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Sociodemographic, clinical and pharmacological factors influencing early readmission in mental health settings

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ABSTRACT

Background. Early readmissions (between 24 hours and 30 days after discharge) can be disruptive for psychiatric patients and their families. The aim of this study is to determine the factors influencing this early readmission.

Methods. A retrospective case-control study was carried out from 2015 to 2017. Cases were matched with controls with a similar age (± 10 years), admission date (± 30 days), ICD-10 diagnosis and sex. Sociodemographic, clinical and pharmacological factors were examined.

Results. 86 cases and 86 controls were chosen. The largest ICD-10 group was F20-29 (70,9%). Statistically significant (SS) factors according to the bivariate analysis were: urban vs. rural living environment ($p=0.011$); poor subjective pharmacological adherence (AdFa, $p=0.048$); poor objective AdFa ($p=0.023$); poor social or family support ($p=0.019$); poor follow-up in psychiatric outpatient consultations ($p=0.021$); unemployment ($p=0.046$); and a higher number of readmissions during the previous year ($p<0.001$). In the multivariate analysis, SS factors were: urban living environment (OR=2.791; 95% CI, 1.017-7.663; $p=0.046$); poor social or family support (OR=2.255; 95% CI, 1.160-4.384; $p=0.017$); poor follow-up in psychiatric outpatient consultations (OR=2.156; 95% CI, 1.101-4.223; $p=0.025$); and a higher number of readmissions during the previous year (OR=1.536; 95% CI, 1.174-2.009; $p=0.002$).

Conclusions. Living in an urban environment; poor AdFa; poor social or family support; poor follow-up in psychiatric outpatient consultations; unemployment; and a higher number of readmissions during the previous year were all directly related to early readmissions for psychiatric patients.

Key words. Factors, early readmission, psychiatry, adherence, bivariate, multivariate.

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FACTORES SOCIODEMOGRÁFICOS, CLÍNICOS Y FARMACOLÓGICOS ASOCIADOS AL REINGRESO PRECOZ EN PACIENTES DE SALUD MENTAL

RESUMEN

Introducción. Los reingresos precoces (entre las 24 horas y 30 días tras el alta) pueden ser traumáticos para los pacientes psiquiátricos y sus familias, por lo que determinar los factores que lo predisponen es esencial desde un punto de visto tanto terapéutico como económico.

Metodología. Se llevó a cabo un estudio de casos y controles retrospectivo para el periodo entre 2015-2017. Se emparejaron los casos con los controles según edad, diagnóstico, sexo y fecha de ingreso. Se recogieron variables sociodemográficas, clínicas y farmacológicas de interés.

Resultados. Se analizaron 86 controles y 86 casos. El grupo mayoritario fue F20-29 (70,9%). En el análisis bivalente resultaron estadísticamente significativas (ES) las variables

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"entorno urbano vs. rural" ($p=0,011$), mala adherencia farmacológica (AdFa) subjetiva ($p=0,048$), mala AdFa objetiva ($p=0,023$), ausencia de red de apoyo ($p=0,019$), seguimiento deficiente en consultas externas de psiquiatría ($p=0,021$), falta de empleo ($p=0,046$) y un mayor número de ingresos en el año previo ($p<0,001$). En el análisis multivariante fueron ES las variables: número de reingresos el año previo (OR=1,536; IC95%:1,174–2,009; $p=0,002$), habitar en un entorno "urbano" (OR=2,791; IC95%:1,017–7,663; $p=0,046$), ausencia de red de apoyo OR=2,255; IC95%:1,160–4,384; $p=0,017$) y un seguimiento ambulatorio inestable (OR=2,156; IC95%:1,101–4,223; $p=0,025$).

Conclusiones. El habitar en un entorno urbano, una baja AdFa, la ausencia de red de apoyo, un seguimiento deficiente en consultas externas de psiquiatría, la falta de empleo y un alto número de reingresos en el año previo se relacionan de forma directa con el reingreso precoz en pacientes psiquiátricos.

BACKGROUND

The prevalence of mental disorders (MD) has been an object of study since the 1980s, with the European Study of the Epidemiology of Mental Disorders (ESEMED) being the largest published to date¹. It found that up to 25.9% of the population had been diagnosed with a MD at some point in their lives. Subsequently, various epidemiological studies have been carried out in Spain, whose different nature makes their interpretation difficult. The National Health Survey in Spain (ENSE) has been the most continuous in the last two decades and shows 22.2% of psychic morbidity in 2006, falling to 19.1% in 2017². In Europe, MD are the most frequent cause of disease burden, surpassing even cardiovascular disease and cancer³.

