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Factors associated with hospital admission and evaluation of a case management program for severe mental disorder by a historical cohort study

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Introduction: People with severe mental disorder (SMD) have serious difficulties in developing a normal life, so community care programs to improve their living conditions and social integration are necessary. This work evaluates the performance of a case management program (CMP) in Segovia (Spain).

Methodology: We conduct a first descriptive phase evaluating the performance of the CMP in 2011 by sociodemographic, health services and clinical variables. We study the factors associated with the occurrence of hospital admission. Finally, using a historical cohort design, we assess the risk of hospital admission of CMP compared to unexposed cohort. Bi and multivariate statistical techniques are employed to perform the analysis with the calculation of relative risks and confidence intervals.

Results: In 2011, 82 patients are cared for in the CMP, mainly middle-aged men. The average clinical course is 19 years and the average stay in the CMP over 6 years. 78% belong to the diagnosis of schizophrenia spectrum. Income affects 27% of patients. Women, mental health teams I-II, increased home visits and abandonment of monitoring are predictors of income, while the highest level of clinical course is protective. No protective effect of income is detected for the CMP in the different analyzes of the historical cohort study.

Conclusions: It is necessary to systematically assess community care programs directed at SMD to make adjustments and modifications aiming at improving their clinical effectiveness.

Keywords: Mental disorder, Community mental health services, Case management programs, Assertive community treatment, Historical cohort studies, Evaluation studies

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Factores asociados al ingreso hospitalario y evaluación de un programa de gestión de casos para trastorno mental grave mediante un estudio de cohortes históricas

Introducción: Las personas con trastorno mental grave (TMG) presentan serias dificultades para desarrollar una vida normalizada, por lo que son necesarios programas de atención comunitaria que mejoren sus condiciones de vida e integración social. Este trabajo pretende evaluar el funcionamiento de un programa de gestión de casos (PGC) en Segovia (España).

Metodología: Se realiza una primera fase descriptiva valorando el funcionamiento del PGC en 2011 mediante variables sociodemográficas, asistenciales y clínicas. Se estudian los factores asociados a la ocurrencia de ingreso hospitalario. Finalmente, mediante un diseño de cohortes históricas, se evalúa el riesgo de ingreso del PGC comparando con una cohorte no expuesta. Se emplean técnicas estadísticas bi y multivariantes con cálculo de riesgos relativos e intervalos de confianza.

Resultados: En 2011 se atiende a 82 pacientes en el PGC, principalmente hombres de mediana edad. La evolución clínica media es de 19 años y la permanencia media en el PGC superior a los 6 años. El 78% pertenecen al espectro diagnóstico de la esquizofrenia. El ingreso afecta al 27% de los pacientes. Ser mujer, ser atendido por equipos de salud mental I-II, el aumento de visitas domiciliarias y el abandono del seguimiento son los factores predictores de ingreso, mientras la mayor evolución clínica es factor protector. No se detecta efecto protector del PGC frente al ingreso hospitalario en los diferentes análisis del estudio de cohortes históricas.

Conclusiones: Es necesario evaluar de forma sistemática los programas de atención comunitaria dirigidos al TMG con el fin de realizar ajustes y modificaciones tendentes a la

mejora de su efectividad clínica.

Palabras clave: Trastorno mental, Servicios de salud mental comunitaria, Programas de gestión de casos, Tratamiento asertivo comunitario, Estudios de cohorte histórica, Estudios de evaluación

INTRODUCTION

The community approach to severe mental disorders (SMD) includes different strategies, including psychosocial therapy (PT). PT could be defined as those non-pharmacological interventions that attempt to help the patient through training in skills and modification of the setting. Its objectives are to decrease severity of the symptoms, avoid unnecessary hospitalizations, improve psychosocial functioning in the family, laboral and social context, and/or improve the quality of life of the patients.¹ PT is a key element in the treatment of schizophrenia and other psychotic disorders. It is especially effective in those aspects where the effect of pharmacological therapy is doubtful, such as negative symptoms, incapacity to develop usual activities and sociolaboral maladjustment.²

PT covers a wide range of different interventions, including training in skills, self-management of the disease, familial intervention, work and supportive housing, cognitive interventions and different intervention models.¹ At present, we have sufficient scientific evidence that confirms how some of these interventions decrease relapses and hospital re-admissions, favoring adherence to treatment and intervention programs.^{3,4}

