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Length of stay by ICD-based diagnostic groups as basis for the remuneration of psychiatric inpatient care in Switzerland?

Ingeborg Warnke, W. Rössler

Psychiatric University Hospital Zurich, Switzerland

Summary

Questions under study: In an attempt to analyse whether ICD-based diagnostic groups are an appropriate approach to the remuneration of Swiss psychiatric inpatient care, we investigated whether resource consumption in terms of length of stay can be predicted by diagnostic groups as well as by sociodemographic, clinical and admission-specific variables.

Methods: Data of 30,616 inpatients referred to psychiatric hospitals of a defined catchment area in Switzerland between 1997 and 2003 were analysed.

Results: The median length of inpatient stay is 23 days, with significant variation between and also within diagnostic groups. Patients with substance-use or adjustment disorders spent the shortest time in inpatient care, while those with an organic or eating disorder remained longest in hospital. Analyses of covariance showed that ICD-based diagnostic groups alone accounted for only 9% of the variance of the logarithmised length of stay. The amount of explained variance was significantly improved by additionally including sociodemographic, clinical and admission-specific variables. Further, investigating interaction terms alongside main effects significantly improved the explained variance to an amount of 20%.

Conclusions: Diagnostic groups – even if sociodemographic, clinical and admission-specific variables are included – cannot sufficiently predict length of stay to serve as basis for the financial remuneration of Swiss psychiatric inpatient care. These results confirm findings of other international studies. Future research is needed to detect variables which adequately explain resource consumption.

Key words: length of stay; psychiatry; psychiatric disorder; severity of illness; diagnosis related groups; DRGs; predictors; costs

Introduction

Although length of stay has decreased considerably in Swiss psychiatry over the last ten years, in 2004 it was still 45 days on average. This is long compared with international data [1]. 20% of psychiatric inpatients are even treated for a mean of 82 days. This has cost implications because psychiatric hospitals are currently paid on a daily basis per patient, i.e. the longer a patient is treated in hospital the more profitable for the hospital. Longer inpatient stays also decrease the risk of bed vacancies. All these advantages from the hospital viewpoint are undesirable from a health policy perspective.

Today some 16% of all health care expenditures in Switzerland is accounted for by mental health care [2], and mental health care expenditures are also on the rise. In psychiatry, inpatient costs increased by 18% between 1998 and 2002, to CHF 568 million, whereas costs for outpatient care rose by only 14%, to CHF 354 million [3]. The rise in costs in inpatient psychiatry is accompanied by high and rising psychiatric hospitalisation rates [4]. In 2006, 11,045 psychiatric inpatients were treated in the Canton of Zurich, compared with 6,190 in 1997 [5]. Only admission rates (expressed as the number of persons hospitalised per 1,000 population) of schizophrenic patients have declined from 7.3 to 2.2 since the 1990s [6]. Inpatient care in general always demands a large proportion of total health care costs [7], and policy makers and other stakeholders have an overwhelming interest in controlling these costs. Alternative remuneration systems are therefore under discussion in the Swiss health care system in general and in psychiatry in particular.

Internationally, the debate centres chiefly on so-called "diagnosis related groups (DRGs)" as a

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means of gaining control over current inpatient care remuneration systems on a daily basis. DRGs are a patient classification system which defines clinically meaningful groups that are reputed to generate similar costs [8]. One example is the German G-DRG version [9], which is based on the Australian refined AR-DRG system [10], and which has been used exclusively in somatic hospitals since 2003. However inpatient mental health care is currently excluded from remuneration by DRGs. Nevertheless, G-DRG contains groupings based on psychiatric disorders and medical procedures. Every treatment episode (save exceptional cases) is first assigned to one of the 23 "main diagnostic groups (MDC)". MDC 19 covers "psychiatric disorders" and MDC 20 "alcohol- and drug-related disorders". Final groupings result in 16 psychiatric DRGs and 7 drug- and alcohol-related DRGs [11]. Overall there are 1,137 G-DRGs. G-DRGs should differ in resource consumption, complexities and comorbidities (patient complexity levels [PCCLs]), age, length of stay, main diagnosis and other characteristics [12]. In general, a case-based lump sum for G-DRGs is based on a cost-weight and mean length of stay [13]. This means that treating a patient longer than defined by the respective DRG is not cost-effective for the hospital [14]. Introduction of DRGs in somatic hospitals has reduced length of stay and costs internationally [15].