Interestingly, in the psychiatric population, a very small number of individuals use a disproportionate amount (50–80%) of mental health resources⁴. Among these resources is repeated admission over time, where readmission is broadly considered to be any unexpected (urgent) admission after an earlier discharge from the same hospital; although the time horizon considered for this varies from one study to another. In Spain, according to the National Health System Key Indicators (Ministry of Health, Consumer Affairs and Social Welfare), a readmission is defined as a patient being urgently re-admitted to the same hospital within 30 days of being discharged. According to this definition, the average estimated percentage of urgent psychiatric readmissions in the whole of Spain in 2015 was 10.48%⁵. In the European setting in 2009, it was shown that the rate of unscheduled readmissions within 30 days ranged from 4.5% in the Slovak Republic to 28.9% of patients discharged in Norway⁶. This variability seems to indicate that readmission must be

evaluated in the context of each health system, although it is used as an indicator of the quality of care and is of special interest for the development of health policies (7).

As well as this phenomenon of readmission having negative effects on health outcomes and being considered a step backwards in the therapeutic process, it is also a very poor cost-effective alternative to outpatient management. In fact, it should be remembered that multiple hospitalisations worsen the prognosis of psychiatric patients^{8,9}, and is especially traumatic for psychiatric patients and their families, due to promoting stigma and social exclusion and increasing healthcare costs¹⁰.

Determining the factors that predispose to readmission is essential from both a therapeutic and financial point of view, and there have been numerous studies examining a wide variety of factors related to readmission; examples are psychotic, substance abuse or personality disorders, comorbidity, sex, age, access to housing, previous admissions and therapeutic adherence, among many others (4,7,10–12). Identifying these factors contributing to early readmission can provide information to develop tools or programmes to help prevent it and improve the quality of life of patients, their medical care as well as reducing costs.

The objective of this study is, therefore, to investigate the influence of certain factors on early readmission in an acute mental health hospitalisation unit.

METHODS

Study types

A case-control study was carried out from 2015 to 2017 on patients hospitalised in the Mental Health Hospitalisation Unit, Virgen Macarena University Hospital. This first admission was considered the index admission (IIn).

Selection of cases and controls

Patients over 18 years of age, with pathologies diagnosed according to ICD-10, readmitted within 30 days of being discharged were chosen as cases. As controls, pairings with similar features to the cases were sought: by age (adults within ± 10 years), sex, pathology (identical ICD-10 diagnosis) and admission date (within ± 30 days). All these features were required for a control to be considered. If no adequate control was found, the case was excluded. IIn discharge reports were reviewed to obtain sociodemographic information (sex, age, distance from the hospital, environment, adherence to support programmes prior to admission, family support network, institutionalisation, any legal guardian, living

companions and employment); pharmacological information (treatment burden: number of drugs prescribed at discharge divided by the number of medical diagnoses), subjective pharmacological adherence (AdFa, as perceived by the clinician at IIn) and objective pharmacological adherence (taken from community pharmacy electronic medication dispensation records), polytherapy, relevant interactions, treatment with long-acting injectable antipsychotics (LAIAPs) and clinical information (number of admissions in the 12 months before IIn; habitual drug use; known years of illness; organic, psychiatric or dual comorbidity; admission and discharge type; medical recommendation for admission; outpatient follow-up; and suicidal ideation on admission).

Statistical analysis

The data were analysed using the statistical program SPSS 19.0 for Windows in accordance with the study objectives and hypotheses. Student's *t*-test was used for hypothesis testing (bivariate regression) when the categorical variable had 2 categories. The Mann-Whitney U test was used for non-parametric tests when the categorical variable had 2 categories. The Chi square test was used for independence between two qualitative variables, corrected by Yates or Fisher in 2x2 tables, depending on whether or not the applicability criteria were met.

The risk factors associated with the dependent variable, readmission, were analysed by adjusting a multivariate model with a binary logistic regression, and the variables that were statistically significant in the bivariate were incorporated into the model. Statistically significant differences were assumed as $p < 0.05$ and $p < 0.10$ for the multivariate. Matching variables (age, sex, and pathology) were not included in the analyses. A binary logistic regression was performed with the backward Wald method as a preliminary step, to identify the significant variables for the model. Subsequently, the validity was verified through the Enter method. To assess the fit of the model, the Hosmer-Lemeshow goodness-of-fit test was used, and the Wald test was used to study the statistical significance of the binary regression model.

Ethical aspects

The study protocol was approved by the Research Ethics Committee of the Virgen Macarena and Virgen del Rocío University Hospitals. Informed consent was not required from the patients as it was a retrospective observational study with data anonymised from the participants.

