Original article

Factors related to positive and negative outcomes in psychiatric inpatients in a General Hospital Psychiatric Unit: a proposal for an outcomes index

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Abstract

Background: General Hospital Psychiatric Units have a fundamental importance in the mental health care systems. However, there is a lack of studies regarding the level of improvement of patients in this type of facility. **Objective:** To assess factors related to good and poor outcomes in psychiatric inpatients using an index composed by clinical parameters easily measured. **Methods:** Length of stay (LOS), Global Assessment of Functioning (variation and at discharge) and Clinical Global Impression (severity and improvement) were used to build a ten-point improvement index (I-Index). Records of psychiatric inpatients of a general hospital during an 18-month period were analyzed. Three groups (poor, intermediate and good outcomes) were compared by univariate and multivariate models according to clinical and sociodemographic variables. **Results**: Two hundred and fifty patients were included, with a percentage in the groups with poor, regular and good outcomes of 16.4%, 59,6% and 24.0% respectively. Poor outcome at the discharge was associated mainly with lower education, transient disability, antipsychotics use, chief complaint "behavioral change/aggressiveness" and psychotic features. Multivariate analysis found a higher OR for diagnoses of "psychotic disorders" and "personality disorders" and others variables in relation to protective categories in the poor outcome group compared to the good outcome group. **Discussion:** Our I-Index proved to be an indicator of that allows an easy and more comprehensive evaluation to assess outcomes of inpatients than just LOS. Different interventions addressed to conditions such as psychotic disorders and disruptive chief complaints are necessary.

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Keywords: Psychiatry unit, inpatients, length of stay, clinical impression, global functioning, psychiatric diagnosis, outcomes.

Introduction

Since the late 1970s, a new proposal for the composition of mental health care system was progressively implemented in some European countries, based on deinstitutionalization and replacement of asylums for community-based psychiatric services and beds in general hospitals[1-3]. Influenced by the European movement, the process of reformation of the psychiatric care in Brazil has led to a significant decrease in psychiatric beds in the past twenty years, even though replacement services have not expanded at the same pace[4,5]. In this context, psychiatric wards within general hospitals became the main facilities for treatment of acute cases, increasing the importance of General Hospital Psychiatric Units (GHPU)[6].

Although GHPU have a fundamental importance in this new model of care, there is a lack of studies regarding the level of improvement of patients in this type of facility. Therefore, it is also not well established what are the best general parameters for evaluating outcomes in patients admitted to general hospitals. Shorter psychiatric length of stay (LOS) has been considered a strong indicator of good outcomes both in specialty and general hospitals[7-9]. Although the LOS of psychiatric inpatients has decreased in recent decades (from months to days), it is still longer than for patients with physical illnesses, increasing expenditures on health, generating stigma and delaying social reintegration of the patient[7]. Functional ratings as the Global Assessment of Functioning (GAF)[10-12] and the Brief Psychiatric Rating Scale (BPRS)[13] also have been used to measure outcomes in psychiatric inpatients acutely ill, as well as the Clinical Global Impression (CGI)[14], a measure of disease severity.

In Brazil, only one study was conducted to assess outcomes of psychiatric inpatients in general hospitals. Dalgalarrondo *et al.*[15] created a variable called "outcome of admission" on the basis of a combination of two other variables: LOS and condition at discharge, a non-standardized clinical assessment. These authors found three variables (poor social functioning before admission, advanced age and organic mental disorder) associated with the "worst outcomes". Despite the merits of this study, the measure constructed to assess these "worst outcomes" used an unusual and subjective criterion for evaluating the condition at discharge, making it difficult to be reproduced.

The use and development of assessment outcomes parameters as routine outcome measurements (ROM) is particularly important in mental health. In addition to recent changes in model of care mentioned above, the evaluation of outcomes has a dual role: evaluating clinical results and generating data for the construction of a care policy and financing model in mental health. While countries like England already possess broader and pragmatically built outcome measures as the Health of the Nation Outcome Scales (HoNOS)[16], the care reality in low- and middle-income countries is much more precarious. In Brazil, for example, the only variables available for assessing results in mental health public system are the psychiatric diagnosis and the LOS. The lack of funding and consequently the lack of professionals and technologies for the assessment of outcome parameters make it difficult to evaluate true reality of assistance. Thus, the proposal of measures of minimal clinical parameters of evaluation of outcomes in mental health is an urgent demand.