Whereas non-psychiatric DRGs explain some 40% of the variance in length of stay [16], psychiatric DRGs developed for somatic medicine could only explain 2–8% of psychiatric patients' length of stay [17, 18]. Accordingly, psychiatric DRGs formed for somatic hospitals were found to be too heterogeneous in terms of length of stay in general [19, 20] and in psychiatric settings [21]. However, DRGs specially developed for psychiatry and evaluated in psychiatric hospitals explained between 30% and 50% of the variance in length of stay [22]. Whereas a psychiatric main diagnosis only explains a small amount of the variance in length of stay [23, 24], further important explanatory variables of length of stay in psychiatry are "number of previous hospitalisations" [18, 25, 26], "involuntary committal" [18, 27] and "level of functioning" [26]. Additionally, those DRGs specifically developed for psychiatric institutions include variables such as "social support", "severity of illness" and "course of treatment" [22].

This study aims to explore whether ICD-based diagnostic groups, alongside sociodemographic, clinical and admission-specific variables, can explain length of stay for Swiss psychiatric inpatients. In this regard we set out to analyse whether ICD-based groups and other variables are appropriate criteria by which to develop remuneration systems such as case-based lump sums on the basis of length of stay.

Methods

Catchment area and central psychiatric register

The Canton of Zurich comprises some 1.2 million inhabitants and is a mixed urban-rural area. All Swiss cantons consecutively collect sociodemographic, diagnostic and treatment-related data of psychiatric inpatients at admission and at discharge. These psychiatric records are part of a central psychiatric register. The attending physician documents the patient data on a standardised questionnaire [28] guided by a manual. No information is available on the reliability and validity of these clinical ratings. The register includes only data on clinical episodes, not patients i.e. cases, although the two terms are used interchangeably in this article.

Sample

37,864 inpatients were admitted to psychiatric inpatient care between 1997 and 2003 and met the following inclusion criteria: age 18 years and over, length of stay between 3 days and 365 days, and main diagnosis by ICD-10 [29] between F00-F69 (see table 1). 76 (0.2%) of the 37,864 inpatients were excluded because of an uncommon diagnostic category (n ≤26). Hence the following seven diagnostic categories could not be analysed: some forms of depression (ICD-10, F38, F39), neurotic disorders (ICD-10, F48), several behavioural disorders (ICD-10, F51, F52, F53, F54) and disorders of sexual identity (ICD-10, F64). 30,616 (81%) of the remaining 37,788 patients had a complete dataset and were included in statistical analyses (for comparison of both samples concerning sociodemography, see Table 2). 15,668 (51%) of the 30,616 cases were admitted for the first time, 15,008 (49%) were readmitted.

All patients analysed were admitted to the six psychiatric hospitals in the Canton of Zurich, each serving for a defined catchment area in the canton. All the hospitals included treat the whole spectrum of psychiatric diagnoses. Specialised and private psychiatric hospitals were not included.

All senior house officers of the hospitals included attend a centralised advanced training programme. Further, senior physicians regularly supervise their medical activities as well as documentation of the data required for the central case register.

Data

Sociodemographic characteristics such as age, gender, marital status, vocational status at admission (full-time employment vs. part-time employment vs. unemployed vs. otherwise not working because of disability, apprenticeship, retirement etc.) as well as housing situation at admission (living alone vs. living with others vs. living in institution vs. homeless) were analysed.

