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The Relationship Between Outpatient Visits and Time to Readmission of Psychiatric Inpatients: An 8-Year Follow-Up Study

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A B S T R A C T

Introduction: Readmission is an important indicator of poor post-discharge management for psychiatric patients. This study explores the factors influencing psychiatric patient readmission, with a focus on post-discharge follow-up visits.

Materials & Methods: This retrospective cohort study analyzed the clinical records of psychiatric inpatients over an eight-year period up to 2019. The relationship between various clinical factors during hospitalization (e.g., length of stay, diagnosis, treatment adherence) and post-discharge follow-up leading to readmission was assessed using Kaplan-Meier survival analysis, Log-rank test, and Cox regression analysis.

Results: The study revealed a 23% readmission rate. Gender, education, length of hospital stay, number of previous hospitalizations, and restraint during hospitalization showed significant associations with post-discharge visits ($P < 0.05$). Gender, place of hospitalization, and type of discharge were related to the timing of the first post-discharge visit ($P < 0.05$). Scheduling follow-up visits at discharge was significantly associated with post-discharge follow-up ($p = 0.001$).

Conclusion: To reduce or delay readmissions, the study recommends increasing post-discharge visits, minimizing treating psychiatrists, scheduling outpatient follow-up upon discharge, providing psycho-education at discharge (particularly for women and individuals with higher education), addressing patients who leave against medical advice, and conducting telephone follow-up for high-risk patients.

Keywords: Patient Readmission, Psychiatry, Risk Factors, Outpatient

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Introduction

The readmission rate in certain countries serves as a significant indicator of inadequate patient management post-discharge and is subject to regular review (1). Previous studies have identified various factors contributing to the risk or protection against readmission, which can be attributed to differences in patient populations, healthcare systems, and temporal variations (2-6). These factors generally fall into two categories: pre-discharge factors (e.g., older age, male gender, single status, higher education, psychosis diagnosis, and physical comorbidities) and post-discharge factors (e.g., follow-up visits) (2-6).

Research indicates that a substantial number of patients with schizophrenia or mood disorders discontinue treatment following discharge, with one-third to one-half of hospitalized patients in this group missing their initial scheduled post-discharge appointment (7).

Direct communication with primary caregivers following hospitalization has been linked to decreased re-hospitalization. Conversely, referrals to specialized psychiatric centers have been associated with increased readmission rates. Patient referral to outpatient centers has been regarded as a risk factor in certain articles and a protective factor in others. Consistent care and communication with patients, especially when conducted by the staff of the admitting ward, have been linked to reduced readmission rates (3). Outpatient visits overseen by the admitting physician are shown to lower readmission rates as well (8). Post-discharge follow-up and communication with the hospital after discharge have yielded varying results across numerous studies. We aim to explore the relationship between post-discharge outpatient visits and patient readmission over an 8-year follow-up period.

Materials and methods

This study is designed as a retrospective cohort, and the sample size was determined by conducting a census of all patients admitted to the psychiatric ward of Rasoul Akram Hospital and Iran Hospital in 2011. Through inquiries with the aforementioned hospitals, we ascertained that approximately 2500 patients were admitted in 2011. The inclusion criteria encompass all hospitalization cases in Rasool Akram and Iran hospitals in 2011, while the exclusion criteria involve short-term hospitalizations of fewer than 7 days. Consequently, a significant number of cases pertain to short-term emergency hospitalization and, in alignment with the study's objectives, were excluded due to their lack of relevant content. Two cases were excluded as the patients declined to participate in the phone survey. The final sample comprised 1410 cases, including 282 cases from Rasoul Akram Hospital and 1128 cases from Iran Hospital (Figure 1). In telephone conversations with patients, the caller initially explained that the purpose of the call is to discuss a research plan aimed at monitoring the patients' condition. Participation in the research was voluntary, and refusal to participate resulted in the case being excluded. Importantly, patients' decision to participate or not did not impact their receipt of medical care. Additionally, patient information was kept confidential, and once registered in the system, it was removed from the data importer's access (IR.IUMS.FMD.REC.1397.001).

