



# Demographic and Clinical Factors Associated with Re-admission in Patients Admitted to Psychiatric Hospital and Psychiatric Ward of General Hospital in 2011: A 7-Year Follow-Up after Discharge

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## Abstract

**Background:** The present study aimed to investigate the relationship between patients' demographic/clinical factors and readmission.

**Methods:** This retrospective cohort study was conducted on all patients admitted to Iran psychiatric hospital and the Psychiatric Ward of Rasoul-e-Akram Hospital in Tehran in 2011. The study variable and post-discharge readmission status in a 7-years period until 2018 were collected by reviewing patients' clinical charts, making telephone calls or studying patients' records at Roozbeh Hospital. Thereafter, clinical factors such as Length of Hospital Stay (LOS), diagnosis, and medication compliance were evaluated by using statistical tests, including Meier-Kaplan survival analysis, Logrank test, and Cox regression analysis and SPSS software.

**Results:** The present study was conducted on 1410 inpatients, 434 women (30.8%) and 976 men (62.9%), whose most common disorder was mood disorder. The diagnoses of the patients were recorded based on DSM-IV-TR. Among the patients readmitted, the mean time to readmission was 24.94 months. Among the demographic and clinical factors, the longer length of stay, more previous hospitalizations, inpatient physical restraint, lack of therapeutic compliance, and diagnosis of psychotic disorders has increased the odds of readmission (all  $p < 0.01$ ).

**Conclusion:** To reduce the readmission rate among these patients, we need to use some methods to reduce readmission such as psychoeducation regarding nature of the disease, importance of medication adherence, and identifying warning signs that indicate the possibility of recurrence of the disease, especially more severe such as psychotic disorders. It is also recommended to avoid physical restraint, a factor of readmission risk, during hospitalization as much as possible.

**Keywords:** Demography, Inpatients, Patient readmission, Psychiatric hospitals

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## Introduction

Psychiatric disorders are among the important public health issues worldwide as well as in Iran. The mental health pattern in Iran is similar to the western countries, but it seems that the prevalence of psychiatric disorders in Iran may be lower than these countries (1). It is estimated that at least about 7 million of Iranian population suffer from one or more psychiatric disorders (1). In addition, one systematic review on the prevalence of psychiatric disorders in Iran included 35 studies and showed that the prevalence estimates varied in the range of 1.9-58.8% (2). Iran's 2003 national study on burden of diseases reported that neuropsychiatric disorders had the highest burden only after injuries and disasters and were contributing to 16.04% of the burden of diseases (3). It represents the importance of the role of the psychiatric disorders in providing preventive and management programs in Iran (1).

Admission is one of the most important modalities in the treatment of psychiatric disorders, which is considered by some authors as an appropriate short-term crisis intervention that can be used periodically during episodes of acute psychiatric disorders (4,5). Re-referrals to hospitals due to various reasons, such as failure of the earlier hospital admission (6), lead to higher bed occupancy rate, and increase the hospital costs imposed on both the health system and patients. Overall, inpatient treatment is an expensive way of caring for people with acute psychiatric disorders (7).

In addition, patients with serious psychiatric disorders are at higher risk of mortality (8) and morbidity (9) (30% higher) compared to the general population (10). The life expectancy of these patients is 15 years less than other people, and they are at risk of suicide. Frequent admissions of psychiatric patients can reflect their psychological and social statuses, their support and social resources and the type of disease (11). Readmission has a major role in the reduction of the quality of life and increases the years of lost life (12) and also predicts the low quality of care (13), which can cause serious complications such as social and psychological dysfunctions.

A study in the United States indicated the highest readmission rate within 30 days after discharge among adult patients with psychiatric disorders is in

patients with schizophrenia and mood disorders (14). However, it was shown that the risk of readmission is high among patients with all psychiatric disorders. Many factors were found to affect the readmission rate of psychiatric patients. In this study, several attempts were made to investigate the effect of risk factors on readmission. Accordingly, these factors are categorized into the following two groups: demographic and clinical (12). Demographic factors include age, sex, marital status, educational level, residence, and occupation. Additionally, clinical factors include diagnosis, medication type, route of administration, comorbidity, history of substance use disorder, history of suicide attempt, history of previous admissions, history of medication compliance, and Length Of Stay (LOS) (10).

