Utilisation of inpatient psychiatric services by people with illicit substance abuse in Switzerland

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Summary

Questions under study: The study aims to examine the utilisation of inpatient psychiatric services by people with substance use disorders (SUD), and to identify factors that predict inpatient service use.

Methods: Out of a sample of consecutively referred first-admitted patients from a catchment area in Switzerland, a cohort of 563 individuals with behavioural and mental disorders due to (illicit) substance use was followed over a period of 5 years by means of register data.

Results: Every fourth individual of the first-admission sample was admitted for a SUD. Over the 5-year period, average number of inpatient episodes (1.7) was comparable to that of patients with other diagnoses; time in hospital, however, was by far shorter (cumulative: 21 days). 61.6% of the individuals with SUD were treated as inpatients only once; 41.4% were not regularly dis-charged. Clinical patient characteristics (psychiatric co-morbidity, admission state, clinical improvement during first inpatient stay) and treatment measures (psychotherapy during first inpatient stay, planned aftercare) were the most important predictors of inpatient psychiatric service use over the 5-year period. Associations with socio-demographic background factors were only weak.

Conclusions: These findings suggest that a high number of patients with SUD are contacting inpatient services, but retention in treatment so far is not sufficient for an adequate drug treatment. Efforts need to be intensified to advance the diagnostic process and to improve current treatment strategies in order to achieve better clinical outcomes.

Key words: substance use disorder; psychiatric hospitalisation; length of stay

Introduction

Substance abuse is a significant public health problem. In psychiatric populations estimates of substance abuse range from 25% to 75% depending on the substances for which patients have been screened, the method of assessment, the geographical region, the time period covered (eg point *vs* lifetime prevalence) and the type of facility [1]. Substance abuse accounts for the most common and clinically significant comorbidities among patients with severe mental illness [2, 3]. Among psychiatric inpatients, those with substance use disorders (SUD) are one of the major patient groups as well [4, 5]. Different studies revealed that patients with co-occurring substance use disorders utilise more treatment resources, ie have a higher mean number of admissions and longer psychiatric inpatient stays as compared to patients without this comorbidity [6–11]. Mostly because of more acute psychiatric inpatient treatment, their psychiatric treatment costs are much higher than those of non-abusers [12].

High rates of *unmet treatment need* concerning substance abuse repeatedly have been reported in drug dependents [13, 14]. In two state-wide studies eg, less than 10% of emergency department patients needing substance abuse treatment (respectively 9% of persons without insurance coverage reporting drug dependence symptoms) currently received any. Therefore, a diagnosis of substance abuse is likely to increase the probability of repeated referral to emergency departments [13, 15]. Research on heavy users of acute psychiatric inpatient care suggests that alcohol dependence is one of the significant predictors for a high number of hospital stays, whereas it does not significantly contribute to the prediction of the cumulative length of hospital stay [16].

Services research studies on patients with SUD however, are not without limitations. Many findings are based on samples that include all patients of a hospital or mental health service (eg emergency departments) thus covering a broad

range of mental disorders and degrees of severity. It is not clear from such research which are the patterns of utilisation and which risk factors carry weight within specific disease groups [17]. Most studies confined to substance abusers focused on patients with alcohol use, but few on illicit drug use [1]. Besides, there are only few studies that have examined *inpatient* service utilisation over longer follow-up periods. Moreover, assessments of substance dependence are often constrained by the fact that surveys are solely based on participants' self-reports. A further crucial point is that the bulk of the pertinent studies stems from the US or from other English-speaking countries. These results may not be entirely generalisable to European countries due to a different contextual background (ie specific mental health care systems; economic, cultural differences). For all these reasons, the extent of, and the factors associated with, the util-

isation of inpatient services by people with mental disorders due to illicit substance use within our health system is still not very well understood.