RESULTS

The number of readmissions in the study period was

175, of which 14 were discarded due to either not having a clear diagnosis or being under review. Of the 161 remaining readmissions, 76 were discarded due to not finding an adequate control. These data are shown in Figure 1.

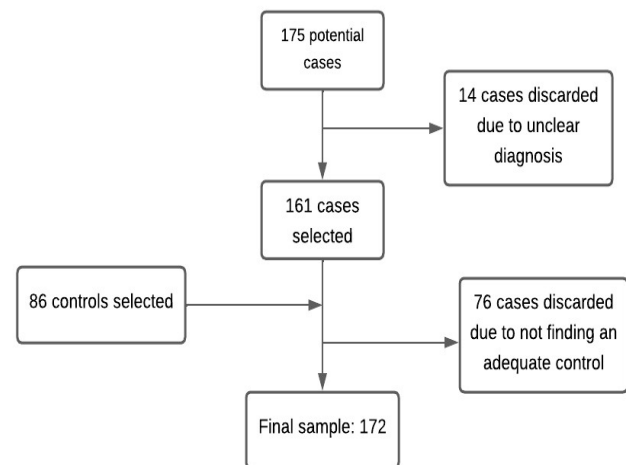


Figure 1

Patient flow chart.
Author: Miguel Vázquez-Real

A final total of 86 readmissions was obtained: 61 (70.93%) had a diagnosis that corresponded to the F20-29 group, Schizophrenia, schizotypal and delusional disorders; 15 (17.44%) were group F30-39, Mood (affective) disorders; 9 (10.47%) corresponded to group F60-F61, Adult personality and behaviour disorders; and 1 readmission (1.16%) was group F70-79, Mental retardation. Regarding sex, 56 (65.1%) patients were men and 30 (34.9%) women.

A control was found for each of the 86 cases, giving a final sample of 172 patients. Percentages by diagnoses and sex were, of course, identical (as these were two of the pairing variables). No significant differences between cases and controls were found for age: 44.23 (± 1.137) vs 44.33 (± 1.130), respectively. The baseline features of the population are in Table 1.

All independent variables in the bivariate analysis were analysed against a dependent variable, readmission; the results are shown in Table 2.

The analysis variables found to increase the probability of patient readmission significantly were: urban living environment vs a rural one ($p=0.011$); poor subjective AdFa ($p=0.048$); lack of objective AdFa ($p=0.023$); absence of a support network ($p=0.0019$); poor follow-up in psychiatric outpatient clinics ($p=0.021$); unemployment (0.046); and a

Table 1	Baseline population features		
	Cases	Controls	p
Age (mean [\pm SD])	44,23 (1,14)	44,33 (1,13)	> 0,05
Sex			
- Male (n [%])	56 (65,1)	56 (65,1)	-
- Female (n [%])	30 (34,9)	30 (34,9)	
Diagnosis			
- F20-29 (n [%])	61 (70,9)	61 (70,9)	
- F30-39 (n [%])	15 (17,4)	15 (17,4)	-
- F60-61 (n [%])	9 (10,5)	9 (10,5)	
- Others (n [%])	1 (1,2)	1 (1,2)	

higher number of admissions the previous year ($p < 0.001$).

Once the significant variables were identified in the bivariate analysis, a multivariate analysis was performed (Table 3) to identify the variables jointly influencing the risk of readmission. The significant variables in this analysis were lack of a support network; irregular outpatient follow-up; urban living environment compared to a rural one; and a higher number of admissions the previous year.

DISCUSSION

The variables related to Mental Health patient readmission in a tertiary hospital within a public, universal health system are shown. Specifically, living in an urban environment; low AdFa; lack of a support network; poor follow-up in