Demographic factors have been investigated in several studies. Some of them reported the protective effect of employment on readmission in a bivariate analysis (15,16) and regarded unemployment as a risk factor (17). However, most of these studies showed no significant relationship between living conditions/ educational level and readmission (18). Another study investigated the effect of demographic factors on readmission of depressed patients and then reported higher readmission rate among younger depressed patients (19).

Considering that clinical factors are among the important predictors of readmission, this issue has been known as the target in many studies. In most studies, the most important risk factor of the recurrence and readmission of psychiatric patients was found to be the history of frequent previous admissions (15,18). However, medication non-compliance has been cited as another important risk factor in this regard (20), and other factors such as the type of diagnosis, type of treatment and Electroconvulsive Therapy (ECT) (21), and self-injurious behaviors (19) have also been investigated.

Although willingness to perform studies in this field has increased in recent decades (22), little information is now available on the predictors of psychiatric readmission (19). On the other hand, there has been only a single similar study in Iran and few studies abroad. It should be noted that none of these studies has evaluated all demographic and clinical factors in a coherent manner.

Considering those previous studies which reported a relationship between the patients' demographic/clinical characteristics and the readmission rates, since there is not much information in this field, especially in Iran, we aimed to investigate the relationship between these factors and readmission. Therefore, several attempts were made to investigate the records of all patients admitted to Rasoul-e-Akram and Iran psychiatric Hospital in 2011. Furthermore, all their demographic and clinical factors were recorded. Thereafter, the included patients were followed up on their readmissions and other related factors for seven years, and finally, the relationship between the aforementioned factors and their readmissions was evaluated.

## Materials and Methods

This was a retrospective cohort study, and the sample size was calculated by using a census of all the patients admitted to the psychiatric ward of Rasoul-e-Akram and Iran psychiatric Hospital in Tehran in 2011. Iran hospital is a single-specialty psychiatric hospital and includes 5 wards and each ward has 30 active inpatient beds, and psychiatric ward of Rasoul-e-Akram general Hospital also has 30 active beds. Additionally, Iran hospital has more facilities for patients like community-based care, specialized care for patients with substance use disorders, more post-discharge clinics, *etc.* After inquiring from the hospitals, we found out that approximately 2500 patients were admitted to these centers in 2011. The inclusion criteria included all patients with admission charts which were archived in the psychiatric ward of Rasoul-e-Akram and Iran psychiatric Hospital in 2011. Moreover, the exclusion criterion was short-term admission (less than seven days). Accordingly, significant numbers of medical patient records associated with a short-term emergency admission, which were not related to the purpose of this study, were excluded from the research. However, two other cases were also excluded due to their unwillingness to participate in the study and/or not responding to the phone call. The final sample size included 1410 patient records, of which 282 records were archived in Rasoul-e-Akram, and 1128 belonged to Iran psychiatric Hospital. Considering the large data volume and the need

for proper data management, a special application was designed to register the necessary patients' specifications such as age, sex, and the number of readmissions. The output of this application was processed in SPSS software. Furthermore, an electronic database was designed to create the patients' information registration system that allows future follow-ups, which multiple users can use to enter patients' follow-up data.

At the first stage of data collection, a pilot assessment was conducted on 30 patient records by the project executors to fix the application bugs, which were detected and fixed by the application designer in several cases.

At the second stage, when the system was completed, the patients' records were evaluated. The number and date of readmissions in the above-mentioned hospitals until 2018 and all information related to variables were recorded in the designed application. The application's information was completed as follows: yes and no options, several possible options for a particular variable, entering a date in the calendar or manually entering information in specific cases. People with medical education (interns) who were familiar with patients' records and medical terms were hired for doing this stage.

At the third stage, all patients who did not have readmission record in the same hospital until 2018 (7 years) were followed-up as follows: To obtain more information, the researcher firstly contacted the patients by using phone numbers registered in the patients' records, then they were asked about the frequency and date of their readmissions and outpatient referrals or their possible death. Accordingly, this stage was implemented twice in order to re-contact those patients who did not answer the previous phone call.

