ORIGINAL ARTICLE

Predictors of length of stay in an acute psychiatric inpatient facility in a general hospital: a prospective study

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Objective: There have been significant reductions in numbers of psychiatric beds and length of stay (LOS) worldwide, making LOS in psychiatric beds an interesting outcome. The objective of this study was to find factors measurable on admission that would predict LOS in the acute psychiatric setting.
Methods: This was a prospective, observational study.
Results: Overall, 385 subjects were included. The median LOS was 25 days. In the final model, six variables explained 14.6% of the variation in LOS: not having own income, psychiatric admissions in the preceding 2 years, high Clinical Global Impression and Brief Psychiatric Rating Scale scores, diagnosis of schizophrenia, and history of attempted suicide. All variables were associated with longer LOS, apart from history of attempted suicide.
Conclusions: Identifying patients who will need to stay longer in psychiatric beds remains a challenge. Improving knowledge about determinants of LOS could lead to improvements in the quality of care in hospital psychiatry.

Keywords: Outcome studies; inpatient psychiatry; chronic psychiatric illness; administration; other delivery issues

Introduction

In the last few decades, changes in how we understand mental illness, advances and improvement in availability of biological psychiatric treatments, greater political interest in mental health, and the emphasis on the costs of medical care have resulted in several modifications to how psychiatric hospital care is provided. Neuroleptic drugs, introduced in the 1950s, were the first effective treatment for psychotic disorders, and enabled some long-stay hospital patients to be discharged.[1,2] Movements for deinstitutionalization of mental health advocate greater emphasis on community-based services for people with mental illness.[3] For hospital psychiatry, this means shifting from long-stay (months, years) admissions in asylum institutions to provision of acute care in short-stay psychiatric beds in general hospitals.[4-6] Today, acute inpatient psychiatric care makes up a relatively small proportion of mental health care in a community-based system of care which tends to be based on the medical model: making a diagnosis and treating acute or dangerous symptoms. Acute psychiatric care now focuses on stabilization, safety, and rapid discharge.[7] Economic pressures also mean that it is important to reduce the cost of treatment, which includes reducing the length of hospital stay as much as possible.[6]

There is a worldwide trend towards closure of psychiatric beds, and, in many countries, the total number of psychiatric beds is steadily decreasing. In the United States, for example, there were around 525,000 psychiatric beds in 1970 but fewer than 212,000 by 2002.[8] In Brazil, there were around 87,134 psychiatric beds in 1994.[9] By 2011, this figure had fallen to 32,284.[10] Consequently, the pressure to reduce inpatient stays increased, and is now shifting to emergency departments as well.[11] Nevertheless, length of stay (LOS) continues to be longer overall for mental disorders than for other conditions: in the U.S., the mean LOS for psychiatric admissions is 8.2 days, compared with 4.6 days for all diagnoses.[12]

In this context, LOS in inpatient psychiatric services has become an interesting outcome for patients, care providers, and health insurance payers. The ability to identify determinants of LOS at admission – and, thus, identify patients who are likely to need a longer stay early on – may help treatment planning. Previous studies using various methodological approaches have shown that gender, age, psychiatric diagnosis, history of hospitalization, level of functioning, severity of disease, hospital characteristics, and type of insurance are all associated with LOS,[2,13-20] but the results were only modest in terms of prediction of LOS. This suggests that there are other factors related to LOS which have not yet been explored. Moreover, high-income countries have been the main source of evidence on determinants of LOS in the international literature; there is a lack of information about which variables are important in less wealthy countries.

Within this context, the main objective of this study was to identify factors measurable at admission that would

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predict LOS in an acute psychiatric facility, including factors that were not identified as predictors in previous studies. The intention was to develop a comprehensive, multivariable model including variables identified in previous studies and variables not previously investigated, namely: having one's own income, 2-year history of psychiatric admissions, total Brief Psychiatric Rating Scale (BPRS) and Clinical Global Impression (CGI) scores, cause of admission, age at diagnosis, time since diagnosis, and history of suicide attempts. The secondary objective was to evaluate LOS and its determinants in a middle-income country.

We hypothesized that LOS would be longer for patients without their own income, who had been admitted to hospital for psychiatric reasons in the preceding 2 years, been admitted for risk of aggression, been diagnosed at an earlier age, and had a longer history of illness or a history of suicide attempts.