The present study aims: 1) to propose and test an index of evaluation outcomes for psychiatric inpatients, using usual and easily measured clinical variables to compose an outcome score; 2) to investigate clinical and sociodemographic factors related to positive and negative outcomes in psychiatric inpatients in a GHPU classified by this index.

Methods

Study design, data source and sampling design

All records of admission to a Psychiatric Unit of a General Hospital (Hospital São Lucas da PUCRS – HSL/PUCRS) in Porto Alegre, Brazil, were selected during 18 months (from February, 2013, to August, 2014). This unit has 18 psychiatric beds for public (six beds) and

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private (twelve beds) patients. We assessed data in two moments: 1) admission and; 2) discharge (last day of hospitalization). All patients admitted to the unit are evaluated on a routine protocol in the early hours of hospitalization. This protocol is part of routine care of the psychiatric unit and includes sociodemographic and clinical data, as well as tools to assess global functioning and severity of illness (described below). Some variables as "chief complaint" were categorized according to their distribution in the emergency room, in accordance with a classification already described in previous studies[17]. All patients who received medical discharge during these 18 months were included in the study. When the routine protocol is completed at discharge, some measures of improvement are collected to assess treatment response (as we describe below). Our initial sample consisted of 287 patients. We excluded from the analysis patients who did not have any data of the five outcome variables (CGI-I, CGI-S at discharge, GAF at discharge, Δ-GAF and LOS) and patients who discontinued treatment before medical discharge (n = 37). The final sample was composed of 250 patients.

Instruments

Clinical Global Impression – Severity (CGI-S): this is one of the most widely used assessment tools in psychiatry, easy to apply and interpret, besides being in the public domain. The CGI is rated on a 7-point scale, with the severity of illness scale using a range of responses from 1 (normal) to 7 (amongst the most severely ill patients)[18].

Clinical Global Impression – Improvement (CGI-I): as the instrument described above, the CGI-I is also in the public domain and assesses the degree of patient improvement or response to treatment. Scores range from 1 (very much improved) to 7 (very much worse)[18].

Global Assessment of Functioning (GAF): This tool composes the so-called Axis V in the DSM-IV Multiaxial System[19]. It is used to report the clinician's judgment of the overall level of functioning of the patient, rating subjectively the social, occupational, and psychological functioning of adults. The scale ranges from 0 (inadequate information) to 100 (higher functioning), with ten categories of functioning. Within each category, there is a range of 10 points, describing and exemplifying patterns of functioning in various environments. A number should be chosen as the most descriptive of the overall functioning of the patient.

Index to assess outcomes

In order to construct a measure that could consider several parameters of improvement commonly used in the literature, inexpensive, and easily collected in Brazilian care reality, we propose an Improvement Index (I-Index) with a score ranging from 0 to 10 points. This index takes into account five variables: length of stay, CGI-S at discharge, CGI-I, GAF at discharge and GAF variation (GAF at discharge – GAF at admission or Δ-GAF). These instruments were chosen due to four pragmatic criteria: 1) they are readily applicable and information be easily collected; 2) their application does not burden the assistant psychiatrist or the patient, that is, the clinical care is not modified or interfered with; 3) measures are usually assessed in clinical outcome studies of psychiatric inpatients; and 4) the psychiatrists of our institution are acquainted with the measures. Each variable might score from 0 to 2 points, according to the guidelines in box 1. The final Index-I score can achieve 10 points, generating three groups with the following cutoffs: from 0 to 4 points = poor outcome; from 5 to 7 points = regular outcome; and from 8 to 10 points = good outcome. The scores of GAF, Δ-GAF and LOS were data-driven defined, according to their mean and standard deviations in our sample.

Data analyses

Descriptive analyses were presented by means and standard deviations (SD) for continuous variables, and by numbers and percentages (%) for categorical variables. The initial scores for each variable of the I-Index were calculated according to the distribution of each variable as illustrated in the box 1. Differences between groups in sociodemographic and clinical continuous variables were analyzed with analysis of variance (ANOVA) test, with Tukey's multiple comparison test as post hoc analysis. Categorical variables were analyzed with Pearson chi-square tests and the analyses post hoc of the adjusted residuals were also performed to reveal the differences among the categories of each variable. In order to evaluate the correlations among variables used in I-Index, Pearson correlation was calculated, with the following parameters: very weak (from 0.00 to 0.19), weak (from 0.20 to 0.39), moderate (from 0.40 to 0.59), strong (0.60 to 0.79) and very strong (0.80 to 1.00) correlations[20]. To identify admission factors independently associated with discharge measurements, the polytomous multivariable logistic regression was used. The I-Index "good outcome" was chosen as a reference to estimate odds-ratios (OR) of "regular outcome" and "poor outcome". The variables included at the multivariate analysis were those with $p < 0.20$ at uncontrolled analysis. Since the variables "diagnosis" and "chief complaint" show covariance two independent final models were calculated. The final models were established excluding variables with less interference one-by-one.