Persons with SMD face serious difficulties to manage the activities of their daily life, including their relationship with the mental health services. Poor therapeutic adherence and infrausage of the community mental health care facilities frequently entail visits to the Emergency Services and admissions to hospital psychiatric departments with the corresponding increase in costs and inefficiency. In an attempt to improve the conditions of life of these patients, several community care programs have been developed over time, such as the *assertive community treatment (ACT)*^{5,6} and *case management (CM)*⁷ designed to provide individualized integral care services adapted to the natural setting where the patients carry out their lives. Among the desirable characteristics of these programs are global evaluation of the needs of the person, elaboration of an agreed on individualized plan of treatment and care, choice of the key professional or specific coordinator team and ensuring care continuity and periodic evaluation of the plan, adjusting it to the changes and to the results that are being obtained.⁸

There are two specific care programs for SMD in the frame of Regional Strategy of Mental Health and Psychiatric

Care of Castilla y León: Community Treatment and Case Management Program (CMP), in which Segovia participates.⁹ CMP was developed at the end of the 90's and pursued the clinical stability of the patient, the patient's integration in the community, and coordination and incorporation of the health care and social activities into the mental health framework. To make it operative, an Individual Plan of Continuity (IPC) was established within the CMP with 5 possible objectives: connection to the care network, therapeutic adherence, improvement of skills, psychoeducation and support to the caregiver and community integration. On the practical level, its organization is based on the detection of cases that fulfill the inclusion criteria, nursing care with home visits, periodic follow-up of the patient and patient's family, and coordination with other resources and professionals. The notion of the case manager is allocated to the nurse of the mental health team corresponding to each district.¹⁰ According to the data of the Regional Health Management, Segovia is the third health area with the greatest number of patients seen in the CMP in 2010, and is in the first place in patients seen/manager ratio with a value greatly exceeding that corresponding to the regional media.¹¹

The development of this work aimed to evaluate the CMP that provides information in order to improve its effectiveness. To do so, a description of the functioning of the CMP in the SMD in the province of Segovia during 2011 was made. Those factors that were related with hospital admission were identified and finally its effectiveness was evaluated by means of a study of the historic cohort that used a relevant result variable, that is, the presence of hospital admissions.

METHODOLOGY

The information sources used to conduct this study were computerized registers of out-patients seen in the Mental Health Center (MHC) "Antonio Machado" and in the Hospital General of Segovia, also using the documental records of CMP for 2011, and reviews of the corresponding clinical records. Care given in the MHC was distributed into three mental health teams (I, II y III) which had similar professional staffing and distribution of the reference population according to a geographic criterion. All the teams attended both a rural and urban population.

A descriptive study was made initially of the functioning of the CMP in 2011. Sociodemographic variables, considering date of birth transformed into age in years, gender, site of residence categorized according the basic rural or urban health zone and sociofamilial status categorized into three groups (lives along, in family or with help or external resources). As care variables, the following were used: date of inclusion in the CMP transformed into

stay time in the program in years, the mental health team, number of home visits within the program, presence of episodes, understood as intervention performed within the CMP due to clinical destabilization that involved demands of the patient/family, lack of contact or conflicts of familial/community co-existence and/or voluntary treatments. As clinical variables, the following were used: diagnosis according to large groups of the International Classification of Diseases, 10th edition, (ICD-10), years of clinical course of the disease and number of admissions in the Psychiatry Unit of the Hospital General of Segovia during 2011. Descriptive techniques adapted to the analysis of continuous and discrete variables were used.

In the second place, an analysis was made of the factors associated to the presence of hospital admission during 2011. Multivariate analysis was done by construction of logistic regression models with the methods of "enter," "forward stepwise (LR)" and "backward stepwise (LR)" of the SPSS v.17.0 statistical program. Independent variables used were age (in years), gender, residence site, sociofamilial status, mental health team, number of home visits, presence of episodes, presence of abandonments, time of stay in the program (in years), ICD-10 diagnosis categorized into two subgroups (F20-29) "Schizophrenia, schizotypal disorders and delusional disorders" and "Other diagnostic subgroups" and the evolution of the disease (in years) in 2011. Presence of hospital admission in 2011 was considered as dependent or outcome variable, Choice of the most explanatory model was made after the modeling phase.