Methods

Study design and setting

This prospective, observational study was conducted in the inpatient psychiatric unit of a general, university-affiliated, tertiary hospital in southern Brazil (Hospital de Clínicas de Porto Alegre, HCPA). The facility was a 36-bed acute psychiatric inpatient unit, with 26 beds intended for patients admitted through public Unified Health System and 10 beds intended for private patients. Patients may be admitted as psychiatric emergencies, transferred from another department within the hospital, or referred from other psychiatric services. The unit is staffed by 10 medical teams.

Participants

The sample consisted of all patients aged 18 years or older who were admitted to a psychiatric bed at the study facility between June 2011 and December 2013, except those who met one or more of the following non-inclusion criteria:

1) Patients admitted to specific treatment programs offered by the facility, namely patients with (a) a substance-related disorder as the main diagnosis and/or detoxification as a main cause of admission; or (b) anorexia as the main cause of admission;
2) Persistent and severe agitation during the first 72 hours of admission, which severely interfered with data collection; this was operationalized as need for mechanical restraint and/or sedation during most of the day;
3) Patients with a severe cognitive impairment which prevented collection of the required information, unless an adult caregiver was able to provide it;
4) Patient refusal to participate.

We also did not consider very short admissions, defined as LOS < 7 days. Other exclusion criteria were (a) death during stay, regardless of cause, and (b) failure to obtain a complete set of data. To avoid dependence between the variables, only one admission per individual (namely, the first) was included. Figure 1 provides a detailed flow diagram of the participant selection procedure. To assess the risk of selection biases, we compared excluded and included patients in terms of age, gender, type of insurance, and LOS.

Measures

Structured protocols were used to collect data. All data were collected within 72 hours of admission by a trained research team. Researchers were not involved in patient care.

Selection of candidate predictor variables was based on previous findings or on clinical relevance.

Independent variables included as possible predictors were:

1) Sociodemographic variables: age, gender, ethnicity (Caucasian vs. non-Caucasian), relationship status (with vs. without a partner), educational level (completed vs. did not complete high school), area of residence (metropolitan area vs. outside metropolitan area), type of insurance (public vs. private), and income (with vs. without own income).
2) Psychiatric history: lifetime history of psychiatric hospital stays and history of psychiatric hospital stays in the preceding 2 years, previous suicide attempts, age at first diagnosis, and time since first diagnosis.
3) Current episode: main cause of admission, main diagnosis at admission according to ICD-10,[21] and scores on CGI,[22] BPRS,[23] and Global Assessment of Functioning (GAF).[24]

Severity of illness was assessed using the CGI (0 = not ill to 6 = extremely ill) and was treated as a continuous variable. The GAF is used to assess psychosocial functioning in daily life (e.g., work, social interactions, relationships); scores range between 0 (poor functioning) and 100 (very good functioning). The BPRS is an 18-item scale used to measure general psychiatric symptoms. These three scales were administered during patient interviews. All other data were collected directly from the patient where possible; in other cases, relatives were requested to provide the information, and if no relative was available, the medical team assistant was consulted. If these three strategies failed, we sought to obtain the information from electronic records. In a previous analysis, medical team was evaluated as predictor because of its potential confounder role in LOS.

The outcome of interest, LOS, was treated as a continuous variable. In the case of patients transferred from other departments within the hospital, only days in the psychiatric unit were counted.

