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Compulsory and voluntary admissions in comparison: A 9-year long observational study

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Compulsory and voluntary admissions in comparison: a 9-years long observational study --Manuscript Draft--

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Compulsory and voluntary admissions in comparison: a 9-years long observational study

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Abstract

Background No studies, so far, have been specifically designed to highlight the features related to Compulsory Admissions (CA) and Voluntary Admissions (VA) in Italian psychiatric emergency wards. The main purpose of this observational study is to compare the sociodemographic and clinical characteristics of VA and CA and to explore possible predictors of re-admissions.

Methods During a 6-months Index Period (February, the 1st – July, the 31st 2008) all psychiatric admissions were documented and then followed-up through all available informatic systems for the next 9 years.

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Conclusions Despite some limitations, the current study adds knowledge on the neglected topic of voluntary and compulsory inpatients psychiatric treatment and demonstrates that engagement with outpatient care may be protective for CA.

Keywords: compulsory admission, voluntary treatment, involuntary hospitalization,
mechanical restraints, mental act

1. Introduction

In Italy, the transition from a hospital-based to a community-based model of mental health care began in 1978 with the “Law 180” or “Basaglia Law”. Such reform was the consequence of a cultural shift of the role of psychiatry, from custody, coercion and segregation to treatment and care. First, the reform ensured that people with mental disorders would be treated as other patients; second, it overcame the concept of ‘social dangerousness of mentally ill patients’(1); third, it brought to the gradual closure of psychiatric hospitals substituted by community mental health outpatients services(2), and, last, it established the purposes and the rules of a compulsory treatment. The aim of hospitalizing a patient against his/her will was no longer taking under control his/her potentially harmful behaviors but, rather, treating the underlying psychiatric illness. According to the reform, three requirements had to be satisfied for a compulsory hospitalization: having a severe psychopathological alteration, lacking insight and thus refusing the treatment, and the impossibility of a treatments outside of the hospital. Two medical doctors are needed to verify the abovementioned conditions before suggesting the compulsory treatment to the city Major (responsible for sanitary rules) who orders the admission. Each admission lasts seven days but can be shortened or prolonged on patient’s clinical course. Nowadays, the reform is still ongoing and a balanced-care model has been developed comprising outpatient community services, community-based residential care and acute in-patient care in general hospitals(3).

Despite a forty years old reform(4), only scant literature is available to describe voluntary admissions (VA) and compulsory admissions (CA) in Italy. Besides two studies published in the early ‘90s(5,6), only the PROGRES-A, a cross-sectional nation-wide survey of acute psychiatric inpatient facilities, provided an extensive description of the sociodemographic(7) and clinical(8,9) features of all psychiatric inpatients: CA represented the 9.0% of all total

1 psychiatric admissions in Italy being cross-sectionally associated to workplace problems,
2 alterations in social functioning, social withdrawal or conflict with family members, agitation,
3 delusions and/or hallucinations. Unfortunately, no longitudinal data were further published
4 neither to describe the outcomes of inpatients' treatments over the time nor to investigate the
5 predictors of re-hospitalization in Italy. In other European Countries, conversely, some
6 evidences are available: in the Netherland's predictors for CA are living alone, having previous
7 mandatory treatments, having poor satisfaction with treatment(10,11). Furthermore,
8 immigration from non-European countries was associated to CA in a Dutch study(12) and in a
9 large English data set(13). Some studies also highlighted that a first CA may hesitate in a three
10 to four-fold higher risk of hospital readmission(14,15).

11 Although the EUNOMIA study(16), in accordance with the European Convention on Human
12 Rights(17), has drawn up the principles of compulsory treatments, there is currently a
13 considerable variability in rules and attitude towards CA among different countries. Besides
14 legislation, a further source of variability is the different availability of care pathways after
15 hospitalization and our hypothesis, supported by literature evidences(18,19), is that an intense
16 engagement in the outpatients care could reduce the need of both compulsory and voluntary
17 readmission.

18 The first aim of our study is to define the socio-demographic and clinical features of patients
19 hospitalized during a 6 months period, comparing the features of voluntary versus compulsorily
20 admitted patients to identify differences and similarity. The second purpose is the longitudinal
21 observation of patients in order to seek for a possible relationship between discharge, drop-out
22 rates, mortality and suicidality and the type of baseline hospitalization (voluntary vs
23 compulsory). Finally, third aim of our study is to explore possible predictors of further

compulsory or voluntary readmissions, including the impact of outpatient care engagement prior to index period.

2. Methods

2.1.Data collection

Bologna is a wealthy town in Northern Italy. During the 6-months index period (February, the 1st – July, the 31st 2008) the metropolitan area comprised around 508.686 inhabitants(20) aged above 15 years (subjects younger than 15 are unlikely to be hospitalized, thus were not counted). All admissions in the psychiatric wards downtown were recorded and then followed-up through all the available informatic systems (the Health Register, the Mental Health Archive, the Computerized Hospital Discharge Record system).