The p value for significance was set at 0.05. The statistical analyses were performed using the software SPSS 18.0 (IBM SPSS, Inc., 2009, Chicago, IL, www.spss.com).

Ethics considerations

This study was approved by the Research Ethics Committee of Pontifical Catholic University of Rio Grande do Sul (protocol number: 565.190).

Box 1. Score Index-I according to the score of each variable

	Poor outcome (score = 0)	Intermediate outcome (score = 1)	Good outcome (score = 2)
CGI-I	1 (very much worse), 2 (much worse), 3 (minimally worse) or 4 (no change)	5 (minimally improved)	6 (much improved) or 7 (very much improved)
CGI-S at discharge	5 (markedly ill), 6 (severely ill) or 7 (among the most extremely ill patients)	3 (mildly ill) or 4 (moderately ill)	1 (normal, not at all ill) or 2 (borderline mentally ill)
GAF at discharge	The patient that scored, at discharge, less than the average of the GAF for all patients	The patient that scored, at discharge, between the average and one SD above the average of the GAF for all patients	The patient that scored, at discharge, more than one SD above average of the GAF for all patients
Δ-GAF	The Δ-GAF changed less than one SD below the average of the Δ-GAF for all patients	The Δ-GAF changed between one SD below the average and the average of the Δ-GAF for all patients	The Δ-GAF changed more than the average of the Δ-GAF for all patients
LOS	Patient remained hospitalized longer than one SD above the average of the LOS for all patients	Patient remained hospitalized between the average and 1 SD above the average of LOS for all patients	Patient remained hospitalized for fewer days than the average of LOS for all patients
Final Index-I score	0-4 = Poor	5-7 = Regular	> 7 = Good

CGI-S: Clinical Global Impression – Severity at discharge; CGI-I: Clinical Global Impression – Improvement; GAF-D: Global Assessment Functioning at discharge; Δ-GAF: GAF variation (GAF at discharge – GAF at admission); LOS: length of stay; SD: standard deviation.

Results

Table 1 lists the sociodemographic and clinical data of the total sample (n = 250). Most of the patients were female (65.2%), with an average age of 41 (SD = 17.6). The majority of them was either single or separated (58.7%) and nonsmokers (70.2%); 38.4% were employed or active. Most of the patients had previous psychiatric hospitalizations (50.6%) and 48.4% had clinical comorbidities. The most frequent specific chief complaint of evaluation was change in behavior/aggressiveness (21.5%), followed by suicidal ideation (19.4%), suicide attempt (19%), psychotic symptoms (14%) and substance abuse (7.9%).

Table 2 compares clinical variables on admission and at discharge. The length of stay had a mean of 27.12 (±15.04) days. During hospitalization, there was an increase in the use of antipsychotics (+23.2%), with discrete changes in other classes of medication, such as a decrease in the use of benzodiazepines (-4.8%). Patients had an average increase in GAF of 31.92 points from admission to discharge. The CGI-S decreased 2.06 points in mean and the average of CGI-I was 5.8 points.

Table 1. Sociodemographic and clinical data of the total sample and univariate differences among groups according to type of outcome