Ethical considerations

The HCPA Ethics Committee approved this study with protocol #10-265. All eligible patients were invited to participate. If a patient's capacity to consent was compromised by psychotic symptoms or intellectual disability, a relative or guardian was contacted to confirm participation. All participants – and, when applicable, a relative or guardian – were informed about the study and provided written informed consent.
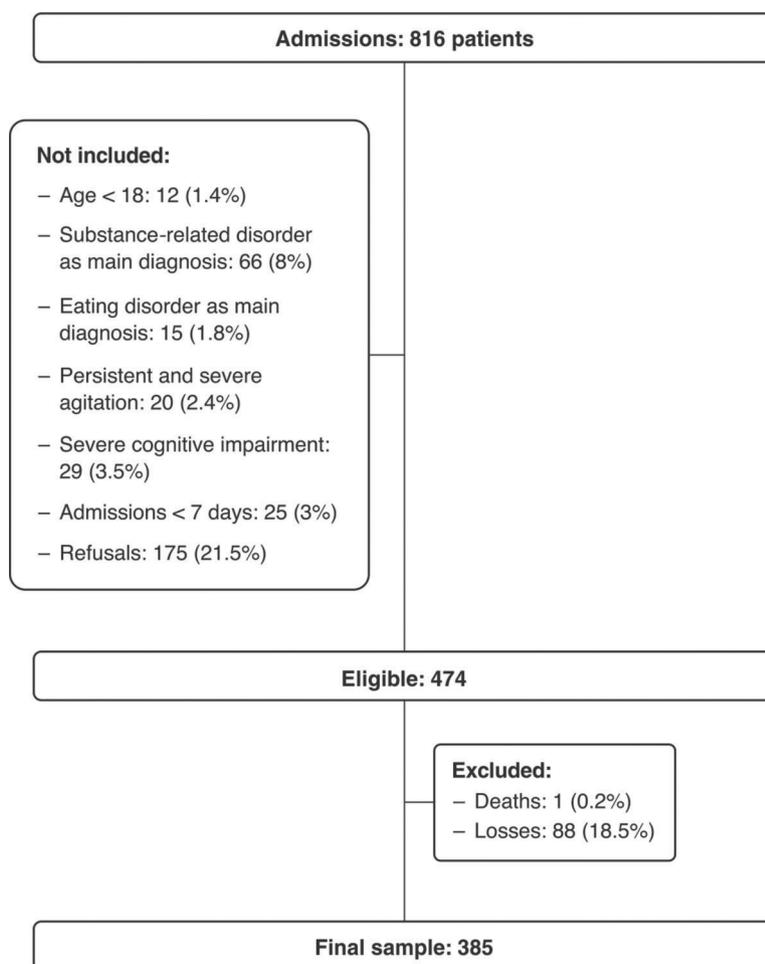
Figure 1 Flowchart of participant selection procedure.

Statistical analysis

Statistical analyses were performed in SPSS for Windows version 21.1. The normality of the distribution of variables was measured using the Kolmogorov-Smirnov test. Comparisons between included and excluded patients were conducted using the Mann-Whitney U test for non-parametric continuous variables and the independent-samples t-test for parametric continuous variables. The chi-square test was used for frequency comparisons.

Predictors of LOS were evaluated using a non-hierarchical, stepwise linear regression model. LOS was treated as a continuous variable; however, as linearity is a prerequisite for linear regression and the raw LOS data were not normally distributed, we used the natural logarithm (ln) of LOS, which was normally distributed according to the Kolmogorov-Smirnov test, as the dependent variable. First, candidate variables were tested individually in a bivariate model; only variables with a coefficient of determination (R^2) > 0.01 (i.e., at least 1% of the variance in the outcome is explained by the variable) and a p-value < 0.1 on the bivariate model were included in the multivariable model. Further multivariable analyses were performed; variables were removed one by one according to their collinearity (mainly measured by

variance inflation factor [VIF]) and p-value until a final model was reached. The significance level for the final model was set at 0.05. We used graphical residual analysis to verify the assumptions of linearity and homoscedasticity.

Preliminary analysis

Before carrying out linear regression analysis, we tested whether medical team was a predictor of LOS, to allow control for the potential influence of characteristics of the medical team responsible for each patient's care on LOS. All possible interactions between variables were pretested. Considering the possibility of a nonlinear relation between variables and LOS, quadratic terms of all variables were also tested as predictors of LOS in bivariate analysis. Since these quadratic terms were not better than the original variables in any of the cases, we chose to keep the original variables alone.

Results

During the study period, 816 patients were admitted, of whom 474 (58.08%) met the inclusion criteria. One

patient died during the stay and data for a further 88 were incomplete; these patients were excluded from analyses, giving a final sample of 385 patients.

Comparison of excluded and included patients

Group comparisons indicated that excluded and included patients were similar in terms of age, type of insurance, and LOS; however, the proportion of women was higher in the excluded group (64.88% vs. 49.5%).

Length of stay and demographic variables

LOS ranged from 7 to 199 days and was not normally distributed (mean = 30.02, standard deviation = 20.81, Shapiro-Wilk W = 0.74, p < 0.01). The mean age was 43.48 years (range 18 to 89 years); 8.8% of the sample was aged > 65. The median LOS was 25 days (interquartile range [IQR] 16 to 36.5 days). The characteristics of the sample are shown in Table 1.