Socio-demographic data and clinical variables were collected through the retrospective compilation of a check-list similar to the one used in the PROGRES-A(21) by resident in psychiatry (S.A, S.V., S.D.), not actively involved in the treatment of hospitalized patients. Regarding patients who experienced more than one hospitalization during index period, data of the first hospitalization were considered in the analysis.

2.2.Sociodemographic variables

Information on age, country of origin, education, marital status, working condition were recorded as categorical variables. The following age group were created: less than 18 years of age (Italian threshold for the legal age), 18-30, 31-64, and over 64 years. Based on the country of origin, participants were divided into born in Italy, born in other European countries, born outside the European Community. Education was set into four categories based on the Italian qualification system: ≤ 5 , 5-8, 8-13, ≥ 13 years. The marital status was also considered as a

1 categorical variable: single, married/cohabiting, separated/divorced, widowed. The working
2 condition was divided into the subsequent categories: student, full-time or part-time worker
3 (excluded patients whose job was a part of a rehabilitation programme), retired for seniority or
4 disability, homemakers, unemployed.
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8 9 10 11 2.3. Clinical Variables 12

13 The ICD-9(22) codes were used to create six diagnostic macro-categories: I) *organic psychotic*
14 *states*, II) *other psychoses*, III) *mood disorders*, and IV) *personality disorders*. Due to the
15 presence of very few cases, all patients with V) *anxiety, dissociative and somatoform disorders*
16 were grouped together in a fifth group and, finally, a sixth macro-category was created and
17 included intellectual deficits, pervasive developmental disorder and adaptive reaction under the
18 name of VI) *other disorders*. Further distinctions in more detailed diagnostic subgroups were
19 applied only in presence of at least five subjects in each subgroup. In the case of coexisting
20 diagnoses, the one related to the hospitalization was chosen. All reference categories were
21 established on the basis of previous studies(21,23).
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36 Based on their engagement with an outpatient service prior to the index period, participants
37 were divided into i) not previously engaged, ii) engaged for less than one year, and iii) engaged
38 for more than one year.
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43 The place of discharge after hospitalization was also considered as a categorical variable: a)
44 other acute psychiatric hospital outside Bologna area, b) non-acute psychiatric facilities for high
45 intensity treatment, c) non-acute psychiatric facilities for low intensity treatment, d) long-term
46 residential facilities, e) home, and f) discharge against the opinion of doctors.
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2.4. Longitudinal analyses

All admitted patients were followed-up for the 9 years following their first admission in the index period thus follow-up ended on 31st, December 2017. By cross checking information of all the available informatic systems, we were able to collect data on number and type (CA vs VA) of subsequent admissions, drop-outs, deaths, reassignments.

2.5. Ethical issues

Although the current study did not interfere with the usual care provided to admitted patients, the Local Ethical Committee approved the study. According to Italian law, all participants signed an informed consent to personal data collection.

2.6. Statistical analyses

Chi square and Student T test were used respectively to compare frequencies and mean between groups (VA vs CA) or, in case of more than two groups, One-way Analysis of Variance (ANOVA). After testing the proportional hazards assumption, Cox Regression Models were implemented to estimate Hazard Ratios (HR) and 95% Confidence Intervals (CI) for possible predictors of VA and CA. Survival time was computed in days from the first day of the admission during the Index Period to the exit of the patients from the follow-up. The outcome of the Cox Regression Analysis was rehospitalization: i) at least one; ii) more than one; iii) type of rehospitalization (CA or VA). All variables significantly associated to VA or CA in the univariate analysis were verified by a Multivariate Cox Regression Model. IBM Statistical Package for Social Science software was used for statistical analyses(24).

3. Results

3.1.Index Period: cross-sectional findings

During the six months index period 404 admissions were registered. Fourteen of those concerned an outlier: a young girl suffering from severe schizophrenia and comorbid addiction who was excluded from subsequent analyses. The remaining 390 hospitalizations were referred to 325 patients. Such discrepancy occurred because 45 persons (14.6%) had more than one admission: 31 patients were hospitalized twice, and 14 subjects were hospitalized from three to six times. The psychiatric hospitalization rate for the population over 15 years was 15.9 per 10,000 inhabitants per year. Out of 390 admissions, 101 (25.9%) were CA; out of 325 admitted patients, 85 (26.2%) were compulsorily admitted. The compulsory admissions rate was 2.79 per 10,000 inhabitants per year.

Since no significant differences between admissions and admitted patients emerged for any of the tested variables (supplementary materials Table S-1) we considered the two populations comparable and we used the admitted patients (n=325) as study population.