At the fourth stage, inquiring from another important psychiatric hospital in Tehran (Roozbeh Hospital) was implemented for cases who could not be contacted. For example, in the case of wrong number or unanswered phone call. Notably, in cases of having readmission, the related information was entered into SPSS.

The final stage aimed to gather information from Civil Registration Office of Tehran to follow up on the patients' survival status that remained unclear

to the researchers until this stage. Unfortunately, the above-mentioned organization was unwilling to cooperate with us by emphasizing the confidentiality of information regarding dead people.

### Data analysis

Statistical calculations were performed using SPSS statistics 24.0 software. Central tendency and dispersion indices were also calculated. Thereafter, the readmission date was calculated using Kaplan-Meier survival analysis. The relationship between factors and readmission date was also determined by logrank test and Cox-Regression analysis.

### Ethical considerations

During the phone calls with the participants, the researcher firstly introduced himself/herself to the patients and stated the purpose of the call, following up on the patients' condition. It was noted that if there was no desire to cooperate, the patient's record would be excluded from the study. The patients were aware that their participation or non-participation would have no effect on receiving medical care. The patients' information was kept confidential, and after being registered in the system, no one had access to them at all.

### Results

The present study's results were obtained by evaluating the records of 1410 patients who were admitted to Iran psychiatric hospital (n=1128 cases, 80%) and the psychiatric ward of Rasoul-e-Akram general Hospital (n=282 cases, 20%) in 2011. The number of the admitted women and men was 434 (30.8%) and 976 (69.2%), respectively. At the time of data entry (2011), the mean  $\pm$  Standard Deviation (SD) of the women's and men's age was  $36.7 \pm 12.9$  and  $35.5 \pm 11.22$  years old, respectively. The mean  $\pm$  SD of the age of onset of the disorder was  $26.96 \pm 10.7$  and  $27.4 \pm 10.13$  years old for the women and men, respectively. Demographic and clinical characteristics of the included patients are presented in table 1.

The diagnoses of the patients were recorded based on DSM-IV-TR coding. The highest prevalence of psychiatric disorders belonged to mood disorders (n=588 cases, 41.7%). The results of chi-square showed that the prevalence rates of psychotic disorders

(72.6%), mood disorders (58.2%), and substance use disorders (88.7%) were higher among men than women ( $p=0.001$ ,  $df=4$  and  $\chi^2=115.38$ ). In contrast, the prevalence rates of anxiety disorders (61.5%) and other mental disorders (50.8%) were higher among women than men. Regarding the comorbid physical diseases, cardiovascular and neurological disorders, trauma, infectious disorders, and infectious/endocrine disorders were more common among men; however, endocrine disorders were more common among women (Table 2).

There was a significant difference between these two hospitals in terms of the prevalence of psychiatric disorders ( $p=0.001$  and  $\chi^2=101.04$ ). The prevalence rates of psychotic and substance use disorders were higher among patients who were admitted to Iran hospital, and mood, anxiety, and other disorders were prevalent among the patients admitted to Rasoul-e-Akram general Hospital. Regarding the prevalence of comorbid physical diseases, neurological disorders, trauma, and infectious disorders also were more common among the patients admitted to Iran hospital, and cardiovascular and endocrine disorders were more common among the patients who were admitted to Rasoul-e-Akram general Hospital (Table 3).

Out of 1410 patients, 48 patients (3.4%) died due to physical illness (n=34 cases, 70.8%), accidents (n=1 case, 1.2%), and unspecified causes (n=13 cases, 27.1%).

The results of one-way ANOVA showed that the mean LOS was significantly longer in the patients with psychotic disorders than in those with the mood and substance use disorders. These results also indicated that the mean LOS of the patients with mood disorders ( $p=0.001$ ,  $F=20.22$ ) and those with substance use disorder ( $p=0.001$ ,  $F=13.52$ ) in Iran hospital was significantly longer than those who were admitted to Rasoul-e-Akram Hospital (Table 4).

A total of 335 patients (23.8%) were readmitted (Table 5). Accordingly, there was a significant difference between different disorders and the number of the readmitted patients. It should be noted that among them, the highest and lowest readmission rates were seen in the patients with mood and anxiety disorders, respectively ( $p=0.014$  and  $\chi^2=12.43$ ).