Clinical characteristics

The clinical characteristics of the sample are shown in Table 2. Most patients (66.8%) had a history of at least one previous hospital stay, and 177 (46%) had been hospitalized at least once in the preceding 2 years. Fifty-four percent of patients had attempted suicide at least once, and the main reason for admission was suicide risk (44.2%), followed by risk of aggression towards others (23.9%). Mood disorders were the most common diagnosis (60.3%), followed by schizophrenia and related disorders (28.8%). Together, these two classes accounted for 89.1% of primary diagnoses in this sample.

Multivariable linear regression model: predictors of length of stay

Because LOS was not normally distributed, we used ln(LOS) as the dependent variable (mean = 3.23, standard deviation = 0.58; Kolmogorov-Smirnov D = 0.039, p = 0.198). The identity of the medical team did not influence LOS. None of the quadratic terms or interactions were included in the model, because they did not add any predictive power to the original variables.

The step-by-step modeling process is summarized in Table 3. In bivariate analysis (step 0), each variable was tested as the sole predictor of the dependent variable. The only demographic variable to predict LOS in a bivariate model was without own income. History of previous hospital stay, history of hospital stays in the preceding 2 years, history of suicide attempts, suicide risk or risk of aggression as main reason for admission, CGI, GAF, and BPRS scores, and diagnosis of mood disorder or schizophrenia and related disorders all met the criteria for inclusion in the multivariable model. All these variables were related to longer LOS, apart from history of suicide attempts, admission due to suicide risk, and diagnosis of mood disorder.

Age at first diagnosis and time since first diagnosis were related to LOS, but were not included in the multivariable model because of their very low R^2 values. In the multivariable analysis, the variables elected in step 0 were inserted together as independent variables, and the variables with the greatest collinearity, as measured with the VIF, were subsequently removed one by one until collinearity was eliminated (i.e., all VIF values were < 2), which was achieved in step 4. From step 5 onwards, variables were removed one by one in descending order of p-value.

The final model was achieved after six steps. This model contained six variables, which explained 14.6% of variance (F-test: 11.982; sig 0.000, gl 278) in ln(LOS): not having one's own income, history of at least one psychiatric

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Table 1 Sociodemographic characteristics of included patients on admission

Variable	
Length of stay, median (IQR)	25 (16-36.5)
Age, mean (SD)	43.48 (15.0)
Male gender	195 (50.6)
Public health system users	283 (73.5)
Caucasian ethnicity	317 (82.3)
Area of residence: metropolitan	287 (74.5)
Educational level	
Lower than middle school	139 (36.1)
Middle school	77 (20.0)
High school	122 (29.1)
Higher education	57 (14.8)
Employment status	
Employed	93 (24.2)
Without own income	125 (32.5)
On sickness benefit/allowance	74 (19.2)
Retired	39 (10.1)
Disability allowance	54 (14.0)
Relationship status: without partner	262 (68.1)

Data presented as n (%), unless otherwise specified.
IQR = interquartile range; SD = standard deviation.

Table 2 Clinical characteristics of patients included in the final sample (n=385)

Clinical characteristics	
Previous psychiatric admission	257 (66.8)
History of hospital stays in the last 2 years (yes)	177 (46.0)
Number of previous psychiatric hospital stays, median (IQR)	3 (2-7)*
Previous suicide attempt	210 (54.5)
Number of previous suicide attempts, median (IQR)	2 (1-3)[†]
Age in years at first diagnosis, median (IQR)	29 (20-40)
Time in years since first diagnosis, median (IQR)	8 (2-20)
Reason for admission	
Suicide risk	170 (44.2)
Risk of aggression	92 (23.9)
Worsening of symptoms	76 (19.7)
Diagnostic uncertainty	23 (6.0)
Risk of moral exposure	20 (5.2)
Other	4 (1.0)
Main diagnosis (ICD-10)	
(F00-F09) Organic, including symptomatic, mental disorders	8 (2.1)
(F20-F29) Schizophrenia, schizotypal, and delusional disorders	111 (28.8)
(F30-F39) Mood (affective) disorders	232 (60.3)
(F40-F48) Neurotic, stress-related, and somatoform disorders	13 (3.4)
(F60-F69) Disorders of adult personality and behavior	8 (2.1)
(F70-F79) Mental retardation	4 (1.0)
Others	5 (1.3)
CGI score, median (IQR)[‡]	6 (5-6)
BPRS score, median (IQR)	23 (16-32)
GAF score, median (IQR)	30 (20-40)