The mean duration of hospitalizations was 7.33 ± 7.84 days, with a significantly longer average hospital stay for CA (11.02 ± 8.56) compared to VA (6.03 ± 7.14) (One-way ANOVA: $F = 27.612$; $p < .001$). A higher rate of VA occurred in married patients ($p = .021$) and a significantly higher rate of CA occurred in patients without a stable relationship ($p = .015$) while no significant difference was found between the two groups regarding sex, age, education and employment (Table 1). As displayed in Table 2, Schizophrenia and related disorder [$p = .042$], in particular schizophrenia ($p = .027$), manic episode ($p = .044$), and delusional disorders ($p = .009$) were associated with CA; conversely, the diagnosis of unipolar major depression ($p = .005$) and personality disorders ($p = .048$) were significantly more frequent in VA. Physical restraint was necessary for 37 patients (11.4%), the majority with a diagnosis of schizophrenia spectrum

disorder (32.4%) and bipolar disorder (18.9%); the use of restraint was significantly higher in CA than in VA ($p=.002$).

3.2.Follow-up: longitudinal analyses

The 325 patients included in the study were followed up for 1,801 person-years. No significant differences were found in mortality rates due to both natural causes and suicide, drop-out and reassignments (for details see Table 3).

3.2.1 Rehospitalization

The univariate Cox Regression analyses showed that age above 65 (HR: 95%CI=4.49: 2.69-7.51, $p<.001$), disorders induced by alcohol or substances (HR: 95%CI=2.09: 1.06-4.16, $p<.001$) and anxiety disorders, dissociative or somatoform disorders (HR: 95%CI=5.89: 2.35-14.75, $p<.001$) were related to at least one additional hospitalization, whereas age under 18 (HR: 95%CI= 4.71: 1.36-16.33, $p=.015$), or psychic disorders induced by alcohol or substances (HR: 95%CI=4.11: 2.03-8.32, $p<.001$) were associated with multiple re-admissions after the index period. Having been engaged with psychiatric outpatient services for over a year before the index period was protective for being re-hospitalized at least once (HR: 95%CI=0.58: 0.41-0.83, $p=.002$) and more than once (HR: 95%CI=0.63: 0.40-0.98, $p=.043$) (supplementary materials Tables S-2 and S-3).

The Multivariate Cox Regression Models confirmed that age (both below 18 and above 65) and disorders related to alcohol or substances abuse were independent predictors of single and multiple rehospitalization, on the contrary, having been previously engaged with psychiatric services lost statistical significance and was no longer protective for re-admission.

3.2.2 Compulsory rehospitalizations

Factors associated with at least one CA in the univariate analysis were age under 18 years (HR: 95%CI=7.19: 1.64-31.59, $p=.009$) and age above 65 (HR: 95%CI=5.82: 2.27-14.93, $p<.001$), as well as having had a previous CA during the index period (HR: 95%CI=2.01: 1.18-3.43, $p=.011$). The only protective factor for CA was having been engaged with psychiatric services for over a year prior to index period (HR: 95%CI= 0.47: 0.26-0.85, $p =.013$) (Supplementary material Table S-4).

All the variables found to be possible predictors of CA in the univariate analysis were further tested by Multivariate Cox Regression Models (Table 4). Regardless of age and despite having had a CA admission in the index period, having been engaged with psychiatric services was still protective for CA readmission during the follow-up.

4. Discussion

This study provides a descriptive overview of emergency psychiatric admissions in a wealthy urban area on Northern Italy and is the first Italian study defining possible predictors of readmissions and compulsory readmissions. In the following paragraphs we discuss our main findings in light of current available literature bearing in mind that results' generalizability and literature comparisons are hampered by the wide variability of legislation, economics and organization of mental health care among countries(19,25).

4.1. Cross-sectional analyses

First, our estimated rate of CA is higher than the national average but substantially comparable to that of the surrounding Italian area in recent years(26,27) being among the lowest in Europe(28). In contrast to findings from other cross-sectional studies that showed that CA are

more frequent in men(29–31) and unemployed persons(32), the only socio-demographic variable associated to CA in our sample was the absence of a stable relationship. This confirms the already known correlation between CA and being unmarried(33) and allows us to consider the presence of a stable relationship as a proxy for social functioning(34) and informal support(35,36). Family care can be crucial for an early access to psychiatric services(36) thus reducing involuntary treatments. Although we must recognize that our data on the immigrant population is based on very few cases, the lack of a relationship between CA and country of origin observed in our sample is in sharp contrast with previous studies that indicate immigration and ethnic minorities membership (in particular of African or Caribbean origin) as factors significantly associated with CA, regardless of diagnoses and social factors(12,37,38). Singh and colleagues estimated a 3.4 times higher risk of CA for ethnic minorities in the UK, with a peak of risk for the sub-Saharan ethnic group(39), confirmed by an extensive cross-sectional analysis on hospitalizations in England(13).