Clinical variables include the main diagnostic categories which were built on the basis of ICD-10 [29] by the judgement of experienced senior psychiatrists. The aim was to define groups which are clinically homogeneous. Table 1 lists all 21 categories which we included in subsequent analyses. The classification of substance disorders is based on subsequent considerations: disorders due to stimulants (ICD-10, F15) are chiefly related to amphetamines, which are illegal. Disorders due to sedatives (ICD-10, F13) are chiefly related to legally prescribed benzodiazepines. Consumption of multiple substances

Table 1

Comparison of patients meeting inclusion criteria and patients included in statistical analyses: ICD-based groups.

Diagnostic groups	ICD-10-Code	n = 37,788 n (%)	n = 30,616 n (%)
Dementia	F00-F03	2,507 (7)	1,999 (7)
Delirium	F05	153 (0)	120 (0)
Other organic disorders	F04, F06, F07, F09	599 (2)	470 (2)
Substance disorder – legal substances	F10, F13, F17, F18	4,929 (13)	3,982 (13)
Substance disorder – illegal substances	F11, F12, F14, F15, F16	2,202 (6)	1,922 (6)
Multiple substance disorder	F19	2,949 (8)	2,406 (8)
Schizophrenia	F20	5,574 (15)	4,204 (14)
Delusional disorder	F21, F22, F24	560 (2)	430 (1)
Schizoaffective disorder	F25	1,914 (5)	1,516 (5)
Other psychotic disorders	F23, F28, F29	1,390 (4)	1,081 (4)
Mania	F30	230 (1)	182 (1)
Bipolar disorder	F31	1,434 (4)	1,178 (4)
Monopolar depression	F32, F33	6,337 (17)	5,359 (18)
Persistent affective disorder	F34	104 (0)	93 (0)
Anxiety and compulsory disorders	F40-F42	648 (2)	565 (2)
Posttraumatic stress disorder and adjustment disorders	F43	3,693 (10)	2,947 (10)
Dissociative disorder	F44	81 (0)	58 (0)
Somatoform disorders	F45	171 (1)	150 (1)
Eating disorders	F50	126 (0)	107 (0)
Personality disorders	F60	1,864 (5)	1,516 (5)
Other personality disorders	F61, F63, F65, F66, F68, F69	423 (1)	331 (1)

In total variables sum up to n = 37,788 (overall sample) or n = 30,616 (patients finally included in statistical analyses).

(ICD-10, F19) is classified as a separate group since legal and illegal substances are included. Further clinical variables were the following two categories of secondary diagnosis: substance use disorder (ICD-10, F1, coded by 0 = no disorder, 1 = one disorder, 2 = two disorders, 3 = at least three disorders) and other psychiatric disorders (ICD-10, F0-F9, coded by 0 = no disorder, 1 = one disorder, 2 = two disorders, 3 = at least three disorders). Secondary somatic disorders, secondary neurological disorders or other factors such as psychosocial problems included in ICD-10 are not considered in our analyses since these categories did not exceed 3% of all cases. The severity of the disorder at admisson was measured by the "Clinical Global Impressions (CGI)" scale [30] included in the documentation system used in this study (coded as 0 = not ill to 6 = extremely ill).

Admission-specific variables cover the number of readmissions to the same psychiatric hospital, whether the patient had been hospitalised in another psychiatric hospital of the canton before (yes vs. no), the person or institution who initiated the admission (e.g. professional, self-referral etc.) and compulsory admission (yes vs. no). We checked for psychiatric hospital and year of admission (1997 to 2003).