Data presented as n (%), unless otherwise specified.
BPRS = Brief Psychiatric Rating Scale; CGI = Clinical Global Impression; GAF = Global Assessment Functioning; IQR = interquartile range; SD = standard deviation.
* Considering only the subsample with a history of hospital stays.
[†] Considering only the subsample with a history of suicide attempts.
[‡] CGI was treated as a continuous variable.

hospital stay in the preceding 2 years, CGI score, BPRS score, diagnosis of schizophrenia and related disorders according to ICD-10 criteria, and history of suicide attempts.

Discussion

Our study demonstrates that LOS in acute psychiatry beds is predicted by variables not mentioned in previous research, namely not having one's own income, history of psychiatric hospital stay in the preceding 2 years, total BPRS score, and history of suicide attempts. We also corroborated previous reports that CGI score and a diagnosis of schizophrenia predict LOS in a psychiatric bed. Together, these six independent variables accounted for 14.6% of the variance in ln(LOS).

Sociodemographic factors

Neither gender, age, nor relationship status were related to LOS in our sample, which contrasts with findings from larger samples. LOS was found to be positively associated with female gender[18] and older age[13,14] in studies with more than 3,118 participants.[18] The small number of elderly people in the sample (8.8%) may explain why age was not related to LOS in our sample. Type of insurance was not associated with LOS in this sample, which conflicts somewhat with evidence that hospital type (general hospital vs. psychiatric hospital) and type of insurance are related to LOS for persons with serious mental illness.[17,20] It is likely that this association was not detectable in this sample because the different groups of patients shared the same facility and treating teams. The only sociodemographic factor associated with LOS in our sample was not having one's own income. Patients without an income probably stay longer in a psychiatric bed because of social difficulties related to discharge. This finding demonstrates a need to pay attention to the finances of severely ill patients.

Psychiatric history

Some previous studies found a highly significant relationship between having had a previous hospital stay and LOS.[14,15,18] In bivariate analyses, both lifetime and 2-year history of psychiatric hospital stays were related to LOS, but in the final multivariable model, only 2-year history of psychiatric admissions was retained. Our study suggests that having been treated in a psychiatric inpatient admission in the last 2 years is a more important determinant of LOS than lifetime history of psychiatric hospital stays. A history of attempted suicide was very common in our sample (54.5%), and was negatively associated with LOS. Contrary to our hypothesis, admission based on risk of aggression was not related to LOS in the final model.

Table 3 Linear regression analysis of natural logarithm of length of stay (LOS): steps from bivariate model to final multiple model