Second, coming to clinical correlates of CA, our cross sectional findings substantially agree with the results of the PROGRES-A project(9) and previous studies, which have shown that the presence of positive psychotic symptoms (delusions and hallucinations) and states of manic excitement are associated with a greater risk of CA(36,40–42) and with poor insight which are both requirements needed for an involuntary treatment(43–46) . The finding of significant associations between VA and diagnosis of unipolar depression is also broadly in line with previous studies(9,31,47).

Third, the use of mechanical restraints has been shown to be significantly associated with CA; this is predictable and inherent in the definition of involuntary treatment. In our study there were no significant associations with sex, employment and geographical origin, as opposed to previous studies, which found a higher risk of containment in male gender, immigrants,

unemployed and in people with low socio-economic status(48–50) . Also noteworthy is the lack of a statistically significant association between use of mechanical restraints with diagnostic categories, although the higher rate of use in schizophrenic spectrum disorder or bipolar disorder confirms data from major studies on the subject(51,52). The use of means of restraint affected the 11.4% of admissions, a percentage similar to other two well-known Italian studies(9,53), whereas a wide variability in the rates reported in other international studies is documented(48,54,55) reflecting different treatment opportunities (including isolation of agitated patients) in different European countries.

4.2. Longitudinal analyses

The equivalence between the completion rates of the two initial groups, without significant differences in terms of drop-out rates, deaths, suicides, transfers to other territories and resignations agreed with the doctor indicates that having had a CA *per se* does not impact long-term outcomes.

Our findings are in line with evidence from various studies, demonstrating that CAs observed in cross-sectional surveys are associated with a higher risk of recurrence in the long term(40,43,56) and that a first CA is associated with a fourfold higher risk of further involuntary treatment(57). In contrast with the evidence reporting male sex, immigration, unemployment, low cultural level and being single as predictors of recurrences and mandatory treatments(58) we did not find any sociodemographic variables being a predictor.

No specific diagnostic categories have been associated with a significant risk of being compulsorily readmitted, rather the social and therapeutic context seems to be relevant. Indeed, being engaged with out-patients psychiatric services for more than a year prior to index period

protects against readmission. This findings are also in substantial agreement with some studies that indicate how the continuous contacts with outpatient psychiatric services reduce the risk of hospitalization(58–60) .

Although our study shows several noteworthy findings, we must acknowledge that these results should be considered with caution due to different limitations. First, the unicentric study design reduces findings generalizability; second, the retrospective data collection prevented the investigation of psychopathological descriptors. Nevertheless, the nine years longitudinal design and the combination of many resources ensured the accuracy of data collection. The unique history of deinstitutionalization in Italy limits generalization to other European countries and the US. Another limitation is the high attrition: indeed only 60% of the enrolled patients completed the study. The proportion of completers and not completers, however, was equally distributed between CA and VA, the drop-out rates were contained (8.2% and 5.4% respectively) and the use of Cox's Regression further reduced the risk of possible differential bias (if drop-outs were different between CA and VA, groups comparability would have been reduced). A further source of limitation could be the choice of ICD-9 instead of most up-to-date diagnostic criteria. This choice allowed us to faithfully report the discharge diagnoses eliminating any possible difficulties in the adaptation to a more modern system. We also missed descriptive elements of the context in which hospitalization took place, such as episodes of aggression or behavioral disorders, used by other studies to predict the risk of CA even if such information is very difficult to be collected in a standardized way. Last, factors such as therapeutic compliance, level of satisfaction with the treatment received during hospitalization and self-stigmas were not investigated although they were reported by other studies as possible predictors of CA(61).

5. Conclusions

To our knowledge, this study has no precedent in the literature at least as far as Italy concerns. Our longitudinal findings demonstrate that being engaged with outpatients' psychiatric services is a protective factor for the risk of being compulsorily readmitted. Forty years after the mental health Italian reform, the integration of resources between hospital and outpatient services can reduce the recurrence of compulsory hospitalizations. Further multicentric studies are needed in order to continue the search for predictors of readmission and compulsory hospitalization.

List of abbreviations

VA: voluntary admission; CA: compulsory admission.

Declarations

Ethic approval

This study has been approved by the local Ethics Committee (Comitato Etico dell'Area Vasta Centrale); all patients have given written consent to data collection; no data from individual person were used.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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Authors' contribution

SA and ARA designed the study protocol; SA, SV, SD collected data; SA analyzed data; ARA and SA wrote the first draft of the manuscript; EV, DDR, ADG contributed to write the manuscript; all authors have read and approved the manuscript.