Statistical analyses

We used a multivariate analysis of covariance and conducted the procedure "univariate general linear model" to examine predictors of the length of inpatient stay. Length of inpatient stay was expressed as the number of days until discharge. The logarithm of the length of stay was approximately normally distributed and was used as dependent variable. In the first model we only included ICD-based diagnostic groups as explanatory variable. In the second model we examined the main effects of all clinical, sociodemographic and admission-specific variables by including all variables in the model simultaneously. In a third step we expanded the second model by analysing the interaction effects between the main diagnosis and all other independent variables. Finally we conducted likelihood ratio tests and compared the first and the second model and the third and the second model. The results of the analyses of covariance and of the likelihood ratio tests (using software "R" [31]) are presented in table 3. In table 4 the back-transformed data (EXP(B)) along with the corresponding 95% confidence interval (EXP (95% CI)) are shown for one of the three models. Those values represent the geometric mean of the length of stay in days and multiplicative effects. SPSS 15.0 software package for Windows was used [32].

Results

Demographic characteristics

We compared the 30,616 patients finally included in the statistical analysis and the 37,788 patients meeting inclusion criteria (see table 2). The 30,616 patients were more often employed full-time and, in a lower percentage, were otherwise not working (due to disability, retirement etc.). The 30,616 patients more frequently lived with others than in an institution and were less frequently compulsorily admitted than the 37,788 patients.

Clinical and admission-specific characteristics

Table 1 shows that the most frequent disor-

Table 2

Comparison of patients meeting inclusion criteria and patients included in statistical analyses: sample characteristics.

Characteristic	n = 37,788	n = 30,616
Age (mean ± SD)	44 ± 18	44 ± 18
Gender, male (n, %)	18,096 (48)	14,696 (48)
Marital status (n, %)		
Married; cohabitant	8,393 (23)	7,090 (23)
Single, separated, divorced, widowed	28,910 (77)	23,565 (77)
Nationality, Swiss (n, %)	28898 (77)	23716 (77)
Vocational status (n, %)		
Full-time employment	6,393 (17)	5,426 (18)
Part-time employment	3,858 (10)	3,180 (10)
Unemployed	5,733 (15)	4,786 (16)
Otherwise not working (unable to work, apprentice, pensioner etc.)	21,584 (58)	17,224 (56)
Housing situation (n, %)		
Living alone	12,449 (34)	10,491 (34)
Living with others	13,945 (38)	11,988 (39)
Living in institution	8,449 (23)	6,855 (22)
Homeless	1,537 (4)	1,282 (4)
Severity of disorder (Median, IQR)	4 (4-4)	4 (4-4)
Secondary disorders (n, %)		
Substance use (ICD-10, F1) (n, %)		
None	30,549 (81)	24,625 (80)
One	5,683 (15)	4,685 (15)
Two	1,231 (3)	1,027 (3)
At least three	325 (1)	279 (1)
Other psychiatric disorders (ICD-10, F0, F2-F9) (n, %)		
None	30,721 (81)	24,765 (81)
One	6,078 (16)	5,041 (17)
Two	860 (2)	702 (2)
At least three	129 (1)	108 (0)
No of readmissions in the same psychiatric hospital, life-time (Median, IQR)	1 (2-0)	0 (2-0)
Admission to another psychiatry before, yes	20,210 (61)	18,579 (61)
Compulsory admission, yes	11,491 (31)	8,968 (29)
Self-referral, no	27,584 (73)	22,350 (73)

37,788 patients met inclusion criteria. Each ICD-based group contained more than 26 cases in this sample. 30,616 patients had a complete dataset and were included in statistical analyses.
Due to missing values or codings of 'situation not known', 'other situation' or 'not assessed' some of the variables do not sum up to n = 37,788. There were no missings concerning age and gender, 485 missings concerning marital status, 220 missings concerning vocational status, 1,408 missings concerning living situation, 351 missings concerning severity of disorder, 435 missings concerning readmission, 4,683 missings concerning admission to another psychiatry before, 531 missings concerning compulsory admission and 344 missings concerning manner of referral. There was no possibility of coding "no secondary disorder", hence missing values represent "no secondary substance disorder" and "no secondary other psychiatric disorder".