Among the readmitted patients, the mean/SD of the time interval between the two admission (mean

**Table 1.** Demographic and clinical characteristics of the patients admitted to Iran and Rasoul-e-Akram psychiatric hospitals in 2011

	Number (%)	Iran psychiatric hospital	Rasoul-e-Akram psychiatric hospital	Total	p-value
		Number (%)	Number (%)		
Sex	Female	294 (26.1)	148 (52.5)	442 (31.3)	0.001
	Male	834 (73.9)	134 (47.5)	968 (68.7)	
Marital status	Unmarried	558 (49.5)	109 (38.7)	667 (47.3)	0.001
	Married	407 (36.1)	142 (50.4)	549 (38.9)	
	Divorced	155 (13.7)	25 (8.9)	180 (12.8)	
	Widow	8 (0.7)	6 (2.1)	14 (1.0)	
Employment status	Employed	206 (18.3)	74 (26.2)	280 (19.9)	0.002
	Unemployed	922 (81.7)	208 (73.8)	1130 (80.1)	
Educational level	illiterate	36 (3.2)	20 (7.1)	56 (4.0)	0.001
	High school	604 (53.5)	122 (43.3)	726 (51.5)	
	Diploma	364 (32.3)	79 (28.0)	443 (31.4)	
	Above diploma	124 (11.0)	61 (21.6)	185 (13.1)	
Place of residence	Urban	99.40%	100.00%	99.50%	0.21
	Rural	0.60%	0.00%	0.50%	
Referral source	Family	97.90%	95.00%	97.30%	0.001
	Doctor	0.00%	3.50%	0.70%	
	Legal authorities	2.10%	1.40%	2.00%	
hospitalization restraint	Physical restraint	26.10%	6.40%	22.10%	0.001
	Drug restraint	26.80%	0.40%	21.50%	
	Unknown	47.20%	93.30%	56.40%	
Substance abuse	Yes	57.00%	31.90%	52.00%	0.001
	No	42.50%	66.30%	47.20%	
	Unknown	0.50%	1.80%	0.80%	
Therapeutic compliance	Yes	40.50%	28.70%	38.20%	0.001
	No	59.50%	71.30%	61.80%	
Type of discharge	Personal request	26.8	11.30%	23.70%	0.001
	Doctor's order	73.20%	88.70%	76.30%	
Suicide history	Yes	19.10%	36.50%	22.60%	0.001
	No	80.90%	63.50%	77.40%	
Post-discharge visit	Registered	68.30%	47.90%	64.20%	0.001
	Not registered	31.70%	52.10%	35.80%	



**Table 2.** Rate of psychiatric disorders and comorbid physical diseases in males and females

		Female number (percentage)	Male number (percentage)	Total number (percentage)	$\chi^2$	p-value
Psychiatric disorders	Psychotic disorders	112 (27.4)	297 (72.6)	409 (29)	115.38	0.001
	Mood disorders	246 (41.8)	342 (58.2)	588 (41.7)		
	Anxiety disorders	16 (61.5)	10 (38.5)	26 (1.8)		
	Substance use disorders	37 (11.3)	289 (88.7)	326 (23.1)		
	Others	31 (50.8)	30 (42.9)	61 (4.3)		
	Total	442 (31.3)	968 (68.7)	1410 (100)		
Comorbidity	No comorbidity	275 (27.6)	720 (72.4)	995 (73.10)	72.35	0.001
	Cerebrovascular	14 (42.4)	19 (57.6)	33 (2.4)		
	Endocrine	65 (66.3)	34 (33.7)	101 (7.4)		
	Neurology	28 (32.6)	58 (67.4)	86 (6.3)		
	Trauma	14 (20.9)	53 (79.1)	67 (4.9)		
	Infectious	2 (12.5)	14 (87.5)	16 (1.2)		
	Endocrine and infectious	19 (30.2)	44 (69.8)	63 (4.6)		
	Total	442 (31.3)	968 (68.7)	1410 (100)		