Aknowledgements

None.

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Compulsory and voluntary admissions in comparison: a 9-years long observational study

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Tables

Table 1. Sociodemographic characteristics of the study population by type of admission: Compulsory Admission (CA, N=85) versus Voluntary Admission (VA, N=240)

		CA	VA	p
		N (%)	N (%)	
Gender	Male	46 (54.1)	135 (56.3)	0.800
Age	<18 years	3 (3.5)	3 (1.3)	0.186
	18-30 years	18 (21.2)	42 (17.5)	0.515
	31-64 years	55 (64.7)	168 (70.0)	0.415
	≥65 years	9 (10.6)	27 (11.3)	1.000
Country of origin	Italy	81 (95.3)	211 (87.8)	0.060
	European Community	0 (0.0)	7 (2.9)	0.196
	Other	4 (4.7)	22 (9.2)	0.248
Education ¹	≤ 5 years	8 (10.0)	40 (18.1)	0.109
	5 – 8 years	30 (37.5)	92 (41.6)	0.595
	8 – 13 years	31 (38.8)	65 (29.4)	0.127
	>13 years	11 (13.8)	24 (10.9)	0.542
Marital status ²	Single	63 (76.8)	140 (61.9)	0.015
	Married/Cohabiting	11 (13.4)	59 (26.1)	0.021
	Separated/Divorced	7 (8.5)	23 (10.2)	0.829
	Widowed	1 (1.2)	4 (1.8)	1.000
Working condition ³	Full-time/Part-time workers	19 (23.5)	42 (18.8)	0.418
	Students	27 (33.3)	78 (34.8)	0.892
	Retired	7 (8.6)	15 (6.7))	0.617
	Homemakers	6 (7.4)	35 (15.6)	0.086
	Unemployed	22 (27.2)	54 (24.1)	0.653
Engagement to outpatient services ⁴	Not in charge in the year before	29 (34.1)	105 (43.8)	0.192
	In charge, less than a year	5 (5.9)	6 (2.5)	0.238

	In charge, more than a year	52 (61.2)	127 (52.9)	0.322
Missing data: ¹ =26 (6.7%); ² =20 (5.1%), ³ = 20 (5.1%), ⁴ =2 (0.6)				
CA: compulsory admission; VA: voluntary admission				

Table 2. Clinical characteristics of the study population by type of admission: Compulsory Admission (CA, N=85) versus Voluntary Admission (VA, N=240)

		CA	VA	p
		N (%)	N (%)	
Organic psychotic states	Dementia	0 (0.0)	5 (2.1)	0.332
	Alcohol/substance induced mental disorders	7 (8.2)	14 (5.8)	0.446
Other psychoses	Schizophrenia and related disorders	35 (41.2)	69 (28.8)	0.042
	Schizophrenia	28 (32.9)	50 (20.8)	0.027
	Schizoaffective disorder	4 (4.7)	11 (4.6)	1.000
	Schizophreniform disorder	3 (3.5)	8 (3.3)	1.000
	Delusional disorders*	7 (8.2)	4 (1.7)	0.009
	Other non organic psychoses**	13 (15.3)	25 (10.4)	0.241
Mood disorders		12 (14.1)	51 (21.3)	0.201
	Major depressive disorder	1 (1.2)	26 (10.8)	0.005
	Bipolar disorder	11 (12.9)	25 (10.4)	0.548
	Manic episode	10 (11.8)	12 (5.0)	0.044
	Depressive episode	1 (1.2)	13 (85.4)	0.125
Personality disorders	Borderline personality disorder, Histrionic personality disorder, NOS***	9 (10.6)	49 (20.4)	0.048
Anxiety, dissociative and somatoform disorders	Anxiety states, Obsessive-Compulsive Disorder, Dissociative, conversion and somatoform disorders	1 (1.2)	7 (2.9)	0.686

Other disorders	Pervasive developmental disorders, Mental retardation, Adaptive reaction	1 (1.2)	16 (6.7)	0.051
Physical containment during hospitalization		18 (21.2)	19 (7.9)	0.002
Place of discharge	Other acute psychiatric hospital	18 (21.2)	26 (10.8)	0.026
	Non-acute psychiatric facilities, high-intensity treatment	10 (11.8)	48 (20.0)	0.100
	Non-acute psychiatric facilities, low-intensity treatment	28 (32.9)	103 (42.9)	0.123
	Long-term residential facilities	3 (3.5)	2 (0.8)	0.114
	Home	21 (24.7)	47 (19.6)	0.352
	Discharge against doctors' opinion	5 (5.9)	14 (5.8)	1.000

*Delusional disorders: Simple paranoid state, Delusional disorder, Paraphrenia **Other non organic psychoses: Depressive type psychosis, Excitative type psychosis, Reactive confusion, Bouffée délirante, Unspecified psychosis ***NOS: Not Otherwise Specified

Table 3. Treatment outcome during follow up by type of admission during the index period: Compulsory Admission (CA, N=85) versus Voluntary Admission (VA, N=240). Chi-square test.