Clinical variables	n	Total sample	Poor outcome	Regular outcome	Good outcome	p
Age[1] – Mean (SD)	250	40.87 (17.65)	39.0 (17.38)	40.9 (17.73)	42.0 (17.82)	0.696
Sex[2] – Female – n (%)	250	163 (65.2%)	26 (63.4%)	95 (63.8%)	42 (70%)	0.669
Marital status – n (%)	247					0.101
Married		86 (34.8%)	8 (20%)	52 (34.7%)	27 (45%)	
Single/separated		145 (58.7%)	29 (72.5%)	88 (59.9%)	28 (46.7%)	
Widowed		16 (6.5%)	3 (7.5%)	8 (3.2%)	5 (2.0%)	
Health insurance[2] – n (%)	247					0.109
SUS (public health system)		55 (22.3%)	15 (36.6%)	32 (21.8%)	8 (13.6%)	
Private health insurance		179 (72.4%)	24 (58.5%)	107 (72.8%)	48 (81.4%)	
No insurance (Private costs)		13 (5.3%)	2 (4.9%)	8 (5.4%)	3 (5.1%)	
Years of education[2] – n (%)	246					**0.018***
0-8 years		65 (26.4%)	18 (45%)[2.9]	36 (24.7%)	11 (18.3%)	
8-12 years		96 (39%)	9 (22.5%)[-2.3]	57 (39%)	30 (50%)[2.0]	
> 12 years		85 (34.6%)	13 (32.5%)	53 (36.3%)	19 (31.7%)	
Occupational status[2] – n (%)	245					**0.027***
Employed/active		98 (38.4%)	9 (22.5%)[-2.3]	53 (36.3%)	32 (54.2%)[2.9]	
Unemployed		60 (24.5%)	11 (27.5%)	38 (26.0%)	11 (18.6%)	
Retired		50 (20.3%)	8 (20%)	29 (19.9%)	13 (22%)	
Transient disability (Government benefit)		31 (12.6%)	9 (22.5%)[2.0]	19 (13%)	3 (5.1%)[-2.0]	
Other		10 (4.1%)	3 (7.5%)	7 (2.9%)	0 (0%)	
Chief complaint[2] – n (%)	242					**< 0.001****
Suicidal ideation		47 (19.4%)	3 (7.5%)[-2.1]	24 (16.9%)	20 (34.5%)[3.3]	
Suicide attempt		46 (19%)	3 (7.5%)[-2.0]	34 (23.6%)[2.2]	9 (15.5%)	
Psychotic symptoms		34 (14%)	11 (27.5%)[2.7]	17 (11.8%)	6 (10.3%)	
Behavior change/aggressiveness		52 (21.5%)	14 (35.0%)[2.3]	33 (22.9%)	5 (8.6%)[-2.7]	
Substance abuse		19 (7.9%)	3 (7.5%)	8 (5.6%)	8 (13.8%)	
Other		44 (18.2%)	6 (15%)	28 (19.4%)	10 (17.2%)	
Clinical comorbidities[2] – n (%)	250	121 (48.4%)	21 (51.2%)	68 (45.6%)	32 (53.3%)	**0.557**
Psychiatric/psychological treatment[2]	233					**0.303**
Yes, on treatment		131 (56.2%)	23 (60.5%)	81 (58.7%)	27 (47.4%)	
No, never		31 (13.3%)	3 (7.9%)	16 (11.6%)	12 (21.1%)	
Yes, but stopped		71 (30.5%)	12 (31.6%)	41 (29.7%)	18 (31.6%)	
Main diagnostic hypothesis [admission][2] – n (%)	248					**0.001****
F10-F19		27 (10.8%)	3 (7.3%)	16 (10.9%)	8 (13.3%)	
F20-F29		36 (14.4%)	15 (36.6%)[4.4]	16 (10.9%)[-2.0]	5 (8.3%)	
F30-F31		54 (21.6%)	8 (19.5%)	35 (23.8%)	11 (18.3%)	
F32-F39		62 (24.8%)	3 (7.3%)[-2.9]	35 (23.8%)	24 (40%)[3.1]	
F60-F69		31 (12.4%)	5 (12.2%)	21 (14.3%)	5 (8.3%)	
Other		38 (15.2%)	7 (17.1%)	24 (16.3%)	7 (11.7%)	
Use of Benzodiazepines[2] – n (%)	243	86 (34.4%)	13 (33.3%)	45 (31.3%)	28 (46.7%)	**0.106**
Use of Antidepressants[2] – n (%)	243	95 (38.0%)	12 (30.8%)	56 (38.9%)	27 (45%)	**0.365**
Use of Antipsychotics[2] – n (%)	234	116 (46.4%)	25 (64.1%)[2.2]	70 (48.6%)	21 (35%)[-2.3]	**0.017***
Use of Lithium[2] – n (%)	243	22 (8.8%)	2 (5.1%)	16 (11.1%)	4 (6.7%)	**0.390**
Use of Anticonvulsants[2] – n (%)	243	70 (28.0%)	9 (23.1%)	51 (35.4%)[2.7]	10 (16.7%)[-2.4]	**0.018***

Superscript values corresponds to post hoc analysis of residuals in variables with positive and negative Residuals ≥ 1.96; [1] ANOVA test; [2] Person Chi-square test.
* $p < 0.05$; ** $p < 0.01$.