Finally, the risk of hospital admission within the CMP was studied within a study design of retrospective or historical cohorts. First, the patients included in the CMP in the diagnostic subgroup F-20-29 of ICD-10 were selected to homogenize the diagnosis. Inclusion criteria were: age equal to or over 18, F20-29 diagnosis of ICD-10, inclusion date in CMP prior to 1-Jan-2009 and stay in the CMP at 1-Jan-2011. Applying said criteria, the exposed cohort population was obtained, this being made up of 45 patients. The population corresponding to the unexposed cohort was obtained from a random sampling of patients in the computerized historic data base of the MHC, that contained information from 1994. The same inclusion criteria described for the exposed cohort shown are applied except for inclusion dates and stay in CMP, adding the presence of current follow-up of the patient in the MHC. To calculate the sample size, an exposed/unexposed ratio of 1 was used, the calculation thus being conditioned to the total number of patients attended in the CMP who meet the inclusion criteria. Considering that there was a 25% difference of risks between exposed and unexposed cohort for a statistical potency of 70-80% with a 90% confidence interval, a size between 35 and 46 patients for each group was estimated. An initial oversized sample size of 150 patients was chosen by simple random sampling, on considering a priori a

significant number of losses to follow-up and lack of compliance of inclusion criteria.

Once the sample was obtained, the patients included in the CMP were excluded and the diagnostic information was updated using available hospital and out-patient sources to reduce the effect of the known diagnostic variability and possibility of classification biases. In the case of diagnostic doubt, the criterion used was to consider the most recent diagnosis included in the clinical record as the valid one. The following variables were obtained from these sources: time of clinical evolution, number of hospital admissions and active follow-up, not contained in the historic data base. To calculate the clinical evolution time, the initial data used were the first written record present in the clinical history. Forty-seven patients finally met the inclusion criteria and made up the non-exposed cohort.

The hypothesis that belonging to the CMP acts as a protective factor against occurrence of hospital admission was tested. The effect variable considered was hospital admission during 2009-2011, both in number of patients admitted versus no-admitted (accumulated data of incidence) and the number of admissions compared to time at risk of each patient (incidence density data), using age, gender, habitat, mental health team and clinical evolution time as control variables. Risks for both types of measures were estimated using bivariate statistical techniques, analyzing contingency tables and multivariate logistic regression techniques with modeling exercises, expressing results as relative risk (RR) and corresponding confidence intervals.

The statistical programs Epidat v.3.1 and SPSS v.17.0 were used to develop the calculations. In the multivariate analysis application, adjustment of the models was evaluated using the calculation of indexes, calibration based on the Hosmer and Lemeshow test and discrimination with the area under the curve ROC (Receiver Operating Characteristic).

RESULTS

The results corresponding to the principal sociodemographic, care and clinical variables of the 82 patients attended in CMP during 2011 are described. More than half of them were between 34 and 54 years, the mean age being 49 years. About two-thirds were men. Approximately half belonged to the rural setting and the other half to the urban setting. Most of the patients lived with their family and one-fourth lived with help or in external resources. More than 40% were attended by Team II. Mean number of home visits made was 2.3. A total of 25% of the patients suffered episodes and 12% abandonments during 2011. Mean time of stay in the CMP was 6.7 years, and more than half had less than 5 years of follow-up. Mean clinical evolution was 19 years, this being less than 10 years