	CA	VA	χ^2	p
	N (%)	N (%)		
Transferred outside Bologna area	9 (10.6)	19 (7.9)	0.57	0.451
Discharged from outpatient services	9 (10.6)	34 (14.2)	0.7	0.403
Drop-out from outpatient services	7 (8.2)	13 (5.4)	0.86	0.353
Deceased	8 (9.4)	26 (10.8)	0.14	0.713
Suicided	1 (1.2)	4 (1.2)	0.10	0.752
Follow-up completion	51 (60.0)	144 (60.0)	0	1

Table 4. Predictors of compulsory re-admission by multivariate Cox Regression Models: Hazard Ratios (HR) and 95% Confidence Intervals (95%CI)

	Compulsory re-admission	
Model I	HR (95% IC)	<i>p</i>
Index admission as CA	1.94 (1.13-3.33)	0.016
In charge, more than a year	0.52 (0.29-0.96)	0.036
Age <18	2.60 (0.58-11.75)	0.215
Model II		
Index admission as CA	1.97 (1.15-3.36)	0.013
In charge, more than a year	0.46 (0.26-0.84)	0.011
Age ≥65	5.08 (2.02-12.80)	0.001

Model I includes index admission as CA, more than one year of outpatient treatment before index admission, age inferior than 18 years. Model II includes index admission as CA, more than one year of outpatient treatment before index admission, older than 64 years.

Supplementary Tables

Table S1. Sociodemographic variables of hospitalizations (N=390) and hospitalized patients (N=325)

		Hospitalizations N (%)	Hospitalized patients N (%)	<i>p</i>
Gender	Male	225 (57.7)	181 (55.7)	0.597
Age	<18	9 (2.3)	6 (1.8)	0.796
	18-30	75(19.2)	60 (18.5)	0.848
	31-64	265 (67.9)	223 (68.6)	0.872
	≥65	41 (10.5)	36 (11.1)	0.810
Country of origin	Italy	346 (88.7)	292 (89.8)	0.716
	European Community	9 (2.3)	7 (2.2)	1.000
	Other	35 (8.9)	26 (8.0)	0.688
Education ¹	≤ 5 years	60 (16.5)	48 (15.9)	0.864
	5 – 8 years	156 (42.9)	122 (40.5)	0.581

	8 – 13 years	107 (29.4)	96 (31.8)	0.499
	>13 years	41 (11.3)	35 (11.6)	0.903
Marital status ²	Single	252 (68.1)	203 (65.9)	0.566
	Married/Cohabiting	79 (21.4)	70 (22.7)	0.710
	Separated/Divorced	33 (8.9)	30 (9.7)	0.791
	Widowed	6 (1.6)	5 (1.6)	1.000
Working condition ³	Full-time/Part-time workers	65 (14.6)	61 (20.0)	0.429
	Students	144 (38.9)	105 (34.4)	0.231
	Retired	22 (5.9)	22 (7.4))	0.534
	Homemakers	46 (12.4)	41 (13.4)	0.730
	Unemployed	93 (25.2)	76 (24.9)	1.000
* Missing data ¹ =26 (6.7%); ² =20 (5.1%), ³ = 20 (5.1%),				

Table S2. Sociodemographic predictors of rehospitalization(s) by univariate Cox Regression Models: Hazard Ratios (HR) and 95 Confidence Intervals (95%CI)

		At least one rehospitalization	<i>p</i>	More than one rehospitalization	<i>p</i>
		<i>HR (95% IC)</i>		<i>HR (95% IC)</i>	
Gender	Male	0.92 (0.67-1.26)	0.599	0.91 (0.62-1.33)	0.630
Age	<18 years	2.75 (0.86-8.82)	0.089	4.71 (1.36-16.33)	0.015
	18-30 years	1.06 (0.71-1.59)	0.761	1.07 (0.66-1.74)	0.773
	31-64 years	1 (ref.)		1 (ref.).	
	≥65 years	4.49 (2.69-7.51)	<0.001	1.67 (0.55-5.01)	0.363
Country of origin	Italy	1 (ref.)		1 (ref.)	
	European Community	0.53 (0.13-2.15)	0.375	0.75 (0.19-3.08)	0.693
	Others	0.55 (0.25-1.18)	0.125	0.57 (0.23-1.43)	0.229
Education ¹	≤ 5 years	1.43 (0.91-2.24)	0.122	1.31 (0.76-2.26)	0.329
	5 – 8 years	1 (ref.)		1 (ref.)	