In the present study, we therefore analysed patterns of inpatient psychiatric service utilisation in a defined catchment area in Switzerland. Psychiatric register data were used to study patients with SUD over a period of five years. Specifically, we addressed the following questions:

– To what extent do patients hospitalised for illicit substance abuse utilise psychiatric inpatient resources (in terms of cumulative length of inpatient treatment and number of inpatient episodes over a 5-year period after first admission)?

– Which demographic and clinical characteristics predict inpatient service use in these patients?

Subjects and methods

Subjects

The basic sample comprises all first-admitted patients aged 12 to 65 years, who received treatment in one of the seven psychiatric hospitals in the Canton of Zurich/ Switzerland during the period January 1, 1995 to December 31, 1996. Because of the longitudinal design of the study, foreign nationals other than settled residents were excluded.

Patients were traced using the central psychiatric register of the Canton of Zurich, which covers all mental health services in a catchment area of about 1.2 million people. All psychiatric hospitals are legally mandated to report admissions and discharges to the register. Thus, all inpatient episodes within this catchment area are recorded. Patients were identified by means of computerised record linkage on the basis of 18 defined matching criteria. The method of this record linkage is detailed elsewhere [18].

In the present study, only individuals with illicit drug use were analysed, ie patients with the diagnosis of a mental and behavioural disorder due to psychoactive substance abuse other than alcohol, nicotine or sedatives (ICD-10, F11–F19; except F13, F17) [19]. In Switzerland, patients with alcohol use disorders are rather admitted to somatic than to psychiatric hospitals. Those treated in psychiatric hospitals for alcohol-related problems are only a small group, not representative for alcohol use disorders. We therefore excluded patients with an ICD-10 F10 diagnosis. This resulted in a sample size of 563 first-admitted patients with 964 documented inpatient episodes over the study period. 10.7% of this sample was diagnosed with a second psychiatric diagnosis other than SUD (dual diagnosis).

Measures

A 5-year period of time individually calculated from the date of first admission onwards was considered to analyse inpatient service utilisation. We analysed service use in terms of both, readmission rate and cumulative length of inpatient stay, which are the most common measures of service use [20].

Information on the subjects' target episode covering demographic, diagnostic and treatment-related variables was drawn from the psychiatric register. Data of this register are collected by standardised forms that are to be completed at admission and at discharge. All measures are defined in a comprehensive manual [21]. The hospital physician in charge of the respective patient is responsible for the documentation. Completion of forms and consistency of information is regularly monitored.

Socio-demographic information obtained from the records included the patient's gender, age at first admission, employment status (employed: fulltime, part-time, in training; not employed) and living situation (living with others, alone, in institution, homeless).

Clinical measures at admission included the legal basis of admission (voluntary, compulsory) and the admission state classified according to ICD-10 categories [19] (acute intoxication ICD-10 F1x.0, withdrawal states F1x.3, F1x.4, psychotic disorder F1x.5; other conditions). Further clinical features comprised therapeutic measures that the patient had received during the inpatient stay (psychotherapy, psychopharmacotherapy), the (ICD-10) psychiatric diagnosis and information on dual diagnoses, which was operationalised for the purpose of this study as a diagnosis of a substance use disorder together with any additional non-F1 psychiatric diagnosis. Symptom improvement during inpatient treatment was assessed with the Clinical Global Impression Scale CGI [22] on a 7-point scale ranging from –3, markedly deteriorated to +3, markedly improved. Measures at discharge covered the discharge situation (ie regular discharge, discharge against medical advise, premature discharge, absconding from the ward), the length of hospital stay and the type of planned aftercare that was divided into three categories (aftercare not planned or unknown; referred to a specialised facility for drug abusers; referred to other treatment/care comprising referral to inpatient treatment, community mental health services, psychiatrists in office practice, general practitioners, and other therapists).

Finally, the number of admissions and the cumulative length of inpatient treatment (days) over the 5-year study period were calculated. Due to the highly skewed distribution of length of stay measures (length of hospital stay of first episode; cumulative length of inpatient treatment) we $\log_{10}$-transformed these measures for statistical analyses. Only for descriptive information, we additionally refer to the non-transformed (percentile) values.