Table 1		Sociodemographic, care and clinical characteristics of the patients attended in the Case Management Program. Segovia. 2011	
Variable		No./Mean (%/SD)	
Age groups			
15-34		11	(13.4)
34-54		46	(56.1)
> 54		25	(30.5)
Mean age (SD)		48.7	(12.5)
Gender			
Man		53	(64.6)
Woman		29	(35.4)
Habitat			
Rural		42	(51.2)
Urban		40	(48.8)
Family situation			
Lives alone		17	(20.7)
Lives with family		45	(54.9)
Lives with support or in external resource		20	(24.4)
Mental health team			
I		28	(34.1)
II		35	(42.7)
III		19	(23.2)
No. of home visits			
0		16	(19.5)
1		23	(28.0)
2		20	(24.4)
>2		23	(27.1)
Mean no. of home visits (SD)		2.3	(2.6)
Presence of episodes			
No		61	(74.4)
Yes		21	(25.6)
Presence of abandonments			
No		72	(87.8)
Yes		10	(12.2)
Time of permanence in the program in years			
<5		44	(53.7)
5-9.9		14	(17.1)
10-15		17	(20.7)
>15		7	(8.5)
Mean time of permanency in year (SD)		6.7	(5.2)
Time of clinical evolution in year			
<10		25	(30.5)
11-20		23	(28.0)
21-30		20	(24.4)
31-40		8	(9.8)
>40		5	(6.1)
Not specified		1	(1.2)
Mean time of clinical evolution in years (SD)		19.1	(11.5)

Table 1		Continuation	
Variable		No./Mean (%/SD)	
Diagnosis- ICD -10			
F 10-19 Mental disorders due to psychoactive substance use		1	(1.2)
F 20-29 Schizophrenia, schizotypal and delusion disorder		64	(78.0)
F 30-39 Mood (affective) disorders		10	(12.2)
F 40-49 Neurotic stress-related and somatoform disorders		1	(1.2)
F 60-69 Disorder of adult personality and behavior		4	(4.9)
F 70-79 Mental retardation		2	(2.4)
Total no. of hospital admissions		36	
No. of patients with admissions		22	(26.8)

in 30%. From the diagnostic point of view, 78% belonged to the schizophrenia, schizotypal, schizo-affective and delusional ideas spectrum disorders. During 2011, there were 36 hospital admissions during in CMP in which 27% of the patients were involved.

Table 2 reflects the grade of association obtained by the different independent variables versus the incidence of hospital admission using the logistic regression "enter" method. As can be observed, there is a significant excess of risk of admission in women, mental health team I, due to the increase of the number of home visits and abandonment of follow-up of the patient. This risk is especially important for abandonment, increasing the likelihood of admission more than 2000 times in comparison with the situation of follow-up continuity. It is also important for the mental health team I (OR>48) and for the women (OR>22). On the contrary, longer clinical evolution behaves as a protective factor against hospital admission. (OR:0.84).

Table 3 shows the results obtained using the step-by-step inclusion and exclusion methods. Identical values for both methods studied were detected. Only those variables maintained in the final model are presented. These mostly coincided with those found by the enter method, although there were some differences: detection of a significant risk of admission in mental health team II (OR>19) and lessening in coefficient values for the female gender (OR:11.27) and presence of abandonment (OR:1549).

Evaluation of the parameters of the models corresponding to tables 2 and 3 indicates an acceptable explanation of the variance, with good results in calibration and discrimination.

In the study phase, mention must be made regarding the decision to rule out the presence of episode variable in the modeling because an elevated correlation was observed with the outcome variable. This caused wide and sudden

Table 2 Factors associated to the presence of hospital admission in patients attended in the Case Management Program. Multivariate logistic regression analysis ("Enter" Method). Segovia. 2012			
Variables	Exp (B)	CI (95%)	p
Age	0.946	0.867 - 1.031	0.204
Gender	22.329	2.565 - 194.399	<0.01
Habitat	0.732	0.125 - 4.272	0.729
Family status			0.339
Lives alone	1.697	0.141 - 20.389	0.677
Lives with family	0.251	0.022 - 2.836	0.264
Mental health team			0.093
I	48.614	1.393 - 1697.062	0.032
II	9.713	0.363 - 260.100	0.175
No. of home visits	1.472	1.055 - 2.054	<0.05
Presence of abandonments	2173.370	29.561 - 159.8*E3	<0.001
Time in CMP	0.903	0.737 - 1.106	0.325
Clinical evolution time	0.844	0.738 - 0.966	<0.05
ICD-10 Diagnosis	0.944	0.144 - 6.166	0.952

Exp (B): Exponent of B coefficient interpretable as odd ratio; CI: Confidence Interval
Reference categories: Gender (male), Habitat (urban), Family status (lives with help/external resource), Mental Health team (III), Presence of abandonments (no), ICD-10 Diagnosis (other subgroups)