Table 3

Explanatory power of the ICD-based groups and further sample characteristics concerning the logarithmised length of stay.

Variable Sets	Adjusted R2	F	df	P*
Model 1: ICD-based groups	0.92	174.51	20, 30595	
Model 2: ICD-based groups & sample characteristics (main effects)	0.18	82.18*	39*, 30556	<0.0001
Model 3: ICD-based groups & sample characteristics (main and interaction effects)	0.20	2.27*	746*, 29810	<0.0001

n = 30,616 cases were included in statistical analyses.
Sample characteristics (next to ICD-based groups) include age, gender, marital status, vocational status at admission, living situation at admission, secondary substance disorder(s), secondary other psychiatric disorder(s), severity of the disorder at admission, number of readmissions to the same psychiatric hospital, admitted to another psychiatry before, manner of referral, compulsory admission, psychiatric hospital, year of admission.
* Results of model improvement: model 2 – model 1; model 3 – model 2.

Table 4

Geometric mean of length of stay and multiplicative effects: two sample characteristics of model 2.

Characteristic*	Exp (B)	EXP (95% CI)	P
Intercept**	10.77	9.89–11.73	<0.0001
Severity of disorder			
Not ill	0.93	0.78–1.11	0.422
Borderline mentally ill	0.74	0.67–0.83	<0.0001
Mildly ill	0.86	0.80–0.92	<0.0001
Markedly ill	1.26	1.22–1.29	<0.0001
Severely ill	1.47	1.42–1.53	<0.0001
Extremely ill	1.41	1.29–1.55	<0.0001
ICD-based groups			
Dementia	0.99	0.93–1.05	0.764
Delirium	0.53	0.44–0.64	<0.0001
Other organic disorders	0.91	0.83–1-00	0.060
Substance disorder – legal substances	0.66	0.63–0.69	<0.0001
Substance disorder – illegal substances	0.63	0.60 0.67	<0.0001
Multiple substance disorder	0.68	0.65–0.72	<0.0001
Schizophrenia	1.27	1.21–1.32	<0.0001
Delusional disorder	0.99	0.90–1.09	0.922
Schizoaffective disorder	1.25	1.18–1.32	<0.0001
Other psychotic disorders	0.75	0.70–0.81	<0.0001
Bipolar disorder	0.90	0.78–1.05	0.200
Mania	1.25	1.17–1.33	<0.0001
Persistent affective disorder	0.94	0.77–1.16	0.568
Anxiety and compulsory disorders	0.98	0.89–1.07	0.609
Posttraumatic stress and adjustment disorder	0.58	0.55–0.60	<0.0001
Dissociative disorder	0.77	0.59–0.99	0.046
Somatoform disorders	0.85	0.72–0.99	0.047
Eating disorders	1.24	1.02–1.51	0.030
Personality disorders	0.89	0.84–0.94	<0.0001
Other personality disorders	1.09	0.97–1.22	0.142

n = 30,616 were included in the analysis. Logarithmised length of stay was the dependent variable.
*Only two variables of model 2 are shown in this table: severity of illness and ICD-based groups.
** Intercept is based on the following reference categories: severity of disorder = moderately ill (vs. no disorder to extremely ill), ICD-based groups = monopolar depression (ICD-10, F32, F33) (vs. other ICD-based groups), gender = female (vs. male), marital status = married (vs. separated, divorced, widowed), housing situation = living with others (vs. living alone, living in institution, homeless, working status = full-time employed (vs. part-time employed, unemployed, otherwise not working), secondary substance disorder = no (vs. one, two, at least three disorders), other secondary psychiatric disorder = none (vs. one, two, at least three disorders) way of referral patient (vs. by professional, near person, public authority, other psychiatry), type of admission = voluntary (vs. compulsory), admitted to another psychiatry before: no (vs. yes), year of admission 2003 (vs. 1997 to 2002), psychiatric hospital 6 (vs. others). The variables age and readmission were used as covariates.
EXP(B), EXP (95% CI): Estimates and 95% confidence intervals were back-transformed from the log scale to the original scale. The back-transformed data along with the corresponding 95% CI represent the geometric mean of the length of stay in days (concerning the intercept) and multiplicative effects.