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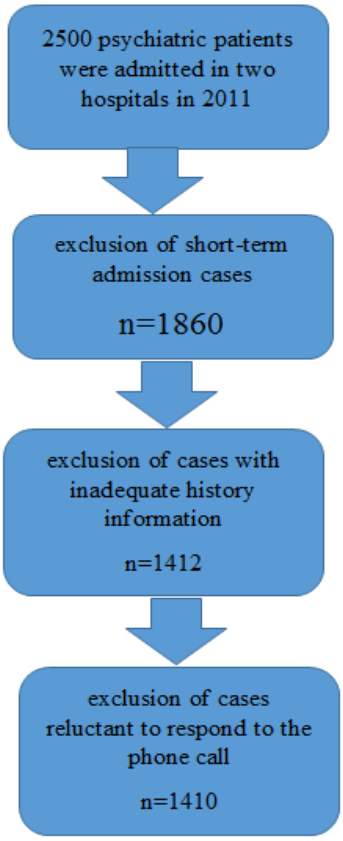


Figure 1. The study procedure depicting the sample selection process.

To manage the large volume of information effectively, an application was developed to capture essential patient data such as age, gender, and number of readmissions, among other specifications. The output from this application was then used for further processing. The initial phase of data collection involved a pilot study of 30 files by the project team to identify and address any application glitches. Subsequently, the identified bugs were raised and resolved multiple times in collaboration with an application design engineer. In the second phase, records of all patients were examined, and for those with readmissions until 2019 at the same medical facilities, the number and timing of admissions were documented. All relevant variables were recorded in the designated system by individuals with medical backgrounds and familiarity with medical records and terminology. The third stage focused on tracking the status of patients who had no readmission records at the same hospital until 2019 (an 8-year period). To achieve this, patients who had provided their phone numbers were contacted to inquire about their hospitalizations, outpatient visits, or any potential decease. Those who did not respond were contacted again in a subsequent step. When contacting patients was not feasible, such as in cases of incorrect numbers or unanswered calls, the fourth step involved reaching out to another major psychiatric hospital in Tehran (Roozbeh Hospital). If it was found that a patient had been hospitalized, the pertinent information was included. The subsequent step entailed gathering information from the Tehran Provincial Registration Organization with the objective of tracking the status of patients whose circumstances were ambiguous. Unfortunately, despite efforts made through the university, the organization declined to cooperate, citing the confidentiality of information regarding individuals' deaths.

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Data Analysis Method

Statistical calculations were carried out using SPSS version 24 to compute central indices and dispersion. The readmission time was determined using Kaplan-Meier survival analysis. Furthermore, the relationship between various factors and readmission time was examined through the utilization of the Log-rank test and Cox regression analysis.

Results

The results of this study were obtained from a review of the files of 1410 patients who were admitted to two psychiatric hospitals in Iran in 2011 and were followed until 2019. Iran Psychiatric Hospital accounted for 1128 cases (80%), and the psychiatric ward of Rasoul Akram Hospital accounted for 282 cases (20%). The number of hospitalized women was 434 (30.8%), and the number of men was 976. At the time of data entry (hospitalization in 2011), the mean age (standard deviation) of women was (± 12.9) 36.7, and for men was (± 11.22) 35.5. Post-discharge follow-up in the two centers showed a significant difference (P = 0.001 and $\chi 2$ = 40.8), with post-discharge visits being more frequent at Iran Hospital (68.3%).

Logistic regression was used to assess the relationship between "post-discharge visit" and variables. Gender, initial age of onset, the current age of disease, education, marriage status, length of hospital stay, number of previous hospitalizations, employment, history of drug use, history of suicide attempt, comorbid physical illness, therapeutic cooperation, and restraint during hospitalization were considered as predictor variables in the regression model.