	8 – 13 years	1.03 (0.71-1.49)	0.894	0.79 (0.50-1.24)	0.306
	>13 years	1.41 (0.82-2.41)	0.215	1.27 (0.66-2.45)	0.480
Marital status ²	Single	0.73 (0.49-1.09)	0.127	0.73 (0.45-1.18)	0.199
	Married/Cohabiting	1 (ref.)		1 (ref.)	
	Separated/Divorced	0.87 (0.38-1.96)	0.727	0.38 (0.09-1.60)	0.184
	Widowed	0.59 (0.29-1.22)	0.156	0.39 (0.14-1.04)	0.060
Working condition ³	Full-time/Part-time workers	1 (ref.)		1 (ref.)	
	Students	1.21 (0.76-1.93)	0.414	1.28 (0.71-2.31)	0.412
	Retired	0.97 (0.49-1.94)	0.933	1.50 (0.70-3.21)	0.303
	Homemakers	1.67 (0.90-3.11)	0.103	0.91 (0.33-2.51)	0.855
	Unemployed	0.95 (0.57-1.57)	0.836	1.17 (0.63-2.17)	0.627
* Missing data: ¹ =26 (6.7%); ² =20 (5.1%), ³ = 20 (5.1%)					

Table S3. Clinical predictors of rehospitalization by univariate Cox Regression Models: Hazard Ratios (HR) and 95 Confidence Intervals (95%CI)

		Rehospitalization			
		At least one	<i>p</i>	More than one	<i>p</i>
		<i>HR (95% IC)</i>		<i>HR (95% IC)</i>	
Organic psychotic states		2.02 (1.05-3.89)	0.035	3.63 (1.79-7.36)	<0.001
Dementia		1.42 (0.20-10.24)	0.726	-	0.707
Alcol/substance related disorders		2.09 (1.06-4.16)	0.034	4.11 (2.03-8.32)	<0.001
Other psychoses					
	Schizophrenia and related disorders	0.83 (0.60-1.15)	0.254	0.90 (0.61-1.32)	0.587
	Schizophrenia	0.95 (0.67-1.35)	0.780	0.90 (0.59-1.38)	0.624
	Schizoaffective disorder	0.82 (0.42-1.61)	0.561	1.18 (0.60-2.35)	0.631
	Schizophreniform disorder	0.44 (0.14-1.38)	0.159	0.62 (0.19-1.96)	0.413
	Delusional disorders	1.12 (0.49-2.53)	0.795	1.13 (0.42-3.09)	0.805
	Other non organic psychoses	0.81 (0.45-1.48)	0.498	0.40 (0.13-1.27)	0.120
Mood disorders		1.25 (0.84-1.86)	0.268	1.16 (0.70-1.90)	0.572

	Major depressive disorder	1.08 (0.53-2.22)	0.831	1.09 (0.44-2.69)	0.857
	Bipolar disorder	1.29 (0.83-2.01)	0.257	1.17 (0.66-2.05)	0.595
	Manic episode	1.66 (1.00-2.76)	0.050	1.63 (0.87-3.05)	0.128
	Depressive episode	0.78 (0.34-1.77)	0.552	0.56 (0.18-1.78)	0.330
Personality disorders					
	Borderline personality disorder, Histrionic personality disorder, NOS	0.83 (0.57-1.22)	0.346	1.01 (0.66-1.56)	0.950
Anxiety, dissociative and somatoform disorders					
	Anxiety states, Obsessive-Compulsive Disorder, Dissociative, conversion and somatoform disorders	5.89 (2.35-14.75)	<0.001	2.56 (0.35-18.81)	0.356
Other disorders					
	Pervasive developmental disorders, Mental retardation, Adaptive reaction	0.99 (0.49-2.04)	0.987	0.94 (0.38-2.31)	0.885
Engagement to outpatient services ¹					
	Not in charge in the previous year	1.01 (0.96-1.06)	0.665	1.02 (0.95-1.10)	0.554
	In charge, less than a year	0.62 (0.23-1.68)	0.348	0.97 (0.53-1.80)	0.930
	In charge, more than a year	0.58 (0.41-0.83)	0.002	0.63 (0.40-0.98)	0.043

Index admission as CA	1.01 (0.72-1.41)	0.976	0.67 (0.43-1.06)	0.086
* Missing data: ¹ =2 (0.6)				

Table S4. Sociodemographic predictors of compulsory rehospitalization by univariate Cox Regression Models: Hazard Ratios (HR) and 95 Confidence Intervals (95%CI)