Table 2. Clinical variables on admission and at discharge (n = 250)

Clinical variables	Admission	Discharge	Variation (Δ) admission/ discharge
Days of hospitalization – mean (SD)	-	-	27.12 (15.04)
F10-F19	-	-	31.86 (20.11)
F20-F29	-	-	30.23 (17.48)
F30-F31	-	-	31.43 (12.58)
F32-F39	-	-	25.86 (13.61)
F60-F69	-	-	20.86 (11.18)
Other	-	-	25.38 (13.61)
GAF – mean (SD)	34.18 (12.86)	66.10 (13.77)	+31.92 (13.35)
Psychiatric medication			
Not recorded in the chart	7 (2.8%)	2 (0.8%)	-5 (-2%)
No medication	51 (20.4%)	5 (2%)	-46 (-18.4%)
Benzodiazepines	86 (34.4%)	74 (29.6%)	-12 (-4.8%)
Antidepressants	95 (38.0%)	99 (39.6%)	+4 (+1.6%)
Antipsychotics	116 (46.4%)	174 (69.6%)	+58 (+23.2%)
Lithium	22 (8.8%)	22 (8.8%)	0 (0%)
Anticonvulsants	70 (28.0%)	72 (28.8%)	+2 (+0.8%)
Others/does not know	20 (8%)	30 (12.0%)	+10 (+4%)
CGI-Severity – n (%)			
Mean	5.22 (0.84)	3.16 (1.04)	-2.06
0 – Not assessed	9 (3.6%)	0 (0%)	-9 (-3.6%)
1 – Normal, not at all ill	0 (0%)	8 (3.2%)	+8 (+3.2%)
2 – Borderline mentally ill	2 (0.8%)	41 (16.4%)	+39 (+15.6%)
3 – Mildly ill	6 (2.4%)	100 (40%)	+94 (+37.6%)
4 – Moderately ill	39 (15.6%)	75 (30%)	+26 (+14.6%)
5 – Markedly ill	106 (42.4%)	19 (7.6%)	-87 (-34.8%)
6 – Severely ill	80 (32%)	6 (2.4%)	-74 (-29.6%)
7 – Among the most extremely ill patients	8 (3.2%)	1 (0.4%)	-7 (-2.8%)
CGI-Improvement – n (%)			
Mean	-	5.80	-
0 – Not assessed	-	0 (0%)	-
1 – Very much worse	-	1 (0.4%)	-
2 – Much worse	-	2 (0.8%)	-
3 – Minimally worse	-	6 (2.4%)	-
4 – No change	-	7 (2.8%)	-
5 – Minimally improved	-	53 (20.8%)	-
6 – Much improved	-	188 (47.2%)	-
7 – Very much improved	-	64 (25.6%)	-

GAF: Global Assessment of Functioning; CGI: Clinical Global Impression. Variables presented in number (percentage) or mean (standard deviation).

Box 2. Data-driven Index-I scores according to the score of each variable

	Poor outcome (score = 0)	Intermediate outcome (score = 1)	Good outcome (score = 2)
CGI-I	1, 2, 3 or 4	5	6 or 7
CGI-S at discharge	5, 6 or 7	3 or 4	1 or 2
GAF at discharge	< 65	65-80	> 80
Δ-GAF	< 19	19-32	> 32
LOS	> 42	27-42	< 27
Final Index-I score	0-4 = Poor	5-7 = Regular	> 7 = Good

GAF-D: Global Assessment Functioning at discharge; Δ-GAF: GAF variation (GAF at discharge – GAF at admission); LOS: length of stay; SD: standard deviation. The mean and SD values were rounded.