At that stage, a statistically significant relationship was observed between the variables of gender (male), education (lower), duration of hospitalization, number of previous hospitalizations, and restraint during hospitalization and readmission (p = 0.001, p = 0.002, p = 0.001, p = 0.035, p = 0.035, respectively). The entire regression model indicated a significant relationship (p = 0.001, df = 12, and $\chi 2 = 75.2$).

In the next step, after eliminating variables that showed no significant relationship with readmission, the analysis was conducted on all cases (1410 cases) (P = 0.001, χ 2= 53.26, df = 5). This model explains between 3% and 5% of the variance in post-discharge visits. The results indicate that being male, longer hospital stays, and a higher number of previous admissions are associated with increased likelihood of post-discharge visits, while individuals with a diploma or higher education have a lower likelihood of follow-up.

To further explore the relationship between "post-discharge visit" and the aforementioned variables, linear regression was employed. However, the overall regression model did not demonstrate a significant relationship, and none of the proposed variables predicted the timing of visits after discharge (P = 0.27, df = 13 and 889, F = 1.20).

According to the Chi-square test results, having a visit after discharge is significantly associated with readmission (p = 0.001, $\chi 2$ = 37.59). There is a significant relationship between readmission and post-discharge visits at Iran Hospital (p = 0.001, $\chi 2$ = 31.9), but this association is not present at Rasoul Akram Hospital (p = 0.17, $\chi 2$ = 1.28).

Table 1. Relationship Between Scheduling Visits, Post-Discharge Visits, Location of the First Post-Discharge Visit, and Readmission.

		Readmission		χ^2	P-value
		No (%)	Yes (%)		
scheduling outpatient visit	yes	706(74.2)	245(25.8)	6.47	0.011
	no	369 (80.4)	90(19.6)		

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	total	1075 (76.2)	335(23.8)		
Have a post-discharge visit	yes	643(71)	262(29)	37.60	0.001
	no	432(85.5)	73(14.5)		
	total	1075 (76.2)	335(23.8)		
place of first post-discharge visit	Same hospital	623(71)	254(29)	0.48	0.92
	Other hospitals	8(72.7)	3(27.3)		
	Private clinic	11(73.3)	4(26.7)		
	Other places	1(50)	1(50)		
	total	643(71)	262(29)		

Table 1 displays the relationship between scheduling a visit, having a post-discharge visit, the location of the first post-discharge visit, and readmission. It indicates that scheduling a post-discharge visit (P-value = 0.011) and attending a post-discharge visit (P-value = 0.001) increase the likelihood of hospital readmission. However, no significant correlation is observed between the location of the first post-discharge visit and readmission (P-value = 0.92).

Among the 1410 patients, 951 (67.4%) had their next visit detailed in their medical records, and 905 (64.2%) were referred for follow-up visits after hospitalization. Through the Chi-square test, it was found that individuals who were scheduled for the next visit were more likely to adhere to follow-up appointments ($p = 0.001$, $\chi 2 = 6.56$).

The Mann-Whitney U test was employed to investigate the relationship between the number of post-discharge visits and readmission, as well as between the timing of the first visit and readmission. A significant difference was found between the number of visits and readmission ($p = 0.001$, $U = 145406.50$), indicating that an increased number of visits after discharge correlates with a reduced likelihood of readmission.

According to the Spearman correlation test, there is a significant relationship between post-discharge visits and the timing of readmission ($P = 0.001$, $r = 0.28$). This suggests that more frequent follow-up visits after discharge are associated with delayed readmission.

Patients were categorized into four groups based on the number of psychiatrists they consulted after discharge, with an average of 2.83 physicians per patient in this study. A significant difference was observed between the number of physicians consulted and readmission ($p = 0.004$, Kruskal-Wallis test (3) = 13.6). Specifically, as the number of physicians increases, the likelihood of readmission also increases. Table 2 presents the number and mean rank for each disorder separately.

Table 2. Number and Mean Rank of Treating Psychiatrists.