Model Evaluation Parameters:			
Adjustment indexes	-2 NL: 45.835	R ² Cox-Snell: 0.439	R ² Nagelkerke: 0.645
Calibration (Hosmer-Lemeshow Test)	χ ² : 3.083	g.l: 8	p=0.929
Discrimination (ROC Curve)	AROC: 0.939	LCI: 0.887	UCI: 0.991

NL: Napierian logarithm of likelihood
AROC: Area under the receiver operating curve (Receiver Operating Characteristic)
LCI: Lower confidence interval
UCI: Upper confidence interval

changes in the coefficient values and in the confidence intervals, which generates very unstable models with the impossibility of correctly interpreting them.

Table 4 shows the analysis of the historical cohort study using the accumulated incidence data on the corresponding contingency table. In the exposition group, there were 14 admissions in a cohort made up of 45 patients versus 17 admission in the 47 patients of the unexposed group. Although it can be observed that the results differ

Table 3 Factors associated to the presence of hospital admission in patients attended in the Case Management Program. Multivariate logistic regression analysis ("Forward Stepwise" Methods or stepwise inclusion and "Backward Stepwise" or stepwise exclusion). Segovia. 2011			
Variables	Exp (B)	IC (95%)	p
Gender	11.270	2.013 - 63.095	<0.01
Mental health team			0.077
I	35.316	1.612 - 773.948	<0.05
II	19.257	1.048 - 353.742	<0.05
No. of home visits	1.343	1.022 - 1.765	<0.05
Presence of abandonments	1548.708	31.55 - 76.032*E3	<0.001
Clinical evolution	0.843	0.754 - 0.943	<0.01

Exp (B): Exponent of B coefficient interpretable as odd ratio; CI: Confidence Interval
Reference categories: Gender (male), Habitat (urban), Family status (lives with help/external resource), Mental health team (III), Presence of abandonments (no), ICD-10 diagnosis (other subgroups)
*: Variables retained in the last step of the final models considered. The results expressed in the table are in agreement for the two calculation methods used.

Model Evaluation Parameters:			
Adjustment indexes	-2 NL: 51.580	R ² Cox-Snell: 0.398	R ² Nagelkerke: 0.584
Calibration (Hosmer-Lemeshow Test)	χ ² : 5.505	g.l: 8	p=0.702
Discrimination (ROC Curve)	AROC: 0.916	LCI: 0.853	UCI: 0.979

NL: Napierian logarithm of likelihood
AROC: Area under the receiver operating curve (Receiver Operating Characteristic)
LCI: Lower confidence interval
UCI: Upper confidence interval

numerically for the bivariate and multivariate analysis, their practical significance is concordant. No significant protective behavior was detected compared to hospital admission in the patient grouped exposed to CMP. This is reflected in some confidence intervals contained in the unit. The model shows some modest adjustment indexes with acceptable results in calibration and discrimination.

Analysis of the incidence density data reflected in table 5 indicates similar incidence rates in the exposed and unexposed cohort. This results in an RR value close to the unit, without detecting a protective effect or against admissions of exposition to CMP.

Table 4			
Number of patients admitted and not-admitted according to exposition in study of historic cohorts (data from accumulated incidence). Results of contrast hypothesis in bivariate analysis. Relative risks for the exposed cohort and confidence intervals (95%) by application of bivariate analysis and multivariate logistic regression analysis. Segovia. 2009-2011			
Cohort	Admission		Total
	Yes	No	
Exposed	14	31	45
Unexposed	17	30	47
Total	31	61	92
Bivariate analysis	Fr. obs. / esp.	χ^2	p
Contrast hypothesis	14 / 15.163	0.263	0.608
Bivariate analysis	Valor	LCI	LCS
Relative risk	0.860	0.483	1.532
Multivariate analysis *	Valor	LCI	LCS
Relative risk	0.678	0.261	1.764

Fr. obs. / exp.: Frequency observed and expected in contrast hypothesis test.
 LCI: Lower confidence interval. UCI: Upper confidence interval.
 *Result obtained introducing the variables of adjustment age, gender, habitat, mental health team and clinical evolution time into the model