**Table 3.** Rate of psychiatric disorders and comorbid physical diseases in Iran and Rasoul-e-Akram general hospitals

		Iran number (percentage)	Rasoul-e-Akram number (percentage)	Total number (percentage)	p-value
Psychiatric disorders	Psychotic disorders	31.60%	18.80%	29.00%	0.001
	Mood disorders	36.60%	62.10%	41.70%	
	Anxiety disorders	1.70%	2.50%	1.80%	
	Substance use disorders	27.00%	7.80%	23.10%	
	Others	3.20%	8.90%	4.30%	
Comorbidity	No comorbidity	75.60%	62.30%	73.10%	0.001
	Cardiovascular	1.60%	5.8	2.40%	
	Endocrine	5.30%	16.70%	7.40%	
	Neurology	6.30%	6.20%	6.30%	
	Trauma	5.70%	1.60%	4.90%	
	Infectious	1.40%	0.40%	1.20%	
	Endocrine and infectious	4.10%	7.00%	4.60%	

**Table 4.** Total patients and their length of stay(Days)

	Number	Iran hospital	Rasoul-e-Akram hospital	Total patients	p-value
Psychotic disorders	409	33.11 (±18.61)	23.77 (±13.47)	90.31 (±18.28)	0.06
Mood disorders	588	26.20 (±15.15)	20.58 (±10.06)	53.24 (±14.06)	0.001
Anxiety disorders	26	25.84 (±13.35)	20.00 (±11.25)	27.24 (±12.87)	0.31
Substance use disorders	326	27.12 (±14.70)	15.50 (±6.39)	33.26 (±14.58)	0.001
Others	61	18.22 (±9.98)	14.52 (±7.01)	70.16 (±9/01)	0.11

**Table 5.** Percentage of readmission among the patients with major psychiatric disorders admitted to Iran and Rasoul-e-Akram psychiatric hospitals in 2011

		Readmission		p-value
		Yes	No	
Psychotic disorders	Number	117	292	0.014
	Percent	34.9	27.2	
Mood disorders	Number	141	447	
	Percent	42.1	41.6	
Anxiety disorders	Number	7	19	
	Percent	2.1	1.8	
Substance use disorders	Number	58	268	
	Percent	17.3	24.9	
Others	Number	12	49	
	Percent	3.6	4.6	
Total	Number	335	1075	
	Percent	100	100	

time to readmission) was 24.94/23.19 months. A significant difference was observed between the two hospitals, in terms of the mean time to readmissions, in the patients with mood disorders ( $p=0.14$ ), which was longer in Iran hospital compared to the other one. However, there was no significant difference in terms of the other disorders.

Logistic regression was used to investigate the relationship between demographic/clinical variables and readmission. At the first stage, sex, initial age of onset, age at the disease's time, educational level, marriage status, length of hospital stay, number of

previous hospitalizations, employment, history of substance use disorders, history of suicide attempt, comorbid physical illness, therapeutic compliance, and hospitalization physical restraint were put in the regression model. Subsequently, the results showed that longer LOS, frequent previous admissions, the presence of physical restraint, and lack of therapeutic compliance (do not take medications regularly) could increase the probability of readmission ( $p=0.001$ ,  $p=0.002$ ,  $p=0.001$ , and  $p=0.004$ , respectively). These factors were also examined by chi-square test. The results represented a significant relationship between

the hospitals in question and readmission ( $p=0.001$  and  $\chi^2=14.09$ ). Among the readmitted patients, 87.2% were admitted to Iran hospital and 12.8% to Rasoul-e-Akram general Hospital. Testing the relationship between the route of drug administration and readmission by chi-square test showed that there was no significant relationship among the 4 groups of the route of drug administration (only oral, oral medicine and ECT and depot, oral and depot, oral and ECT) ( $p=0.091$ ,  $df=3$ , and  $\chi^2=45.6$ ).

Chi-square test was utilized to evaluate the relationship between the prescribed drugs and ECT with readmission. For this purpose, medications were divided into 15 groups as follows: atypical antipsychotics, typical antipsychotics, mood stabilizers, antidepressants, depot, buspirone, z-drugs, benzodiazepine, anticholinergic, anticonvulsant, B blocker, antihistamine, levothyroxine, ECT, and others. Among the prescribed drugs, depot and anticholinergics were found to be significantly associated with decrease readmission ( $p=0.03$  and  $\chi^2=4.27$ ) ( $p=0.001$  and  $\chi^2=10.28$ ). The patients receiving depot had no readmission in 70.1% of the cases and the patients receiving anticholinergics had no readmission in 73.5% of the cases.