Statistics

In a pre-analysis we explored whether there are meaningful differences between institutions regarding the cumulative length of inpatient treatment. Length of inpatient stay was analysed by a variance decomposition procedure using SPSS MIXED [23] (what is equivalent to a one-way ANOVA with "hospital" as random effect). Estimation of variance components revealed that only 0.4% variance is explained by "hospital" (Wald Z-value 0.27; p = 0.79). Hospital effects therefore were not taken into account in the further analyses.

We examined associations of inpatient service use with variables of interest using regression analysis. The cumulative length of inpatient treatment within the 5-year study period was used as the outcome variable. As independent variables we considered the socio-demographic and the clinical variables (as described in *Measures*) assessed during the first inpatient episode. All independent variables were first examined separately (univariate regression analyses) to evaluate the extent to which they are associated with the outcome variable. Then a model was fit including all independent variables together (forced entry; multiple regression analysis) to analyse their contribution to the prediction when adjusting for effects of other predictors. Statistical significance level was fixed at $\alpha = 0.05$. Analyses were performed using the SPSS 11.5 software package.

Results

Psychiatric inpatient service utilisation in disorders due to illicit drug use, compared to other mental disorders

Of the patients first admitted in 1995–1996, every fourth individual was admitted for a disorder due to psychoactive substance use (alcohol not included). Within this group, 287 (51.0%) were admitted for multiple drug abuse (ICD-10, F19), 220 (39.1%) for abuse of opioids (ICD-10, F11); abusers of other illicit drugs – mostly cocaine – made up 9.9% of the sample. Over the study period of 5 years, patients with disorders due to illicit drug use consumed 23.7% of all treatment episodes of this first-admission sample, and 28.3% of all episodes of patients first admitted for any diagnosis other than ICD-10, F1 *(table 1)*. With 1.7 hospitalisations on average, the number of inpatient episodes was comparable to that of patients with other diagnoses. Length of treatment, however, was by far shorter. Illicit drug abusers spent only half the time in hospital compared to individuals with other mental disorders (median: 21 days; other mental disorders: 41 days). 25% of the patients with SUD were hospitalised up to 11 days (other mental disorders: 15 days), 75% up to 49 days (other mental disorders: 109 days). 10% of the sample had a cumulative length of inpatient stay of more than 100 days, whereas in patients treated for other mental disorders, there was 27% with a comparable or longer cumulative treatment length.

Sociodemographic and clinical characteristics of the illicit drug user sample

Around two thirds (67.7%) of the SUD sample were male. Illicit drug abusers, when first admitted to a psychiatric hospital, were on average 26.2 years old *(table 2)*. Most of them were living at home, together with others (55.2%) or alone (21.5%). Approximately one out of three patients held any occupation, ie was employed at least part-time, or in training.

Regarding the primary referral source, 31.1% admitted themselves to the hospital. Referrals by general practitioners accounted for 26.1%. Referrals from specialised drug services were found in 19.4%, from community mental health services or psychiatrists in office practice in 12.9%. Every fifth patient was compulsorily admitted. At admission, 13.3% were intoxicated, on drug withdrawal or psychotic. Of the 60 patients with a dual diagnosis, 23 were diagnosed with a personality disorder (ICD-10, F6), 12 with an affective disorder (F3). Comorbidity of neurotic (F4; n = 8), psychotic (F2; n = 7) and other disorders (F0, F9, F5;

Table 1

Utilisation of inpatient psychiatric services by first-admitted patients over a period of 5 years

	Patients admitted for SUD[1]	Patients with diagnoses other than F1[2]
Number of patients (n)	563	1638
Inpatient episodes (N)	964	2438
Length of first inpatient episode; days		
(Mean, SD)	23.5 (37.8)	61.8 (109.4)
(Median)	15.0	30.0
Cumulative length of inpatient treatment over 5 years; days		
(Mean; SD)	42.6 (24.8)	92.9 (152.9)
(Median)	21.0	41.0
>100 days (%)	9.8%	27.0%
Mean N of inpatient episodes over 5 years		
(Mean; SD)	1.7 (1.3)	1.5 (1.2)
4+ episodes (%)	7.3%	5.6%