	Bivariate analysis		Multivariate analysis					
	Step 0		Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
	β standardized (p-value)	Adjusted R2	β standardized	β standardized	β standardized	β standardized	β standardized	β standardized
Age, years	-0.016 (0.749)	< 0.01						
Female gender	0.011 (0.833)	< 0.01						
Caucasian ethnicity	0.040 (0.437)	< 0.01						
Area of residence: non-metropolitan	-0.023 (0.658)	< 0.01						
Educational level: did not complete high school*	0.07 (0.172)	< 0.01						
Without own income[†]	**0.175 (0.001)**	0.028[‡]	**0.114 (0.021)**	**0.112 (0.022)**	**0.110 (0.024)**	**0.109 (0.025)**	**0.110 (0.022)**	**0.111 (0.021)**
Relationship status: without partner	0.014 (0.782)	< 0.01						
Public health system user	0.083 (0.105)	< 0.01						
Lifetime history of psychiatric admission	**0.182 (0.001)**	0.03[‡]	0.035 (0.576)	0.036 (0.558)	0.040 (0.515)	0.041 (0.508)		
Psychiatric admission in the preceding 2 years	**0.160 (0.002)**	0.023[‡]	0.081 (0.174)	0.081 (0.175)	0.078 (0.186)	0.078 (0.187)	**0.100 (0.039)**	**0.104 (0.033)**
History of suicide attempt	**-0.124 (0.015)**	0.013[‡]	-0.079 (0.137)	-0.081 (0.125)	-0.080 (0.129)	-0.079 (0.131)	-0.075 (0.150)	**-0.096 (0.05)**
Age at first diagnosis	-0.098 (0.055)[‡]	< 0.01						
Time since first diagnosis	0.098 (0.054)[‡]	< 0.01						
Cause of admission								
Suicide risk	**-0.181 (< 0.001)**	0.03[‡]	-0.058 (0.357)	-0.061 (0.323)	-0.057 (0.350)	-0.062 (0.266)	-0.069 (0.204)	
Risk of aggression	**0.115 (0.024)**	0.011[‡]	0.017 (0.761)	0.015 (0.789)	0.010 (0.858)			
Worsening of symptoms	0.061 (0.235)	< 0.01						
Diagnostic uncertainty	0.059 (0.246)	< 0.01						
Risk of moral exposure	0.075 (0.142)	< 0.01						
CGI	**0.286 (< 0.001)**	0.08[‡]	**0.202 (0.007)**	**0.186 (0.002)**	**0.188 (0.001)**	**0.188 (0.652)**	**0.192 (0.001)**	**0.188 (0.001)**
BPRS	**0.286 (< 0.001)**	0.079[‡]	0.098 (0.114)	0.094 (0.123)	0.093 (0.126)	0.094 (0.612)	0.095 (0.117)	0.102 (0.088)
GAF	**-0.194 (< 0.001)**	0.035[‡]	0.025 (0.724)					
Main diagnosis (ICD-10)								
(F00-F09) Organic, including symptomatic, mental disorders	0.091 (0.077)	< 0.01						
(F20-F29) Schizophrenia, schizotypal, and delusional disorders	**0.231 (< 0.001)**	0.051[‡]	**0.136 (0.085)**	**0.140 (0.075)**	**0.103 (0.054)**	**0.104 (0.792)**	**0.106 (0.046)**	**0.126 (0.013)**
(F30-F39) Mood (affective) disorders	**-0.168 (0.001)**	0.026[‡]	0.046 (0.566)	0.050 (0.524)				
(F40-F48) Neurotic, stress-related, and somatoform disorders	**-0.109 (0.034)**	< 0.01						
(F60-F69) Disorders of adult personality and behavior	-0.048 (0.352)	< 0.01						
Intercept			2.313	2.4	2.441	2.446	2.453	2.424
R2			0.14	0.143	0.144	0.147	0.148	0.146

LOS = length of stay; CGI = Clinical Global Impression; BPRS = Brief Psychiatric Rating Scale; GAF = Global Assessment Functioning.
Significant results shown in bold.
* Educational level was dummy-coded as a binary variable. with completion of high school or more as the reference category.
[†] Income was dummy-coded as a binary variable, with having own income as the reference category.
[‡] R² > 0.01.

Current episode

In this sample, total BPRS score was positively associated with LOS, even in the multivariable model. Hopko et al. demonstrated that data from the BPRS subscales could be used to identify up to 80% of patients who required extended hospital care.[15] In our sample, total BPRS score was associated with LOS independently of diagnosis. In the bivariate models (Step 0), CGI score was the single variable which accounted for most variance in ln(LOS) (R^2 = 0.08). Even when other variables were added to the model, CGI remained positively associated with LOS, which is consistent with the findings of Warnke et al.[16] This is particularly important, as the CGI scale is quick and easy to administer and is in very widespread use.

Reason for admission was not a determinant of LOS in the multivariable final model, rejecting our hypothesis that patients admitted for risk of aggression would need longer hospitalization. In our study, diagnoses of mood disorders or schizophrenia and related disorders (using ICD-10 criteria) were associated with LOS in bivariate models; diagnoses of mood disorders were negatively associated with LOS. In the multivariable final model, schizophrenia and related disorders remained positively associated with LOS. Several studies have reported that a diagnosis of schizophrenia is positively associated with LOS.[14,16,18,25] Our findings confirm that patient with schizophrenia have longer stays as psychiatric inpatients than patients with other mental disorders. This may reflect the combination of complex, hard-to-treat acute symptoms and social withdrawal which characterize schizophrenia, and can prevent achievement of rapid discharge.