Number of treating psychiatrist	Number	Mean Rank	Kruskal Wallis (df)	P-value
One	105	112.49	13.6(4)	0.004
Two	56	129.39		
Three	35	150.86		
More than three	65	151.59		
Total	261			

Survival analysis results: log-rank test

In this study, half of the patients had a follow-up visit within approximately five and a half months after discharge (Figure 2).

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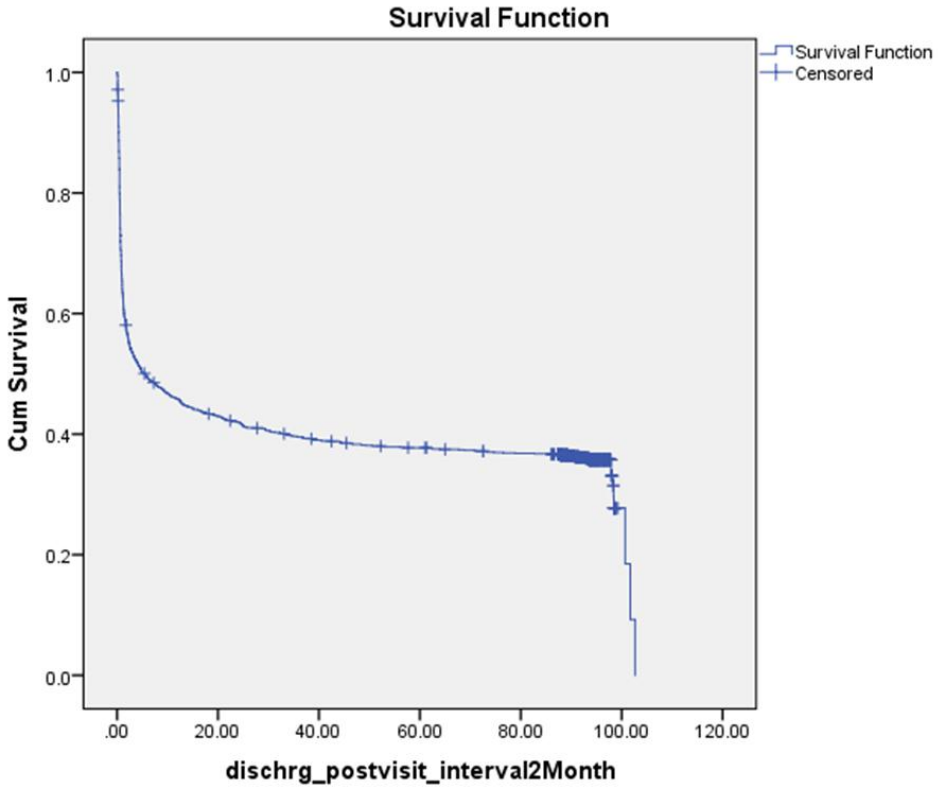
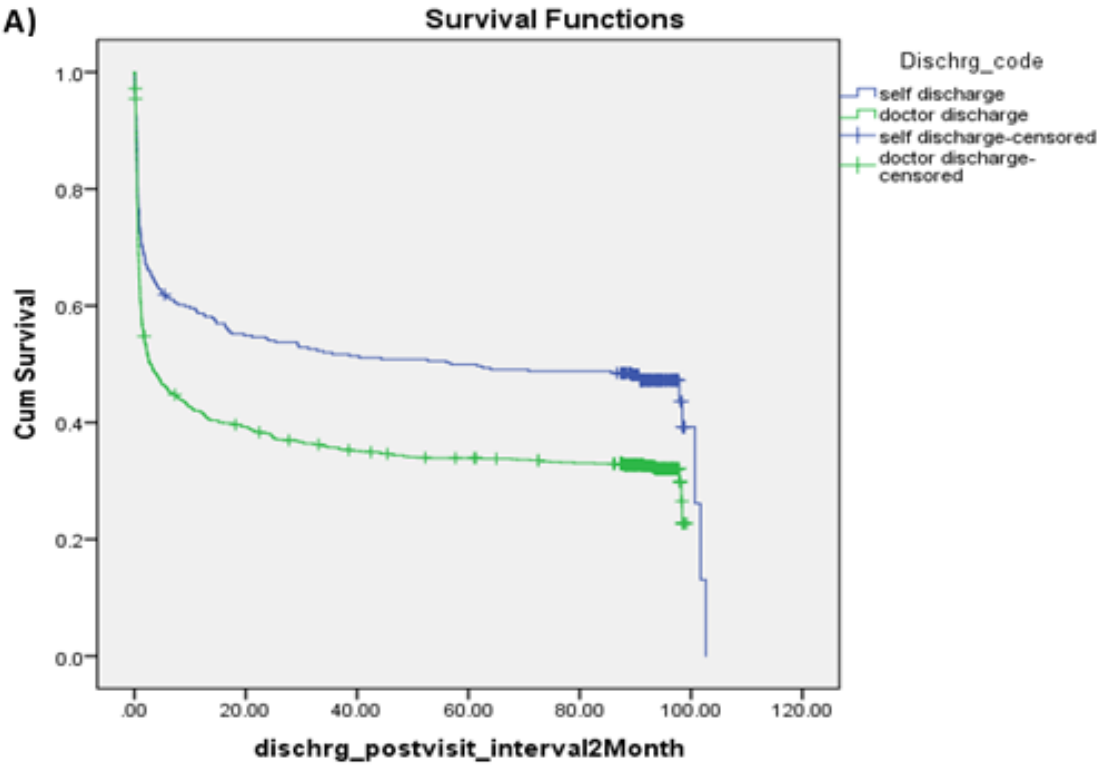