[1] Substance use disorder; diagnoses included: ICD-10 F11, F12, F14, F15, F16, F19
[2] F0, F2–F9

Table 2

Patients admitted for SUD: sample characteristics (n = 563)

Sociodemographic	n	%
Gender, male	381	67.7
Age (years; Mean, SD)		26.2 (7.1)
Employment status, employed	169	31.2
Living situation prior to admission		
At home, with others	311	55.2
At home, alone	121	21.5
In institution	47	8.3
Homeless, other	84	14.9
Clinical		
Admission, compulsory	113	20.6
Admission state, acute (F1x.0, F1x.3, F1x.4, F1x.5)	75	13.3
Dual diagnosis	60	10.7
Psychotherapy	173	30.7
Pharmacotherapy	324	57.5
Improvement of clinical symptoms (–1 to +3; Mean, SD)		1.2 (1.0)
Discharge, regular	330	58.6
Treatment/care after discharge		
No / not known	192	34.1
In-/outpatient/GP	237	42.1
Special services drugs	134	23.8

n = 10) was found at even lower rates. Eight patients had multiple diagnoses.

During inpatient treatment, 57.5% of the patients received psychopharmacotherapy. Psychotherapy was less frequently offered. Ratings of the overall level of improvement during treatment indicated only minor improvements (mean = 1.2 on a scale indicating 0 = unchanged; 3 = markedly improved). Only 58.6% of the sample was regularly discharged. One out of three patients (34.1%) left the hospital without planned aftercare. 23.8% were referred to a specialised service for drug abusers after discharge. A referral to community mental health services or psychiatrists in office practice was arranged in 15.6% of the sample, 17.8% were referred to a general practitioner, and 8.7% to other institutions or therapists.

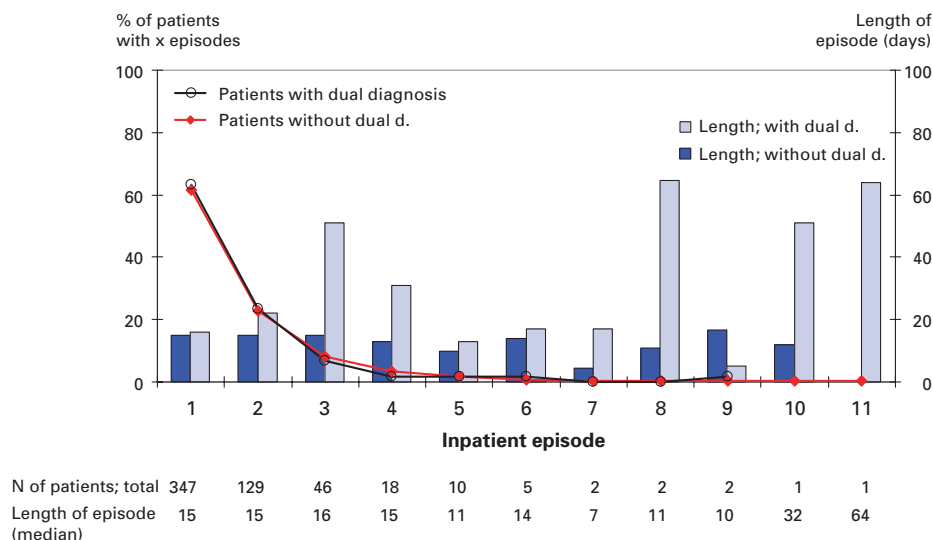## Utilisation of inpatient facilities over the 5-year period

Most patients (61.6%) had only one inpatient episode. Nevertheless, up to 11 inpatient admissions per patient were recorded; 7.3% of the sample were admitted four times or more. *Figure 1* gives the number of inpatient episodes (% of patients with n episodes) and the length of inpatient stays, separately for patients with and without a dual diagnosis. Results showed that the number of inpatient admissions over the 5-year period is quite comparable in both these groups (t = 0.08; df = 561; p = 0.94). Time spent as inpatient was 15 days on average for the first hospitalisation. With further hospitalisations, dual diagnosis patients in general spent longer time in hospital (t = 4.30; df = 166,3; p <0.001). It should be mentioned though, that in this group, length of stay refers only to very small numbers.