Table 2	Readmission variables analysed			
		Cases	Controls	p ^a
Quantitative variables, mean (\pm SD)				
Distance to the hospital (km)		14,18 (15,596)	14,49 (18,114)	0,810
Treatment burden at discharge		3,99 (2,001)	4,02 (2,081)	0,913
Index admission duration		16,30 (12,184)	14,42 (9,929)	0,538
No. of admissions the previous year		1,52 (1,727)	0,60 (1,055)	0,000***
Qualitative variables, n (%)				
Environment	Rural	7 (8,1)	19 (22,1)	0,011*
	Urban	79 (91,9)	67 (77,9)	
Habitual drug use	No	60 (69,8)	59 (68,6)	0,869
	Yes	26 (30,2)	27 (31,4)	
Known years of illness	< 5	3 (3,5)	3 (3,5)	0,102
	5 - 10	8 (9,4)	18 (20,9)	
	> 10	75 (87,2)	65 (75,6)	
Subjective pharmacological adherence	No	62 (72,1)	48 (57,0)	0,038'
	Yes	24 (27,9)	37 (43,0)	
Objective pharmacological adherence	No	46 (53,5)	31 (36,0)	0,023'
	Yes	40 (46,5)	55 (64,0)	
Polytherapy at discharge	No	47 (54,7)	47 (54,7)	1
	Yes	39 (45,3)	39 (45,3)	
Major interactions	No	76 (88,4)	69 (80,2)	0,142
	Yes	10 (11,6)	17 (19,8)	
Comorbidity	No	43 (50,0)	47 (54,7)	0,541
	Yes	43 (50,0)	39 (45,3)	
Admission	Voluntary	29 (33,7)	36 (41,9)	0,271
	Involuntary	57 (66,3)	50 (58,1)	
Admission recommended	No	63 (73,3)	62 (72,1)	0,864
	Yes	23 (26,7)	24 (27,9)	
Discharge	Regulated	77 (89,5)	79 (91,9)	0,600
	Voluntary	9 (10,5)	7 (8,1)	

Table 2 Cont.		Readmission variables analysed		
		Cases	Controls	p ^a
Adherence to support programmes	No	75 (87,2)	81 (94,2)	0,115
	Yes	11 (12,8)	5 (5,8)	
Support network	No	49 (57,0)	28 (32,6)	0,001*
	Yes	37 (43,0)	58 (67,4)	
Institutionalised in a long-stay centre	No	75 (87,2)	81 (94,2)	0,115
	Yes	11 (12,8)	5 (5,8)	
Guardian	No	75 (87,2)	80 (93,0)	0,201
	Yes	11 (12,8)	6 (7,0)	
Living companions	No	23 (26,7)	17 (19,8)	0,279
	Yes	63 (73,3)	69 (80,2)	
Outpatient follow-up	Irregular	51 (59,3)	36 (41,9)	0,022*
	Stable	35 (40,7)	50 (58,1)	
Employment	No	80 (93,0)	71 (82,6)	0,036*
	Yes	6 (7,0)	15 (17,4)	
Treatment with Long-Term Injectables	No	46 (53,5)	45 (52,3)	0,879
	Yes	40 (46,5)	41 (47,7)	
Suicidal ideation on admission	No	70 (81,4)	66 (76,7)	0,453
	Sí	16 (18,6)	20 (23,3)	

^a The Mann Whitney U test was used for quantitative variables after verifying non-normality using the Kolmogorov-Smirnov test. The Chi square test was used for qualitative variables

* p < 0.05 *** p < 0.001

outpatient psychiatry consultations; unemployment and a high number of readmissions the previous year were all directly related to early readmission for psychiatric patients.

Among the sociodemographic variables with a statistically significant association is the environment where the patient lives; such that patients living in urban areas have a higher readmission rate than those in rural areas, irrespective of the distance. These results agree with the findings of *Sfetcu et al.*¹³, who determined that patients who lived closer to the hospital were readmitted more frequently. Also, the influence of the environment on readmission appears to be independent of income level¹⁴. However, *Prince et al.*¹⁵ found that older patients discharged in environments with a high purchasing power (without differentiating between rural or urban) had a lower tendency to be re-admitted early. Some authors describe lower readmission rates in urban regions, such as

Table 3		Variables included in the binary logistic regression model ^a		
Variable	p	OR	IC95%	
			Lower	Higher
Lack of support network	0,017	2,255	1,160	4,384
Irregular outpatient follow-up	0,025	2,156	1,101	4,223
Living in an urban environment	0,046	2,791	1,017	7,663
No. of admissions the previous year	0,002	1,536	1,174	2,009

CI: Confidence interval; OR: Odds ratio.

^a In the Hosmer-Lemeshow goodness-of-fit test, the Chi-square value was equal to 7.681 (degrees of freedom = 7, p=0.362). The area under the curve of the model was 0.737.

^b An urban environment was considered as one with a population density ≥ 10,000 inhabitants / km².

*Lin et al.*¹⁶ and *Rüesch et al.*¹⁷; with the latter finding a non-linear association between population density and the risk of re-admission. Meanwhile, there were others who found no relationship between population density or distance to health services and the rate of readmission.

The influence of the patients' personal environment was affected by both marital status and family support, as well as by the people they lived with. *Evans et al.*¹⁸ found that patients living in supervised accommodation had a higher rate of readmission, while *Morlino et al.*¹⁹ found the same for those living in institutionalised care centres. Some authors^{20,21} meanwhile, found living alone to be the only risk factor, while others gave it a protective role^{22,23}. Homelessness was a risk factor in the study by *Russo et al.*²⁴.