Figure 2. Time Interval (in Months) between the first follow-up visit and discharge time.

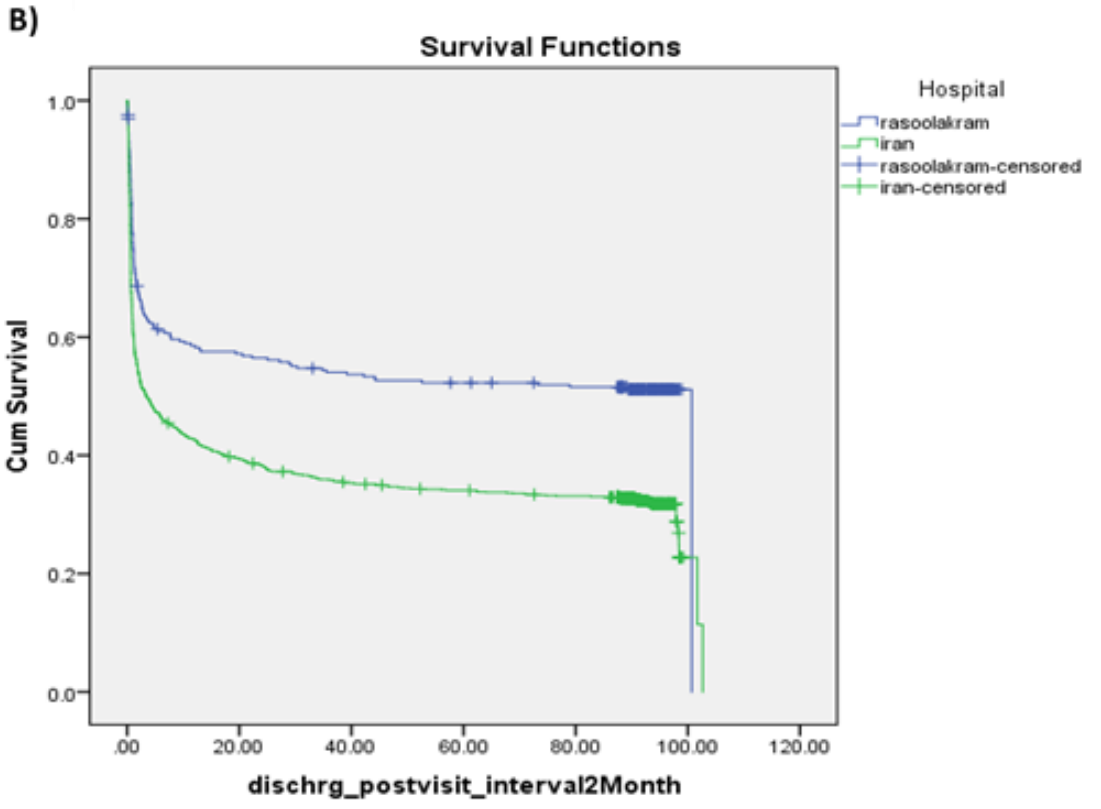
The interval between post-discharge visits and the time of discharge varied significantly depending on the type of discharge. Patients discharged by doctor's order returned for a visit sooner compared to those discharged against medical advice (Figure 3A). Additionally, there was a notable difference in the timing of post-discharge visits relative to the type of hospital. Patients from Iran Hospital tended to visit shortly after discharge (Figure 3B). Furthermore, the timing of post-discharge visits differed significantly by gender, with men attending visits earlier than women (Figure 3C).