Length of stay

The median LOS was 25 days, a figure very similar to the median 22-day stay reported for a Swiss sample.[16] However, LOS varies widely between studies. A previous Brazilian study reported a mean LOS of 20 days.[26] A large U.S. study of more than 45,000 subjects reported a mean length of psychiatric hospital stay was 10.0 days,[20] while in an Australian sample, the median LOS was 12 days.[2] In contrast, the mean LOS in a Japanese sample was 49 days,[27] and in a Chinese sample, 45 days.[25] We hypothesize that the marked difference between LOS in different countries can be attributable to differences in the range of treatment options available in the community in different places, as well as to cultural aspects regarding style of psychiatric care delivery. There is still some doubt as to whether short admissions should be recommended (because they help prevent patients from becoming institutionalized) or whether they are harmful (because they do not allow the causes and symptoms of illness to be fully addressed). This issue is further complicated by the existence of a group of patients who have short but frequent admissions, also known as revolving-door patients. A recent Cochrane review which compared stays of less than vs. more than 28 days in patients with severe mental illness concluded that there were no benefits from longer hospital stays in terms of readmission and other outcomes, and that short stays were associated with better

social functioning.[28] Especially because of the restricted number of psychiatric beds nowadays, rapid discharge means greater availability of such beds, which, in turn, means an opportunity to provide care to another patient. On the other hand, very short hospital stays may reduce the opportunity for a comprehensive investigation and make it more difficult to address the psychosocial aspects of a patient's illness, thus compromising the chances of sustained recovery.[6] For some patients, a short stay is not sufficient to stabilize their symptoms and may not be long enough to even begin to treat serious illnesses; in these cases, a longer stay would reduce the odds of rapid readmission, homelessness, and criminalization.[1] Therefore, any policy meant to reduce the duration of inpatient treatment should be carefully evaluated to ensure that potential negative consequences for patients are avoided.[29]

This study has several strengths. First, we found four predictors of LOS which have not been mentioned in previous international studies, namely being without an income, history of psychiatric admissions in the preceding 2 years, total BPRS score, and history of suicide attempts. Second, this was a prospective study based on primary data rather than hospital records; hence, data were accurate and clinically detailed. Third, we performed a comprehensive analysis including several categories of predictors – demographic variables, psychiatric history variables, current episode variables – in a single model. Fourth, the sample encompassed a wide range of diagnoses. Fifth, in contrast to most of the published evidence in this area, our study was conducted in a middle-income economy, thus providing data about LOS produced in a population outside high-income countries.

The sample size was small compared with other investigations into potential determinants of LOS. This probably explains why we failed to find relationships between LOS and age, gender, and relationship status. It is possible that, in a larger sample from this population, we might detect a negative association between LOS and age at diagnosis or a positive association between LOS and duration of illness. The common weaknesses of large-sample studies are, however, that they tend to be retrospective and based only on data from hospital records. About 6% of patients admitted during the study period were not included in the study because they exhibited severe, persistent agitation or a severe cognitive impairment; we are therefore unable to comment on predictors of LOS in these patient groups. Our analysis of LOS also excluded very short admissions. Our rate of loss was 18.5% among eligible patients. There were more female than male patients with missing data; however, as included and excluded patients were similar with respect to LOS, age, and type of insurance, it is unlikely that their exclusion biased the findings significantly. Generalization of these findings to other settings can be compromised by the fact that policies regarding hospitalization vary widely across settings, depending on culture, local legislation, and even hospital type (psychiatric bed in a general hospital vs. dedicated psychiatric hospital).

Six independent variables accounted for 14.6% of the variance in ln(LOS), indicating that a small proportion

of the variance in LOS can be predicted from patient characteristics which are measurable on admission. This finding is consistent with other studies,[14,18] and suggests that prediction of LOS is far from straightforward, with multiple factors being involved.[15,30]

Identifying patients who will need to stay longer in a psychiatric bed remains a challenge. It is likely that LOS is influenced more by the process of psychiatric treatment and by factors which emerge after admission, such as comorbidity and psychosocial impairments,[29,31] than by simple patient characteristics. Nevertheless, our findings suggest that patients without an income, with a recent history (previous 2 years) of psychiatric admissions, with high CGI or BPRS scores, or with a diagnosis of schizophrenia or related disorders based on ICD-10 criteria may benefit from early identification and careful discharge planning. LOS remains an under-investigated variable, and better understanding of the factors which influence it might lead to improvements in the quality of care in hospital psychiatry.

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Disclosure

The authors report no conflicts of interest.

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