Number of inpatient episodes and cumulative length of inpatient treatment were closely correlated (r = 0.62; p <0.001). Nevertheless, frequent utilisation of inpatient services was coinciding with long cumulative inpatient time only in a subgroup. Only 41.8% of those patients with SUD who had been hospitalised for more than 100 days, had four or more inpatient episodes.

Predictors for cumulative length of inpatient treatment

In order to examine which of the variables of the first admission predict inpatient service use, regression analyses were performed. Results showed that length of time spent in hospitals during the study period was associated with several clinical measures *(table 3):* a not acute admission, having a dual diagnosis, receiving therapy during hospitalisation, improvement of clinical symptoms, a regular discharge situation and planned aftercare were found to be predictive for (higher) utilisation of inpatient services over the 5 year period. As to sociodemographic factors, higher service utilisation was predicted by "living in an institution" and "being unemployed" before first admission. Each of these

Figure 1

Number and length of inpatient psychiatric episodes over the 5-year period after first admission in patients admitted for SUD with and without dual diagnosis.

|	1	2	3	4	5	6	7	8	9	10	11
N of patients; total	347	129	46	18	10	5	2	2	2	1	1
Length of episode (median)	15	15	16	15	11	14	7	11	10	32	64

Table 3

Associations of demographic and clinical characteristics at first admission with inpatient service use over the 5-year study period (results of univariate and multiple regression analysis)

	Regression coefficient					
	Univariate			Multiple		
	b	β	(95% CI)	b	β	(95% CI)
Sociodemographic						
Gender, male	–0.05	–0.05	(–0.14–0.04)	–0.02	–0.02	(–0.11–0.06)
Age (years)	–0.00	–0.06	(–0.01–0.00)	**–0.01**	**–0.10**	**(–0.01– –0.00)**
Employment status, employed	**–0.10**	**–0.09**	**(–0.20– –0.01)**	–0.08	–0.07	(–0.17–0.01)
Living situation prior to admission						
At home, with others	Ref			Ref		
At home, alone	0.02	0.01	(–0.09–0.13)	0.03	0.02	(–0.08–0.13)
In institution	**0.21**	**0.11**	**(0.05–0.37)**	0.15	0.08	(–0.01–0.30)
Homeless, other	0.06	0.04	(–0.07–0.18)	–0.03	–0.02	(–0.16–0.10)
Clinical						
Admission, compulsory	0.02	0.02	(–0.09–0.13)	0.05	0.04	(–0.06–0.16)
Admission state, acute	**–0.25**	**–0.16**	**(–0.38– –0.13)**	**–0.31**	**–0.20**	**(–0.44– –0.17)**
Dual diagnosis	**0.19**	**0.12**	**(0.06–0.33)**	**0.15**	**0.09**	**(0.02–0.29)**
Psychotherapy	**0.29**	**0.26**	**(0.20–0.38)**	**0.27**	**0.24**	**(0.18–0.36)**
Pharmacotherapy	**0.10**	**0.09**	**(0.01–0.18)**	**0.09**	**0.09**	**(0.01–0.18)**
Improvement of clinical symptoms (–1 to +3)	**0.12**	**0.21**	**(0.07–0.16)**	**0.10**	**0.18**	**(0.04–0.16)**
Discharge, regular	**0.18**	**0.17**	**(0.10–0.27)**	0.06	0.06	(–0.04–0.17)
Treatment/care after discharge						
No / not known	Ref			Ref		
In-/outpatient/GP	**0.11**	**0.10**	**(0.01–0.20)**	0.02	0.02	(–0.08–0.12)
Special services drugs	**0.27**	**0.22**	**(0.15–0.38)**	**0.14**	**0.12**	**(0.03–0.26)**

b, regression coefficient; β standardised regression coefficient; CI, confidence interval
Multiple linear regression model, F = 8.84; df = 15, 502; P <0.001; R^2 = .18
Bold values indicate coefficients statistically significant at P <0.05