According to the survival analysis, half of the patients were readmitted within 101 months after being discharged. According to the Kaplan-Meier test, a longer time interval between admissions was seen among the married patients. In contrast, earlier admission was seen among the unemployed patients, patients who were admitted to Iran hospital, patients with psychotic disorders, and patients with inadequate medication compliance (Figure 1).

The results of Cox-Regression analysis, regarding the time of readmission, showed a relationship among factors such as medication compliance, type of psychiatric disorder, employment, and the hospital in question with the time of readmission. Medication non-compliance, admission in Iran hospital, unemployment, and psychotic disorders were reported as the risk factors for earlier admission.

## Discussion

The readmission of psychiatric patients is currently an important issue since it imposes a huge burden on both patients and society, indicating the importance

of research in this field. The present study indicated that clinical factors such as hospital stay length, the number of previous admissions, and physical restraint during hospitalization significantly increase the readmission risk. In other words, longer hospital stay, frequent previous admissions, and physical restraint during hospitalization as well as therapeutic non-compliance increase the readmission risk, and there was no significant relationship between other variables and readmission.

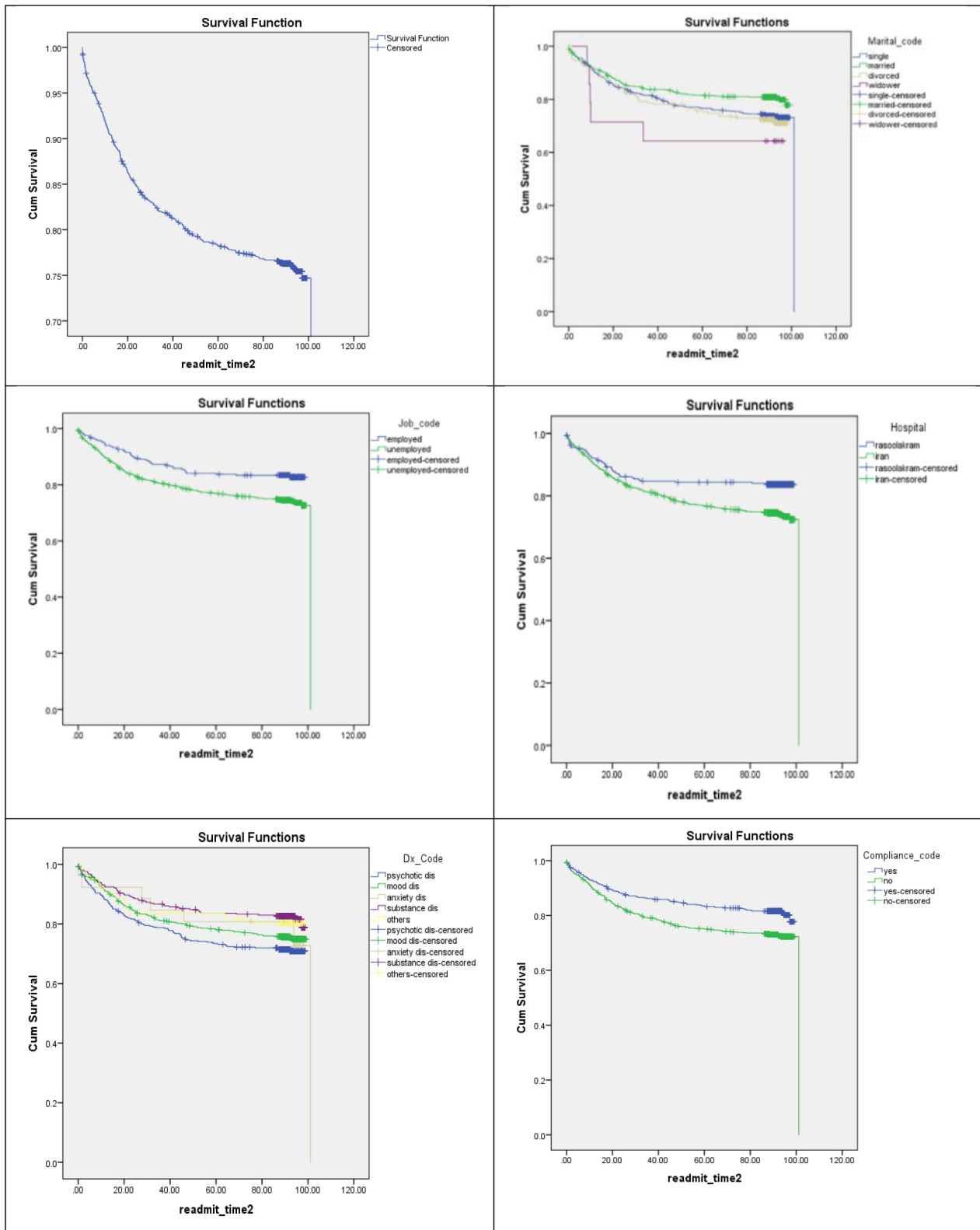
The present study, consistent with Kent *et al* (23) and the study by Bernardo *et al* (15), who examined the relationship among different readmission factors, showed that therapeutic non-compliance predicts readmission. This relationship was also shown in the study by Li *et al* (24) and studies by Crosas (25) and Lien (26). In a retrospective cohort study on the readmission of psychiatric patients in Malawi, Barnett (27) also reported the effect of therapeutic non-compliance. It shows the importance of taking medications to control the disease and prevent a recurrence.