Box 3. Pearson correlations among the variables used in the I-Index

	I-Index score	LOS	CGI-S	CGI-I	GAF-D	Δ-GAF
I-Index score	1	-	-	-	-	-
LOS	-0.355**	1	-	-	-	-
CGI-S	-0.600**	0.147*	1	-	-	-
CGI-I	0.505**	0.101	-0.207**	1	-	-
GAF-D	0.710**	-0.127*	-0.440**	0.281**	1	-
Δ-GAF	0.657**	0.063	-0.288**	0.300**	0.624**	1

LOS: length of stay; GAF-D: Global Assessment Functioning at discharge; Δ GAF: GAF variation (GAF at discharge – GAF at admission); CGI-S: Clinical Global Impression – Severity at discharge; CGI-I: Clinical Global Impression – Improvement.
* Significant correlation at $p < 0.05$; ** Significant correlation at $p < 0.01$.

The box 2 presents the values used to generate the points of each variable according to the means and SD of the variables. Box 3 presents the results of correlations among variables of the Index-I. The LOS presented no significant (with CGI-I x Δ-GAF) or very weak (with CGI-S at discharge x GAF-D) correlations with others variables. The higher correlation was between GAF-D x Δ-GAF (strong) and GAF-D x CGI-S at discharge (moderate), while the other correlations were weak. In relation to the I-Index score, strong correlations with CGI-S (negative), GAF-D and Δ-GAF were found; moderate correlation with CGI-I; and weak correlation with LOS (negative).

In relation to the Index-I, 41 patients (16.4%) were classified in the poor outcome group, 140 (59.6%) in the regular outcome group and 60 (20%) in the good outcome group. The results of the univariate analyses comparing these groups are also presented in table 1.

The poor outcome group frequently had low education, higher percentage of transient disability and smaller percentage of active/employed in occupational status, more psychotic symptoms and change in behavior/aggressiveness and less suicidal ideations in chief complaints. This group also had more psychotic disorders and less depressive disorders as psychiatric diagnoses and more use of antipsychotics than the good outcome group (regular outcome group presented usually intermediate results).

The main results of the multivariate analyses (Table 3) show two different clinical admission factors related with a poorer outcome. Two regression models are present. With regards to diagnosis at admission, psychotic disorders (OR: 16.77; CI: 3.16 – 89.10), personality disorders (OR: 9.76; CI: 1.51 – 63.05) and "others" (OR: 8.19; CI: 1.52 – 44.15) were associated with poorer outcome at discharge compared with the reference variable depressive disorder. The admission chief complaints of "psychotic symptoms" (OR: 12.42; CI: 2.28 – 67.75) and "change in behavior/aggressiveness" (OR: 25.19; CI: 4.48 – 141.72) were also associated with poor outcome at discharge (in relation to suicide ideation). Transient disability was associated with poor outcome in both models.

Discussion

This study proposed an index of evaluation of outcomes for psychiatric inpatients using variables easily measured and routinely collected in psychiatric units. Our strategy was able to identify clinical and sociodemographic risk factors associated with positive and negative outcomes regarding improvement at discharge. The results replicate and extend findings of the literature that used single variables as outcome, proposing more comprehensive and clinically useful criteria for evaluating results in psychiatric inpatients, what is particularly important for the mental care reality of low- and middle-income countries.

The first strategy of this study was composing an index of improvement that encompasses more than one dimension related to the outcome of inpatients. The most part of the literature has predominantly used isolated variables in this assessment, such as LOS[10,12,21,22],

Table 3. Polytomous logistic regression comparing different patterns of discharge outcomes