Figure 2

Improvement of clinical symptoms during first and further inpatient treatments, by duration of inpatient episode (0 = unchanged; 3 = markedly improved).
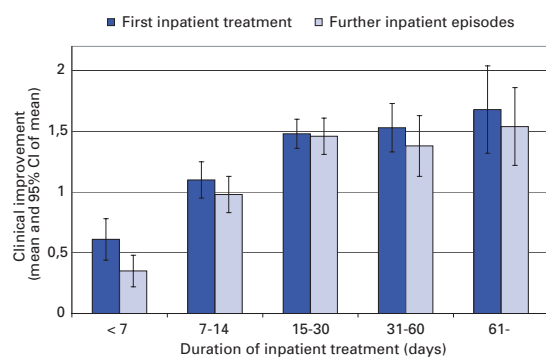
predictor variables, however, was able to explain only a small proportion of variance.

When all variables were fit together in a multiple regression model, length of inpatient time again was predominantly associated with clinical measures. Sociodemographic background factors, except younger age (indicating higher service use), were not significantly related to the utilisation of inpatient services. The most important predictors in terms of their effect size were the admission state (with acute admissions indicating shorter time in hospital), whether patients received psychotherapy, and the degree of symptom improvement during first hospitalisation. Having a dual diagnosis, psychopharmacotherapy during first admission, and discharge to a specialised service for drug abusers were further predictors of a longer (cumulative) time as inpatient.

Since in our catchment area outpatient maintenance treatment for heroin dependent patients is widely available and might influence the frequency and length of hospitalisation, we also modelled effects separately for abusers of opioids and of multiple drugs. Results showed an all in all similar pattern of predictors in the multiple drug user group (except for age and symptom improvement, which no longer contributed to this model). In the subgroup of opioid users, compulsory admission was a further significant predictor of (longer!) cumulative inpatient time over the 5-year period, as was a regular discharge. Beyond that, opioid users who received psychotherapy and were discharged at a higher degree of symptom improvement were hospitalised longer. Younger age, too, was significantly associated with a longer inpatient stay in this group (data on request from the first author).

Improvement of clinical symptoms and duration of inpatient treatment

Because improvement of clinical symptoms was significantly associated with the time spent in psychiatric hospitals over the 5-year period ($\beta_{univariate}$ = 0.21; p <0.001; $\beta_{multivariate}$ = 0.18; p <0.001), we closer examined the duration of inpatient treatment of first and further episodes post hoc. To this end, length of inpatient stay was divided into 5 categories. As shown in *figure 2*, there was an increase in symptom improvement during the first inpa-

tient episode with increasing length of stay. Patients treated for longer than 60 days showed the highest degree of improvement. Increase in symptom improvement was particularly marked during the first two weeks and then attenuated. A quite similar association was found for further inpatient episodes (measures averaged over episodes 2–11).

Discussion

With the present study we addressed the question of inpatient psychiatric service utilisation by people with illicit substance abuse. We analysed first-admitted patients from a catchment area in Switzerland over a five-year period. Admissions due to psychoactive substance abuse (alcohol not included) made up 25.6% of all first-admissions and 23.7% of all episodes in the study period. The average number of admissions (1.7) was comparable to that of patients with other diagnoses whereas the length of inpatient stay was only half the time in patients with SUD (21 *vs* 41 days). Overall, only minor symptom improvement was achieved during inpatient stay; however, with longer duration, level of clinical improvement increased. 41.4% of the patients were not regularly discharged, and one of three patients left the hospital without aftercare. Over the 5-year period, most of the illicit drug abusers were only once hospitalised. Clinical measures assessed at first admission were the most important predictors of the utilisation of inpatient services.