Consistent with the present study, the positive history of previous admissions was reported in other studies such as Barekatin *et al* (12), Bernardo (15), Roque (10), and Donisi *et al* (18). In a study on patients discharged from a psychiatric hospital in Finland in 1990, Korkeila *et al* (28) showed the importance of previous admissions. They found that frequent prior admissions lead to readmission. Similarly, Donisi (18) and Bernardo (15) also referred to this factor as the most important risk factor of readmission. Frequent previous admissions indicate severe and possibly uncontrollable disease, which may lead to more admissions in the future and thus explain this relationship.

Although Bernardo (15) found a relationship among other factors such as male sex, younger age, unemployment, divorce, lower level of education, and drug abuse with readmission, Donisi *et al* (18) referred to old age, being married, and, less importantly, employment and higher education as possible factors which reduce the readmission risk. However, the number of previous admissions was the factor that was considered in all studies.

In their studies, Donisi *et al* (18) and Korkeila *et al* (28) indicated the effect of hospital length of stay





**Figure 1.** Results of Kaplan-Meier test (factors affecting readmission of the patients with major psychiatric disorders admitted to Iran and Rasoul-e-Akram psychiatric hospitals).

on readmission rates. These two studies and the present study revealed that a longer hospital stay leads to a higher readmission rate. Therefore, it can be concluded that patients with long hospital stay are more likely to suffer from more severe form of disease, which requires longer hospital stays. As a result, the readmission risk is higher among these patients.

The present study showed a significant relationship between different disorders and readmission ( $p=0.001$ ). The highest readmission rate was reported among patients with mood disorders, psychotic disorders, and substance use disorders, respectively. However, the readmission risk was lower among the patients with other disorders and anxiety disorders. In a study, Berekatani *et al* (12) reported a relationship between Bipolar I Disorder (BID), Bipolar II Disorder (BIID), psychotic disorder, major depressive disorder, and anxiety disorder with readmission. Still, there was no relationship between cognitive disorder or substance use disorder with readmission. In Bernardo's study (15), 200 patients who were discharged from a hospital in Canada in 1991 were randomly selected, and their readmission rates were evaluated. Among the readmitted patients, the most prevalent disorders included schizophrenia, followed by personality disorders, mood disorders, and schizoaffective disorder, respectively. This finding suggests that more severe disorders such as psychotic and mood disorders lead to more readmission rates than other milder disorders.

The present study also investigated the relationship among the variables of drug type and drug administration route with readmission. There was no significant difference among 4 drug categories:

1. Oral only, 2. Oral, depot, ECT, 3. Oral and depot, 4. Oral and ECT.

This finding is not consistent with Slade *et al* (21), which showed that ECT treatment reduced readmission rates. However, considering that all patients received different treatments in our study and, for example, did not receive only ECT treatment, it was not possible to calculate each treatment, and further studies are needed in the future.