ders for the 37,788 and the 30,616 patients were substance abuse (ICD-10, F1, 27%), psychotic disorders (ICD-10, F2, 25% for the 37,788 patients vs. 24% for the 30,616 patients) and affective disorders (ICD-10, F3, 21% for the 37,788 patients vs. 22% for the 30,616 patients). We compared both samples with respect to frequency of the ICD-based diagnostic groups. There are differences with respect to frequency of schizophrenia (ICD-19, F20), a delusional disorder (ICD-10, F21, F22, F24) and the diagnostic group monopolar depression (ICD-10, F32-F33).

The 30,616 patients differ from the 37,788 patients with respect to the number of readmissions.

Length of stay across disorders

The 30,616 and the 37,788 patients did not differ with respect to the logarithmised length of stay, which was analysed for each diagnostic group separately. In figure 1 box-plots of length of stay are shown for the 37,788 patients. The median of the length of stay is 23 [IQR = 51-10] and the mean is 40 days (SD = 49). Patients with the longest stays were those with dementia (median = 42 [IQR = 70-24], mean = 59, SD = 58), an eating disorder (median = 39 [IQR = 93-9], mean = 59, SD = 60) or schizophrenia (median = 33 [IQR = 70-14], mean = 54, SD = 62). Patients with the shortest inpatient stays had posttraumatic stress disorder or an adjustment disorder (median = 10

[IQR = 29-4], mean=25, SD = 38), a substance disorder (median = 15 [IQR = 31-8], mean = 26, SD=33) or the diagnosis of delirium (median = 18 [IQR = 36-8], mean = 26, SD = 25).

Analyses of covariance

Table 3 shows that model 3 had most predictive power and explained 20% of variance. Hence model 1 was significantly improved by adding main effects of sociodemographic, clinical and admission-specific variables. Inclusion of interaction terms further increased predictive power.

In the interests of readability the back-transformed data along with the corresponding 95% CI of only two variables (severity of illness and ICD-based groups) of model 2 are shown in Table 4. Patients with the following characteristics had an increased length of stay compared with the reference group: being markedly, severely or extremely ill (vs. being moderately ill) or having a main diagnosis of schizophrenia, a schizoaffective disorder, a bipolar disorder or an eating disorder (compared to the diagnostic category of monopolar depression). There are additional meaningful results which cannot be presented in the table. Patients with at least three secondary psychiatric diagnoses (except substance disorders) stayed twice as long (CI = 1.7–2.5) in hospital than patients without. In 1997 length of stay was approx. 3.3 (CI = 2.9–3.7) times higher than in the year 2003. Patients who were referred to psychiatry by another psychiatric hospital (delivering outpatient or inpatient care) stayed 1.5 (CI = 1.4–1.6) times as long as patients who referred themselves. Patients who were hospitalised involuntarily stayed 0.8 (CI = 0.8–0.9) times less long than patients admitted voluntarily. The effect of gender was not significant. The multiplicative effect of most of the other significant variables was approx. 0.9 to 1.2.

Discussion

Strengths of the study

This is the first study in the Swiss context to analyse the predictive power of ICD-based diagnostic groups on length of stay. The grouping of the main diagnoses was made by experienced psychiatrists and is therefore based on clinical face validity.

There are only few differences between the 30,616 patients included in statistical analyses and the 37,788 patients meeting inclusion criteria (see table 1 and table 2).

In the light of the high response rate and acceptable low proportion of missing data on patient characteristics, the data are deemed to be representative of Swiss psychiatric inpatients.

We used severity of illness as an independent variable which is found to be an important predictor of length of stay [22, 24].