Utilisation of inpatient facilities over the 5-year period

Regarding the amount of inpatient services used by these patients, three aspects are noticeable. First, people with SUD – accounting for approximately every fourth inpatient admission – constitute one of the major patient groups treated in psychiatric hospitals. This is suggestive of a high need of psychiatric treatment arising from people with drug-related disorders. Since the present analysis is based on a first-admission sample, these figures most probably still underestimate the treatment need, as it is to be assumed that patients with already persistent mental health problems are likely to absorb more treatment capacities. To assess the treatment need in substance abusers at large, however, further research in a population-based sample is necessary.

Secondly, considering the utilisation of inpatient resources over the 5-year period, comparison with other diagnostic groups suggests that people with SUD are clearly not "heavy or frequent users of inpatient psychiatric services". Several factors might have contributed to shorter inpatient time: it is well known that drug abusers admitted in a state of acute intoxication often leave the hospital shortly after being admitted. This is likely to be an expression of low problem recognition, treatment readiness and the desire for help [25, 26]. The relatively young age of the group studied is further to be considered, since age repeatedly has been reported to be positively associated with the likelihood of a hospital admission [8, 13, 27]. Moreover, low inpatient service utilisation might also derive from the mental health provision system itself and might point to a failure of inpatient mental health services to meet the needs of people with SUD and to retain them in treatment [26]. Barriers to care due to stigmatisation and denial, as identified in people with alcohol disorder [28], probably contribute to health care inequalities also in people with SUD due to illicit drug abuse.

Likewise, it should also be kept in mind that opioid substitution (eg by methadone) is a widely used treatment procedure for opioid-dependent patients in in- and outpatient services in Switzerland. Substitution treatment is leading to lower illicit opioid use, increased (outpatient) service retention and diminished medical complications [29–32]. We do not know the number of opioid-dependent patients who entered a substitution programme after first admission, but it can be presumed that retention in an outpatient programme which has been well-established already at that time has prevented quite a few drug users from seeking treatment as inpatient [33].

A third clinical aspect relates to diagnostic issues. The high rate of patients admitted for multiple drug use (a diagnosis that according to ICD-10 is reserved to cases in which it is *impossible to assess which* substance is contributing most to the disorder), and the unexpectedly low rate of dual diagnoses leaves some doubts whether these patients were correctly diagnosed. Epidemiological studies repeatedly have shown high rates of comorbidity (20% to 60%) of addictive and other mental disorders [11, 34–37]. We therefore assume that dual diagnoses in the patient group studied were underestimated. This suggests that recognition of comorbid psychiatric disorders in illicit drug abusers in inpatient treatment should be improved, and thus calls for better education and training of mental health professionals.

Determinants of inpatient service use

Regarding the predictors of inpatient service utilisation, the present findings suggest that these are mainly clinical patient characteristics.

It is noteworthy that most of the clinical variables associated with higher cumulative inpatient time – such as psychotherapeutic and pharmacological treatment received during first hospitalisation, improvement of symptomatology, discharge

to a unit specialised in drug treatment – may be regarded as an expression of the patients' compliance with therapeutic measures.

Treatment motivation and session attendance of patients are well-known predictors of favourable outcome [38]. In our study, only short-term improvement was analysed. Conclusions based on measures assessed at discharge therefore should be regarded as tentative. The overall low level of improvement, and the positive correlation of symptom improvement and duration of the first and further inpatient episodes in the present data, however, further support the notion of a "minimum retention threshold" necessary to assure treatment effectiveness (eg [38, 39]).

A further clinical characteristic associated with an increased length of inpatient stay was the presence of a dual diagnosis. This association is known from previous research and has been attributed to higher levels of unmet needs and more severe symptomatology [8, 11, 24]. Previous studies, however, compared (mostly psychotic) patients with serious mental illness with and without SUD. This is in contrast to our study, which established such an effect for SUD patients with psychiatric comorbidity, comparing them to patients with SUD alone.