For our population, the relationship with long-stay structures with no care, the presence of a legal guardian and adherence to support programmes showed no differences between cases and controls. However, a good social support network and good follow-up in medical specialist consultations were found to be significant protective factors in the analysis. These results, like adherence, were studied more in the period between In discharge and readmission¹³, so the results found here reinforce the importance of these variables in the period immediately prior to admission. At first, one might think that, once the patient is admitted, there is nothing to do; however, it may be advisable to pay more attention to those patients with a higher risk of readmission.

Employment is another factor widely included in many studies and found to have significant protection against readmission^{16,18,25,26}; this was found in our population. Similarly, receiving social care or payments has been identified as a protective factor for readmission²². This factor creates uncertainty as it may be a confounding factor, since only the less severe patients are the ones who can access a job.

Among the pharmacological factors in our study, it seems that none of pharmacological combination therapy, relevant pharmacological interactions or treatment with LAIAPs had any significant influence on readmission. Also polytherapy, whether with antipsychotics, antidepressants or mood stabilisers, was not associated with a risk of readmission, as found by *Boza et al.*¹⁰.

LAIAP therapy is controversial in therapeutics for controlling patients without adequate adherence or who have difficulty controlling their symptoms. It focuses on their usefulness for reducing admissions; however, there is evidence both for and against this. No significant results were obtained for patients treated with LAIAPs between In

and readmission in this study population. These results are consistent with the study by *Espiridion et al.*²⁷, who found no differences at 30 or 60 days in the rate of readmission in patients with schizophrenia taking oral antipsychotics compared to those using LAIAPs, as also occurred in the PROACTIVE study²⁸. According to these results, treatment with LAIAPs should not be used exclusively as a tool to prevent future readmissions, but should be based on the patient's preferences for one treatment or another, as part of a shared decision strategy²⁹ or depending on their effectiveness in controlling symptoms. However, *Maestri et al.*³⁰ found differences in time to readmission, with it being significantly longer for the group treated with LAIAPs, but with no differences in the rate of readmission at one year.

One of the most important factors related to readmission is AdFa, both when assessed "electronically" ("objective adherence") and as perceived in clinical interviews ("subjective adherence"). Although both direct and indirect measurement is recommended for therapeutic adherence, in practice this is unusual; as the direct measurement requires the extraction of drug levels in the blood³¹. Thus, two indirect measures were used in this study, so that one could reinforce the other and to have two different approaches; although the assumption that electronic dispensing records are indicative of adequate adherence may be a limitation in this study. These were measured in the year prior to In to estimate the adherence profile of the population.

The results of both variables confirm the importance of good adherence to pharmacological treatment to prevent readmission, and these are in line with the findings of *Donisi et al.*³² in their review, which gave importance, not only to adherence itself, but also to patient satisfaction with the treatment. The review by *Sfetcu et al.*¹³ also concluded that adequate adherence in the period between the index admission and readmission is key to preventing the latter.

One of the most important factors in our study was the number of admissions the previous year, which had a direct relationship with the risk of readmission. This factor, together with the length of hospital stay, seems to be one of the most clearly influential, as is also seen in the literature^{13,32,33}; while also giving some relevance to the patient's psychiatric history³⁴: the longer the diagnosis, the greater the risk of readmission.

Among the limitations of the study are those typical of observational case-control studies, such as sample selection bias and the exclusion of 51.2% of initially identified readmissions due to not having an adequate control; although the results obtained are similar to others published in the related bibliography. Another significant limitation is

not being able to stratify according to the severity of the symptoms, since no clinical tool was applied in the admission/discharge reports to be able to make any correlation, either at the time or over a longer period, to adjust cases and controls according to severity.

CONCLUSIONS

The results obtained lead to the conclusion that the patient with the highest risk of readmission is one who has been admitted several times in the previous year, is unemployed, lives in an urban environment, with little social or family support or outpatient follow-up and has low AdFa.

Our study represents an advance in the knowledge of the reasons behind readmission, and is a possible tool to try to identify patients with a higher risk of returning to hospital within 30 days of In. It highlights the importance of starting programmes that improve therapeutic adherence (clinical and pharmacological), to improve the attitude of patients towards medication and their condition, with possible better adherence results and, in parallel, lower relapse rates³⁵. Along with this, programmes for insertion into working life would help reduce the risk of re-admission. Conducting multicentre studies with a larger population would be useful to validate the results obtained.

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