Multivariate model evaluation parameters:			
Adjustment indexes	-2 NL: 105.880	R ² Cox-Snell: 0.105	R ² Nagelkerke: 0.146
Calibration (Hosmer-Lemeshow Test)	χ^2 : 8.642	g.l.: 8	p=0.373
Discrimination (ROC Curve)	AROC: 0.688	LCI: 0.579	UCI: 0.796

NL: Napierian logarithm of likelihood
 AROC: Area under the receiver operating curve (Receiver Operating Characteristic)
 LCI: Lower confidence interval
 UCI: Upper confidence interval

CONCLUSIONS

Social, familial and occupational incapacity present in patients with SMD causes serious problems for the development of a normalized life. Among its consequences are problems of interaction with the health care setting, either because of the patient per se (behavior inhibition,

Table 5				
Number of hospital admissions and time at risk according to exposition in historic cohort study (density and incidence data). Incidence rates ratio, confidence interval (95%) and statistical significance. Segovia. 2009-2011				
Cohort	No. of admissions	Persons-Time (months at risk)	Incidence rate	
Exposed	28	1589	0.0176	
Unexposed	31	1692	0.0183	
Relative risk	Valor	LCI	LCS	p
	0.9618	0.5770	1.6032	0.9846

limited disease awareness) or to the health care setting (access barriers, lack of care continuity).¹²

During the last 40 years, coinciding with the psychiatric reform that gave rise to deinstitutionalization, different community care strategies have been under development in our setting. The first strategy was done with the functioning of the community mental health teams and then with other care and intensive follow-up modalities.¹³ CMP is included in these systems, and is mainly directed by nursing professionals within the mental health teams. These are especially aimed at the more severe patients who have high incapacity and considerable difficulty for psychiatric care.¹⁴ The concept of case management arose from the clinical settings with fragmentation of care, chronicity of the process and complexity of the disease situations. It was initially developed in the United States in the middle of the last century to approach mental health problems. The application of these programs is extended to other high risk situations and health care cost to improve the efficiency and decrease variability and is slowly being introduced into European countries.⁷ Case management is a management system that intends to offer health care and socio-health care services in a coordinated and comprehensive way within the usual setting of the patient. It is oriented towards covering the needs of the person and their family, seeking independence and potentiating capacities, with a multidimensional approach and efficient and sustainable performance.¹⁵

The conventional programs of Case Management (CM) aim to achieve five basic objectives: assessment of needs, treatment planning, linkage, monitoring and advocacy of the patient.² There is great variety of CM models. These include generalistic ones, characterized by a large number of patients and possible mediation of external providers, up to the more clinical ones, which manage a small number of patients. They may be made up of a single manager or a management team.

In any event, their conventional programs face important limitations in regards to providing adequate comprehensive community services. That is why interest has been growing to evaluate the real needs of the patients and to reach a consensus on how to approach and treatment them. This has been shown to be effective with a global psychopathological improvement of SMD.¹⁶ One of the alternative models is the ACT that was developed in the United States in the 1970's. It combines comprehensive services and adequate coordination and is one of the most widely investigated community care models. It is currently being supported as an evidence-based practice.¹⁷⁻²⁰

CM and ACT are especially effective when aimed at some specific profiles, as SMD with deficient or negative symptoms, linkage problems and multiple hospital admissions, and poor therapeutic adherence together with added social and legal problems.²¹⁻²³ ACT has shown its effectiveness in the reduction of hospital costs related with the frequent re-admissions, also improving the satisfaction grade of the patients.²⁴ On its part, CM seems to be effective in increasing therapeutic bonding and adherence by duplicating hospital admissions and increasing stays, without achieving improvements in social functioning or quality of life.²⁵

The CM programs have been evolving with time. They have evolved from the traditional models to the so-called intensive case management (ICM). This new strategy is the result of the evolution of two original models, the CM program itself and the ACT. It focuses on the management of small groups having less than 20 patients. Recently, a systematic review compared the results obtained by the ICM versus the non-intensive CM and standard cares. ICM reduces hospitalization and stay, increases adherence to the care program and improves social functioning compared to the standard cases, especially in patients with high hospitalization rates. However, comparison with the standard CM programs does not clarify its potential advantages.²⁶ This result was also found in some individual studies,²⁷ but not in other investigations. Thus, therefore leads to doubts about the accuracy of these programs to the original model, the possibility of differences in the providing of key services and the non-use of effective interventions based on evidence.²⁸