Limitations of the study

Data on the reliability and validity of the instruments used are still lacking [28] or insufficient [30].

Finally, it was just possible to make episode-related instead of person-related analyses because the factor "person" included too many single observations. Observations are probably correlated, which means that confidence intervals may be too narrow. In any event, the median of the variable "readmission" is 0 (IQR = 2-0) for the 30,616 patients.

Psychiatric comorbidity has an influence on length of stay [25]. We analysed psychiatric secondary diagnoses as independent variables merely by way of example, as a more detailed analysis cannot be considered here.

Comparison with previous research

Length of stay across and within ICD-based groups

Our results demonstrate that there are differences in the length of stay between ICD-based diagnostic groups (figure 1). Current studies have also found differences in the length of stay across diagnostic disorders, but most of the results of these studies are inconsistent [24–26]. Accordingly, our results show wide dispersion of the length of stay within diagnostic categories in terms of differences between the third and first quartile.

Prediction of length of stay by ICD-based groups

The maximum amount of explained variance of logarithmised length of stay was 20% in our study (table 3). This means we could not explain 80% of the variance by variables such as ICD-based diagnostic groups, severity of illness, working status, housing or number of readmissions. Our results are comparable with other studies analysing psychiatric diagnosis [23, 24] and further variables [23] in terms of length of stay.

Implications for the financial remuneration of psychiatric inpatient care in Switzerland

Although we did not analyse a DRG system, our results provide hints as to case-related financing in Swiss psychiatry. They also contain information which may form a basis for the further improvement of DRGs. Our models and psychiatric DRGs have in common that a classification based on main diagnosis is an important component or even basis, and DRGs additionally explain only a small amount of the length of stay [17, 18]. The Austrian payment-system "Leistungsorientierte Krankenhausfinanzierung (LKF)" [33] is an exam-

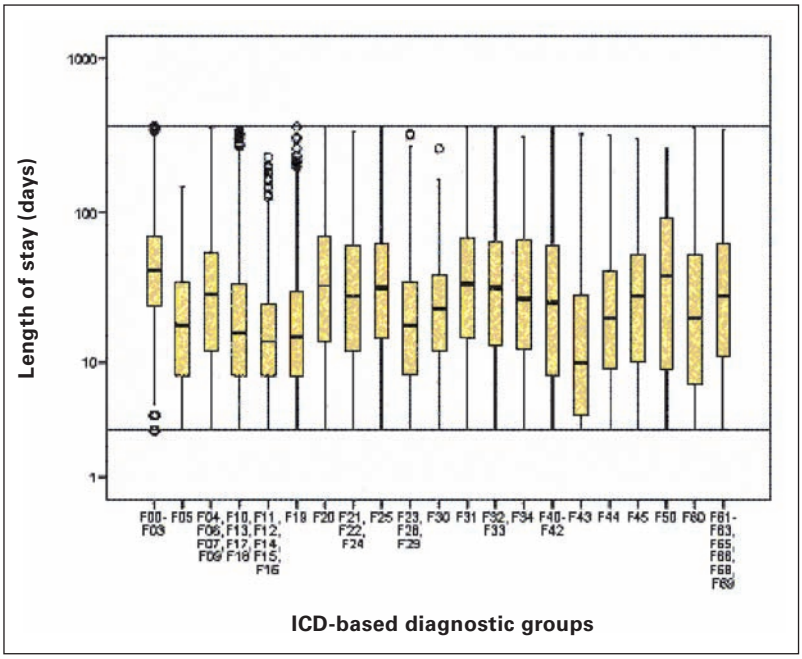

Figure 1

Box-plot of length of stay mapped on logarithmised ordinate across ICD-based groups. n = 37,788 patients
Horizontal lines represent median and quartiles, vertical lines represent minimum and maximum of length of stay and circles stand for outliers (which are values between 1.5 IQR's and 3 IQR's from the end of a box such as 261 days for patients with mania [ICD-10, F30] for example).
Upper and lower horizontal line stands for length of stay between 3 and 365 days.

ple of a DRG-like remuneration system which has been used in psychiatry since 1997 but has had no implications concerning length of stay or admission rates in psychiatric hospitals [34].