		Compulsory rehospitalization			
		At least one	<i>p</i>	More than one	<i>p</i>
		<i>HR (95% IC)</i>		<i>HR (95% IC)</i>	
Male Gender		0.84 (0.49-1.45)	0.532	1.03 (0.46-2.32)	0.937
Age	<18 years	7.19 (1.64-31.59)	0.009	19.18 (3.75-98.23)	<0.001
	18-30 years	1.51 (0.81-2.82)	0.200	1.99 (0.83-4.76)	0.123
	31-64 years	1 (ref.)		1 (ref.)	
	≥65 years	5.82 (2.27-14.93)	<0.001	3.26 (0.38-27.72)	0.280
Country of Origin					
	Italy	1 (ref.)		1 (ref.)	
	European Community	0.71 (0.10-5.17)	0.731	0.43 (0.55-3.41)	0.427
	Other	0.80 (0.25-2.58)	0.704	2.37 (0.30-19.06)	0.417
Education					
	≤ 5 years	1.41 (0.65-3.07)	0.385	1.79 (0.50-6.49)	0.373
	5 – 8 years	1 (ref.)		1 (ref.)	

	8 – 13 years	0.94 (0.49-1.79)	0.846	0.61 (0.22-1.71)	0.344
	>13 years	1.71 (0.73-4.04)	0.219	1.97 (0.63-6.22)	0.245
Marital status					
	Single	1.13 (0.52-2.43)	0.758	3.32 (0.44-25.16)	0.246
	Married/Cohabiting	1 (ref.)		1 (ref.)	
	Separated/Divorced	1.06 (0.23-5.01)	0.941	-	0.989
	Widowed	0.49 (0.10-2.35)	0.375	2.94 (0.17-49.50)	0.454
Working condition					
	Full/Part-time workers	1 (ref.)		1 (ref.)	
	Students	0.91 (0.41-2.01)	0.809	1.00 (0.34-4.85)	0.995
	Retired	1.21 (0.43-3.41)	0.717	1.27 (0.33-4.85)	0.723
	Homemakers	1.43 (0.48-4.29)	0.520	0.56 (0.06-4.85)	0.596
	Unemployed	0.88 (0.38-2.04)	0.771	1.15 (0.34-3.92)	0.826
Engagement to outpatient services					
	Not engaged in the previous year	1.02 (0.94-1.11)	0.572	1.42 (0.52-3.93)	0.495
	Engagement, less than a year	1.01 (0.83-1.22)	0.963	3.50 (0.44-27.71)	0.235
	Engagement, more than a year	0.47 (0.26-0.85)	0.013	0.45 (0.18-1.14)	0.091
Index admission as CA		2.01 (1.18-3.43)	0.011	2.30 (1.04-5.09)	0.040
Organic psychotic states		2.10 (0.64-6.93)	0.220	2.44 (0.31-19.11)	0.395
	Dementia	5.57 (0.75-41.26)	0.093	-	0.876

	Alcol/substance induced mental disorders	1.56 (0.37-6.53)	0.544	2.81 (0.36-21.91)	0.325
Other psychoses					
	Schizophrenic disorders	1.09 (0.63-1.86)	0.766	1.12 (0.51-2.48)	0.772
	Schizophrenia	1.22 (0.69-2.14)	0.499	0.79 (0.31-1.98)	0.611
	Schizoaffective disorder	1.07 (0.39-2.97)	0.897	2.51 (0.86-7.32)	0.093
	Schizophreniform disorder	0.40 (0.05-2.89)	0.360	0.71 (0.10-5.37)	0.744
	Delusional disorders	2.44 (0.87-6.82)	0.090	2.92 (0.67-12.71)	0.154
	Other non organic psychoses	0.44 (0.11-1.79)	0.249	0.49 (0.07-3.61)	0.482
Mood disorders		1.05 (0.51-2.16)	0.889	1.37 (0.51-3.67)	0.532
	Major depressive disorder	0.45 (0.01-15.55)	0.299	0.05 (0.01-398.05)	0.504
	Bipolar disorder	1.52 (0.74-3.12)	0.250	1.91 (0.72-5.10)	0.197
	Manic episode	2.13 (0.96-4.76)	0.064	2.19 (0.64-7.46)	0.212
	Depressive episode	0.72 (0.18-2.99)	0.655	1.47 (0.34-6.32)	0.604
Personality disorders					
	Borderline personality disorder, Histrionic personality disorder, NOS	0.64 (0.31-1.31)	0.225	0.75 (0.28-2.00)	0.563
Anxiety states, Obsessive-Compulsive Disorder, Dissociative, conversion and somatoform disorders		4.96 (0.66-37.54)	0.121	-	0.853
Pervasive developmental disorders, Mental retardation, Adaptive reaction		1.07 (0.33-3.47)	0.909	0.04 (0.01-95.97)	0.425