Variables Model 1 (n = 240)	Intermediate OR (95% CI) [P value]	Poor OR (95% CI) [P value]
Years of education		
0-8 years	1.03 (0.42-2.55) [0.951]	1.63 (0.51-5.20) [0.411]
8-12 years	0.62 (0.30-1.30) [0.204]	0.29 (0.09-0.92) [0.036]
> 12 years	†	†
Occupational status		
Employed/active	†	†
Unemployed	2.29 (0.99-5.24) [0.051]	3.21 (0.95-10.88) [0.061]
Retired	1.52 (0.53. 4.36) [0.440]	3.06 (0.61-15.43) [0.175]
Transient disability	**3.96 (1.06-14.84) [0.041]**	**9.43 (1.88-47.31) [0.006]**
Other	X	X
Main diagnostic hypothesis [admission]		
F10-F19	1.50 (0.52-4.30) [0.453]	3.78 (0.58-24.86) [0.166]
F20-F29	1.88 (0.58-6.11) [0.297]	**16.77 (3.16-89.10) [0.001]**
F30-31	2.01 (0.82-4.93) [0.127]	4.71 (0.96-23.04) [0.056]
F60-F69	3.16 (0.96-10.46) [0.059]	**9.76 (1.51-63.05) [0.017]**
Other	2.33 (0.83-6.54) [0.108]	**8.19 (1.52-44.15) [0.014]**
F32-F39	†	†
Variables Model 2 (n = 234)	**Intermediate OR (95% CI) [P value]**	**Poor OR (95% CI) [P value]**
Years of education		
0-8 years	0.92 (0.40-2.75) [0.951]	1.57 (0.46-5.30) [0.470]
8-12 years	0.54 (0.25-1.19) [0.129]	0.27 (0.08-0.90) [0.032]
> 12 years	†	†
Occupational status		
Employed/active	†	†
Unemployed	**2.86 (1.17-6.99) [0.022]**	**4.14 (1.15-14.96) [0.030]**
Retired	1.40 (0.47-4.14) [0.547]	3.68 (0.69-19.50) [0.126]
Transient disability	**4.36 (1.13-16.81) [0.033]**	**15.01 (2.89-78.85) [0.001]**
Other	X	X
Chief complaint		
Other	2.50 (0.86-7.11) [0.095]	4.61 (0.82-26.01) [0.084]
Suicide attempt	**3.84 (1.38-10.69) [0.010]**	3.30 (0.50-31.83) [0.22]
Psychotic symptoms	1.98 (0.60-6.51) [0.260]	**12.42 (2.28-67.75) [0.004]**
Behavior change/aggressiveness	**6.90 (2.11-22.50) [0.001]**	**25.19 (4.48-141.72) [< 0.001]**
Substance abuse	0.83 (0.25-2.80) [0.763]	2.80 (0.40-19.54) [0.300]
Suicidal ideation	†	†

Results are controlled for age, sex, civil status, and income. †: reference category. X: insufficient number for analysis. The I-Index "good outcome" was chosen as a reference to estimate odds-ratios (OR) of "intermediate outcome" and "poor outcome". Values in bold represent significant differences with $p < 0.05$.

as a single parameter of outcome. However, LOS might mistakenly evaluate a hospitalization for a long period as a poor outcome, despite a significant improvement in symptoms and functionality of a patient. Although LOS is recognized as an important parameter, it is often chosen because it relates directly to health expenditure[7], underestimating clinical issues. Furthermore, LOS may even underestimate the degree of improvement. Prince *et al.* found very short admissions as predictors of readmission in patients with mood disorder in a US population-based study[23], suggesting the insufficiency of this parameter. We found only a weak correlation between the I-index and the LOS. In addition, the weak correlation between LOS and other variables of the I-Index and the weak correlations of most variables with each other reinforce the independence and complementarity of them in our sample. Other authors have used subjective variables (such as "good clinical condition at discharge")[15] or indices constructed from more complex methodologies[24], complicating replicability or limiting its application. Thus, the variables and the method used to measure the I-Index can be considered simple and practical for treatment environments with limited resources.

The sociodemographic variables associated with poor outcomes were low education and patients with transient disability. While several other variables have been usually related with poor outcomes (such as unemployment, being unmarried and public insurance)[10,21], no other studies have evaluated transient disability, a very common condition in inpatients in Brazil; our results show increased OR for transient disability in relation to employed/active status on the groups with intermediate (OR vary from 3.96 to 4.36) and poor (OR vary from 9.43 to 15.01) outcomes. Disability pension due to mental disorders has been associated with increased suicide risk[25] and heavy use of psychiatric inpatients services[26], while this outcomes have not yet been evaluated in transient disability. On the other hand, being employed/active in occupational status was associated with a good outcome, which has been extensively replicated in the literature[10,15].