G-DRG is to be adapted to the Swiss context and it is planned for introduction within the next few years as a remuneration system in primarily somatic and possibly also psychiatric hospitals. Concerning the introduction of a G-DRG-like system in psychiatry there are some points which need to be reconsidered.

Overall the G-DRG system includes 23 DRGs related to psychiatric disorders and problems with alcohol or drugs [11], groups which do not seem to cover the whole spectrum of psychiatric cases and their characteristics. Some authors have constructed subgroups within major DSM-IV categories by severity of illness and functioning, and these explained more than 30% of the variance of the costs based on daily remuneration per patient in psychiatry [35]. On the other hand, the appropriateness of a grouping based chiefly on psychiatric disorders seems wholly questionable. Hence a classification based on the severity of a disorder, the length of stay and the daily amount of care needed is suggested [36]. In that case the main diagnosis would play a minor role. A further alternative concerning classification is the AMDP system generated by the working group "Arbeitsgemeinschaft für Dokumentation in der Psychiatrie" [37] which has been in use since 2008 in all psychiatric hospitals of the Canton of Zurich. It allows assessment of psychiatric and somatic syndromes and as such is independent of theoretical considerations of diagnostic classification.

The severity of a disorder is confirmed as an important predictor of length of stay [22]. Nevertheless, our data do not support this when we analyse the CGI. In the G-DRG system the severity of a disorder is defined by an index based on comorbidity (PCCL) [13]. In our study secondary psychiatric disorders had some influence on length of stay. Additionally, it could be worth identifying an impact on length of stay by analysing secondary somatic disorders, but in our sample only 3% had one or more secondary somatic disorders. Other studies identified 20–30% secondary somatic diagnoses in psychiatric inpatients [38, 39]. These percentages are comparable to those of psychiatric comorbidity in psychiatric inpatients [40]. Medical comorbidity increases length of stay in psychiatry [39] and should therefore receive more attention in psychiatry in the Canton of Zurich and possibly in Switzerland, since psychiatry traditionally is not very strongly integrated into (somatic) medicine. However, in G-DRG the coding of secondary disorders is to some extent arbitrary because not every secondary disorder necessarily involves an increase in resource consumption [41]. Some authors found no difference in the complication and comorbidity levels (PCCL) of the G-DRG system between medical patients with and without psychiatric comorbidity, but a longer stay in somatic hospital for patients with psychiatric comorbidity [42]. Alternatively, the "Psychiatric Severity of Illness Index" (PSI) could be an appropriate measure of the severity of illness for psychiatric inpatients, since it explains 34–50% of the length-of-stay variance in psychiatry [43].

Next to alternative groupings and measures of the severity of illness, structural variables could provide additional information. They are only briefly reported as we did not have data of this kind. Nevertheless, patterns of care, type or size of the psychiatric hospital, available beds and degree of outpatient support could improve prediction of length of stay or costs [44].

Conclusions

The present results indicate that ICD-based diagnostic groups and severity of illness explain only a small part of length of stay. For this reason financing mainly founded on ICD-based groupings and mean length of stay does not seem to be appropriate in Swiss psychiatry. Future research in the area of length of stay is needed. In this respect psychiatric DRGs (generated for somatic hospitals) could be refined in terms of classification and measurement of severity.

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Correspondence:
Ingeborg Warnke
Psychiatric University Hospital Zurich
Switzerland
Department of General and Social Psychiatry
Research Unit Public Mental Health
Lenggstrasse 31
CH-8032 Zurich
E-Mail: inge.warnke@bli.unizh.ch

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