However, there was a significant relationship among mood stabilizers, depot, and anticholinergic drugs with readmission. In another study, Pilon *et al* (29)

found a significant relationship between paliperidone palmitate and readmission; that is, it reduced the readmission rate. Lien *et al* (26) found that second-generation antipsychotics reduced the readmission rates, which was not consistent with the present study. The logrank test's results showed a shorter time interval between discharge and readmission for widows and divorced and longer for married people, which may be because widows and divorced people do not receive adequate support and are more prone to recurrence. The results of Cox-Regression analysis, regarding the time of readmission, showed a shorter time interval between discharge and readmission for patients with therapeutic non-compliance, patients with psychotic disorder, unemployed patients, and patients who were admitted to Iran hospital. The shorter time interval between discharge and readmission, and the more admission rate of psychotic disorders in patients admitted to Iran hospital may be suggested that patients with more severe psychiatric disorders were admitted to Iran hospital since the mentioned hospital is a specialized psychiatric hospital.

Korkeila *et al* (28) found earlier readmission among those who had more than 30 days of hospitalization, among men compared to women, and like the present study, among those with psychotic disorders. Therefore, people with psychotic disorders need more attention due to the higher risk of recurrence.

Regarding the mentioned findings, we need a better understanding of the factors related to readmission to help better management and early intervention. Understanding these factors will decrease the number of readmissions and as a result it will decrease hospital costs imposed on the health system and patients.

## Conclusion

This study's results showed that longer hospital stay, frequent previous admissions, physical restraint during hospitalization, and therapeutic non-compliance could potentially increase the risk of readmission. Patients with psychotic disorders are also at high risk of readmission; therefore, the above issues should be focused on to reduce the readmission rates. Attempts should be made to perform psychoeducation for all patients, to explain the nature of disease, and focus on the importance of regular medications use to prevent recurrence. Also, education should be given

to patients about identifying the warning signs that indicate the possibility of recurrence of the disease, especially more severe such as psychotic disorders, thus it helps patients to control their illness faster. It is also recommended to avoid physical restraint, a factor of readmission risk, during hospitalization as much as possible to reduce the readmission.

Other factors may also affect the readmission rate, such as compulsory hospital admission, financial status, types of medications, *etc.*, which have not been studied in our study and are recommended to be studied in future studies.

### **Limitations**

By considering that the readmission of some patients could be in the other hospitals, where access to information was not practically possible, for example, in the case of admission in other cities, there was a restriction on the follow-up of all patients. However, as expected, the correspondence was made with Roozbeh hospital regarding the follow-up of patients' readmission in those centers. There was also a similar restriction in cases where patients' first visits were not recorded in the hospital file for reasons such as referral to the private office.

Another limitation was the access to complete information of patients in inpatient files, as there were incomplete files in one of the wards of Iran hospital. In these cases, attempts were made to complete the information by studying the nursing reports as much as possible. Another limitation was the wrong phone numbers or workplace phone numbers or the phone numbers of legal authorities registered in some files, which limited our access to information, although this limitation was eliminated to some extent by subsequent inquiries from other psychiatric centers. Another limitation was the problem of remembering the exact date of post-discharge visit or readmission to other centers by the patients or their companions, in which case the approximate date was recorded. In cases where patients recalled only the year of readmission, September 30 of the same year was

recorded as the date of readmission. Since the Civil Registration Office of Tehran did not cooperate with us, we had no access to information on the deceased patients other than those died in the hospital.

### **Suggestions**

In this study, the drugs were evaluated in groups; therefore, it is necessary to study the drugs separately in future studies to find their relationship with readmission.

Physical comorbidities were studied in general. This problem can be solved in a study that only examines the relationship between comorbidities and readmission.

### **Declaration**

Ethics approval and consent to participate: Approved by IUMS Research Ethics Boards #IR.IUMS.FMD.REC.1397.259

### **Consent for publication**

Confirmed following IUMS REB requirements. Availability of data and material: the data for this study would be available in IUMS data center server.

### **Competing interests**

None.

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