appears to be effective not only in the treatment of drug addiction, but also in taking care of all health-related disorders.

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Competing interest
None to be declared.

Keywords: hospital admissions, drug addiction, infectious diseases.

SUMMARY

The aim of this study was to monitor the health status of the users of the services for drug addiction (SERT) in the metropolitan area of Bologna by analysing the hospital discharge records (SDO). For the period 2004-2013, among the residents of the metropolitan areas aged 15-64, we compared the trend in hospital admissions of SERT users with that of the general population. We calculated the standardised rates of hospitalisation and the likelihood of admission. Over the period in question the standardised hospitalisation rates decreased, with a larger drop among SERT users (330.17 males per 10,000 inhabitants in 2004, 215.91 in 2013; 547.60 females per 10,000 inhabitants in 2004 , 283.20 in 2013) as compared with the general population (109.49 males in 2004, 82.16 in 2013; 161.40 females in 2004, 124.38 in 2013). Admission likelihood was always higher for SERT users, but was lower in 2013 than in 2004, especially for infectious diseases and psychic disorders. The results highlight the effectiveness of Bologna's local system of services in taking care of aspects connected to addiction, as well as health-related disorders.

RIASSUNTO

Obiettivo di questo studio è il monitoraggio dello stato di salute degli utenti dei servizi per le tossicodipendenze dell'area metropolitana di Bologna mediante l'analisi delle schede di dimissione ospedaliera (SDO). Relativamente al periodo 2004/2013, tra i residenti nell'area metropolitana di Bologna di età 15/64 anni, è stato confrontato l'andamento dei ricoveri ospedalieri dei tossicodipendenti utenti dei SERT con quello della popolazione generale. Sono stati calcolati i tassi standardizzati di ospedalizzazione e la probabilità di ricovero. I tassi di ricovero standardizzati sono in diminuzione, con un calo più consistente tra gli utenti SERT (maschi anno 2004 tassi standardizzati per 10 mila anni persona 330.17, anno 2013 tasso 215.91; femmine anno 2004 tasso 547.60, anno 2013 tasso 283.20) rispetto alla popolazione generale (maschi anno 2004 tassi standardizzati per 10 mila anni persona 109.49, anno 2013 tasso 82.16; femmine anno 2004 tasso 161.40, anno 2013 tasso 124.38). La probabilità di ricovero è sempre più elevata per gli utenti SERT , ma si riduce nel 2013 rispetto al 2004, in modo più accentuato per le malattie infettive e per i disturbi psichici. I risultati evidenziano l'efficacia di un sistema di servizi a livello territoriale nel prendersi cura sia degli aspetti connessi alla dipendenza, che delle problematiche di tipo sanitario.

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