Psychotic symptoms and change in behavior/aggressiveness were the most prevalent chief complaints and were both independently associated with the poor outcome group, while suicidal ideation was the most prevalent one in the good outcome group. Concerning psychiatric diagnosis, psychotic disorders were related to poor outcome

and unipolar depressive disorders to good outcome. Psychotic disorders were the diagnostic group most associated with poor outcome when compared with depressive disorders. These results also possibly explain respectively the highest prevalence of psychotic symptoms and change in behavior/aggressiveness in the poor outcome group (related to psychotic disorders and more severe cases) and a higher prevalence of suicidal ideation in the good outcome group (related to depressive disorders). The relation between psychotic disorders and bad outcomes, including readmissions ("revolving door phenomenon")[27,28], longer hospitalizations[7,10,21] and higher mortality[29], is well established. This association further explains the poor outcome for patients taking antipsychotics at admission. Psychotic disorders as schizophrenia are usually chronic disorders associated with long-lasting symptoms resistant or refractory to treatment[30]. It is also well established that patients with aggression issues are difficult to treat and keep in compliance on an outpatient basis and readmissions rates are high for them[28]; this corroborates that these patients have a poor outcome. On the other hand, unipolar depression was highly prevalent in those with good outcomes. While Masters *et al.*[10] found depressive disorders with shorter LOS than schizophrenia and bipolar disorders, Green and Griffiths[31] found a substantial decline in LOS over the last decades for patients with depressive disorders, with no changes in LOS for schizophrenia in England. Our results suggest that beyond the LOS, improving symptoms and level of functioning also differentiates these two diagnostic groups.

In the multivariate analysis, both models found high OR for specific variables associated with an increased risk for poor outcome in relation to those related to protective factors. Thus, in addition to psychotic disorders, transient disability and chief complaints of psychotic symptoms and change in behavior/aggressiveness, the poor outcome group presents a high chance (OR = 9.76) of having a diagnosis of personality disorder than the protective diagnosis of depressive disorder. Thus, although personality disorder showed shorter LOS, our more complex approach to examine outcomes could relativize the weight of this variable, valuing other clinical aspects. In this line, Leontieva and Gregory found shorter LOS in inpatients with borderline personality disorder compared with other diagnoses, but significantly more management problems, such as incidents of self-harm, episodes of restraint, stat administrations of medications and readmissions[32]. Thus, the chronic disruptive behavior of such patients can make the hospitalization insufficient to improve the functioning and the severity of their symptoms, regardless of LOS.

Although our index is composed of measures of easy extraction and availability, it is limited to assess other dimensions that are associated with hospitalization outcomes. Quality of care measures, satisfaction with care, quality of life, perception of improvement by the patients and their family and evaluation of specific symptoms of each diagnosis cluster (among others) can compose a more complex and dynamic evaluation of outcomes, but require the availability of human resources to conduct the process of applying them. Others more complex ROM approaches using broad standard instruments (as HoNOS) and more robust methodological designs (based on both anchor- or distribution-based approaches)[33] must also be developed in more structured services. Thus, although limited, the measures of the I-Index can serve as an initial outcome indicator in mental health systems with limited resources and personnel.

This work has a number of limitations. First, we used data selected retrospectively from records, not being possible to test the inter-rater reliability of measuring instruments. Second, diagnoses were made by clinical evaluation without the use of standardized instruments and using only the primary diagnosis (comorbidities were not considered). Third, although our I-Index comprises five different parameters, we did not use any instrument evaluating different symptom dimensions. While we strongly suggest that LOS, CGI and GAF should be used, the BPRS may be another additional simple measure to be used in the evaluation of outcomes in clinical settings with limited time and personnel for the use of more complex tools. In addition, more complex parameters (such as evaluation of results by patients and use of more specific instruments assessing other dimensions of variable) can be useful, but require a more complex logistical organization that the current reality of mental health assistance in Brazil. The comparison of this index with other measures using more complex instruments can bring validation data for both. Forth, our sample size is limited and was selected in only one institution, limiting a generalization of the results and the interpretation of the regression analysis for some variables. Finally, shorter LOS is not necessary associated with a good outcome, just as the I-index indicates. However, as the LOS is easily measured and classically used as a measure of outcome, we prefer to ponder its weight and keep it in the index. The use of other parameters and the assignment of weights according to the specific objectives of each evaluation (measurement of clinical improvement or use of data to support the allocation of health funding) should be better tested in large clinical samples.

In conclusion, we suggest that an assessment composed of simple parameters can be useful for measuring outcomes in psychiatric inpatients. The identification of factors associated with poor outcomes may help build strategies to minimize or lessen the health, social and financial burden of mental disorders. Social support and health care programs directed to vulnerable groups can relieve the patients after hospitalization and prevent readmissions. The use of composed parameters to evaluate outcomes as the I-Index can be easily incorporated by managers of mental health policies in treatment environments to support funding of mental health service and evaluate its quality.

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Conflicts of interest

The authors have no conflicts of interest.

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