Regarding the impact of sociodemographic background factors, our findings are not as clear-cut. Only age had a (weak) effect on inpatient service use, whereas effects of the living situation and employment status no longer contributed to the (cumulative) time in hospital when adjusting for other first episode effects. Remarkably, the effects of clinical measures (patient and treatment characteristics) largely remained significant after accounting for sociodemographic background factors.

Limitations and strengths of this study

Several methodological issues require a comment. First, this analysis was confined to inpatient service use and did not cover treatment by general practitioners, psychiatrists in private practice or community mental health services. Our study therefore does not permit statements on the prevalence of illicit drug use, nor does it cover treatment (and retention in treatment) at large. Second, it is to be mentioned that the criterion to be included was an admission to inpatient treatment for some form of SUD, rather than for mental disorder *and co-occurring* drug use. Our results therefore do not compare to those of service use research focusing on people with dual diagnosis. Service use and costs repeatedly have been found to be higher in dual diagnosis patients [8, 11, 24] as compared to non-dual-diagnosis patients. Finally, the clinical diagnoses used were made by different clinicians and are not standardised for research purposes. Since our analyses are based on register data, we have no detailed information on the quantity and the duration of drug abuse in these patients. Moreover, there was no assessment of inter-rater reliability of the clinical ratings what must be considered as a shortcoming.

This study's strengths derive from its catchment area sample and its longitudinal perspective. To our knowledge, it is the first study to assess inpatient service utilisation in people with SUD due to illicit substance abuse over an extended period in this country. Since all hospitals in the catchment area were included, selection bias due to eg a selective admission threshold of a particular service was avoided. Data were also not biased by a restricted access to the mental health service system, because inpatient treatment is covered by compulsory health insurance in Switzerland. This is in contrast to other countries where lack of health insurance coverage represents a major barrier to health care utilisation [14].

Clinical implications

In conclusion, the high number of drug abusers contacting inpatient services, many of them presenting as self-referrals, shows that there seems to be a primary acceptance of inpatient treatment. Nevertheless, the high number of patients with SUD who leave the hospital early, with only minor clinical improvement, and without planned aftercare, suggests that retention in treatment in these patients certainly was too short, ie not sufficient for an adequate drug treatment, considering the minimal retention thresholds proposed in the literature (eg [38, 39]). Our findings emphasise the need to improve health care education in order to recognise psychiatric comorbidity, and argue for improving current treatment strategies, possibly by implementing integrated treatment settings [40], in order to achieve better clinical outcomes.

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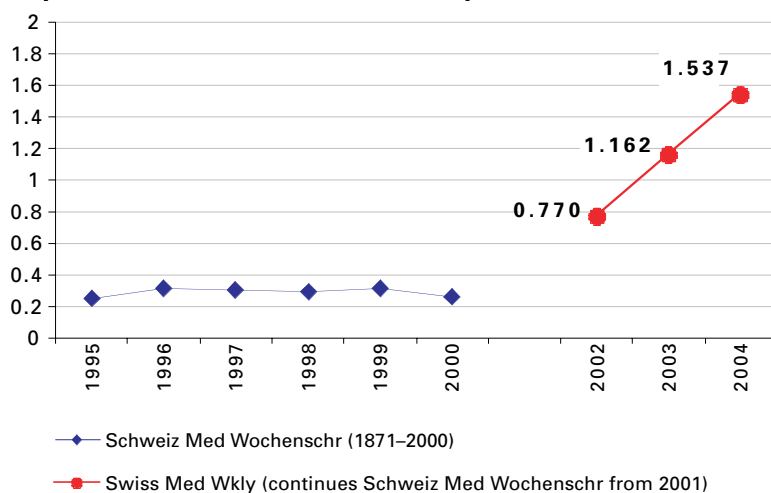- No page charges and attractive colour offprints at no extra cost

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