The effect of these programs in the reduction of hospitalization and/or stays is contradictory. Although it was initially stated that the principal purposes of the CM models were reached independently of the type of intervention applied,² this is not valid for the generic CM programs, especially with the care limitations, as it has scarce value in attention of SMD.²⁹ Along this line, our results also do not detect protection against hospital admission from belonging to the CMP, and it was not possible to validate the initial hypothesis of the study. Our

CMP is based on a generic CM model and does not have the specificities of specialized models (ICM or ACT). It has been under development with the limitations per se of the resources and infrastructures of the mental health public services of our country. It could even be argued inversely that CMP would detect psychotic episodes and decompensation with greater ease than traditional care, therefore favoring increase of admissions as it would be acting more as a resource that increases diagnostic sensitivity than as a resource for prevention of hospitalization. In this sense, some authors have detected an increase in admissions and stays for the CM.²⁵ Another possible untested explanation in our study is the dependency of the effect of the level of care demand and that in the ICM greater effectiveness is observed as the use of hospital resources grows.³⁰ On its part, ACT has been shown to be effective in reducing the admissions and stays versus standard care.²⁴

In relation to the factors associated to hospital admission in our study, we consider that some of them are truly predictive of effect (number of home visits and presence of abandonment). On the contrary, the greater risk of admission in women and in some teams are more difficult to explain. The possibility exists of differential decision-making influenced by characteristics intrinsic to care management. To the contrary, a longer course acts as a protective factor against admission, in possible relation to greater clinical stability.

The choice of the indicator, number of hospital admissions, as an outcome variable in our study is an advantage as it is a recognizable event that is easily observable by hospital and outpatient information sources. It is also beyond the interpretability of vague and inexact criteria present in other variables that hinder their implementation due to consensus problems. The latter introduce difficult to control classification biases. Another advantage is that it is easy to use with comparative purposes since its detection in comparison groups is relatively simple if adequate information sources are available. From another point of view, it could be considered that the prevention of hospital admission is not a primary objective of CMP and that its use is not adequate. However, said indicator shows a clear and indirect relation to therapeutic adherence and to care linkage, since it is precisely its absence or breakdown that increases the likelihood of admission. In our results, this fact is visualized when observing the high predictability of the variable- presence of abandonment. On the other hand, the choice of another outcome variable, was either not possible due to absence of specific information (social integration, acquisition of skills, etc.) or because it would mean significant problems of interpretability and operability.

The comparative study was carried out using a retrospective or historic cohort design that was performed after the occurrence of the event being studied (hospital

admission) using a study population (exposed and unexposed cohorts) already formed prior to the onset of the observation period without previous knowledge of the event and/or exposition by the investigators. Thus, in this study, the presence of the event and exposition (inclusion in the CMP) occurred prior to the onset of the study, so that the follow-up is retrospective. The principal advantages of this design are the possibility of making a direct calculation of the incidence, not limited to the indirect estimation of other observational studies and the important decrease of biases characteristic of other non-experimental designs. On the other hand, there is an important decrease in costs compared to prospective designs, this being a valid and profitable alternative to the selection of cohorts by registers of previously constructed exposition.³¹

The choice of the unexposed cohort is derived from the same population as the CMP patients. Possibility of a screening bias in relation to the many exclusions from the initial sample could be alleged, more than 50% being due to unknown losses to follow-up. If these excluded patients have some differential characteristic that would vary their likelihood of admission, our results could be biased. However, we consider this to be very unlikely since their baseline characteristics are similar to those of the final sample (data not reported in the results). In any event, interpretation of the results, independently of the method and analysis used is strongly aimed at the absence of effect of the exposition factor. This would make detecting an effect in based on the sample used very unlikely.

Even considering the limitations mentioned, this study manifests the need to have functioning evaluation tools of this type of programs. This would make it possible to evaluate the appropriateness regarding the initially proposed objectives. In this way, it would be possible to make adjustments and introduce scientifically supported modifications to achieve substantial improvements of their clinical effectiveness.

CONFLICT OF INTERESTS

No conflict of interests have results from the development of this work.

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