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A)



B)



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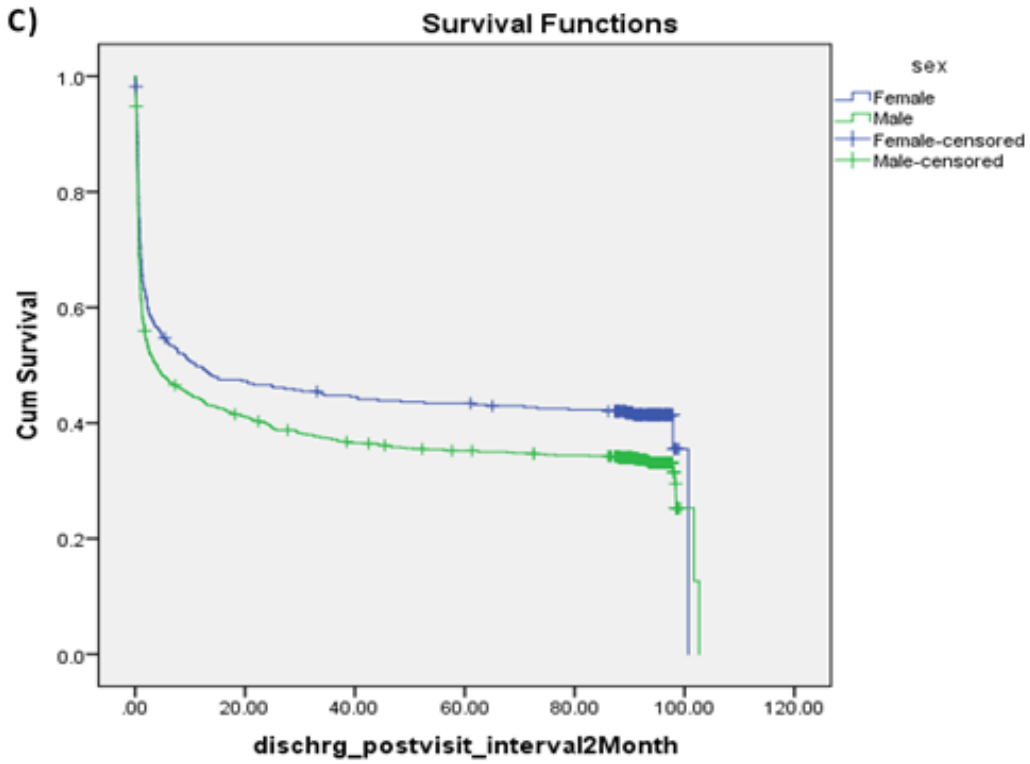


Figure 3. The temporal (months) interval between the first follow-up visits and the time of discharge according to: **A)** the type of discharge, **B)** type of hospital, and **C)** gender.

The duration between the first hospitalization in 2011 and readmission varied significantly based on whether patients had a post-discharge visit. Patients who attended a post-discharge visit experienced a shorter interval to readmission (Figure 4).

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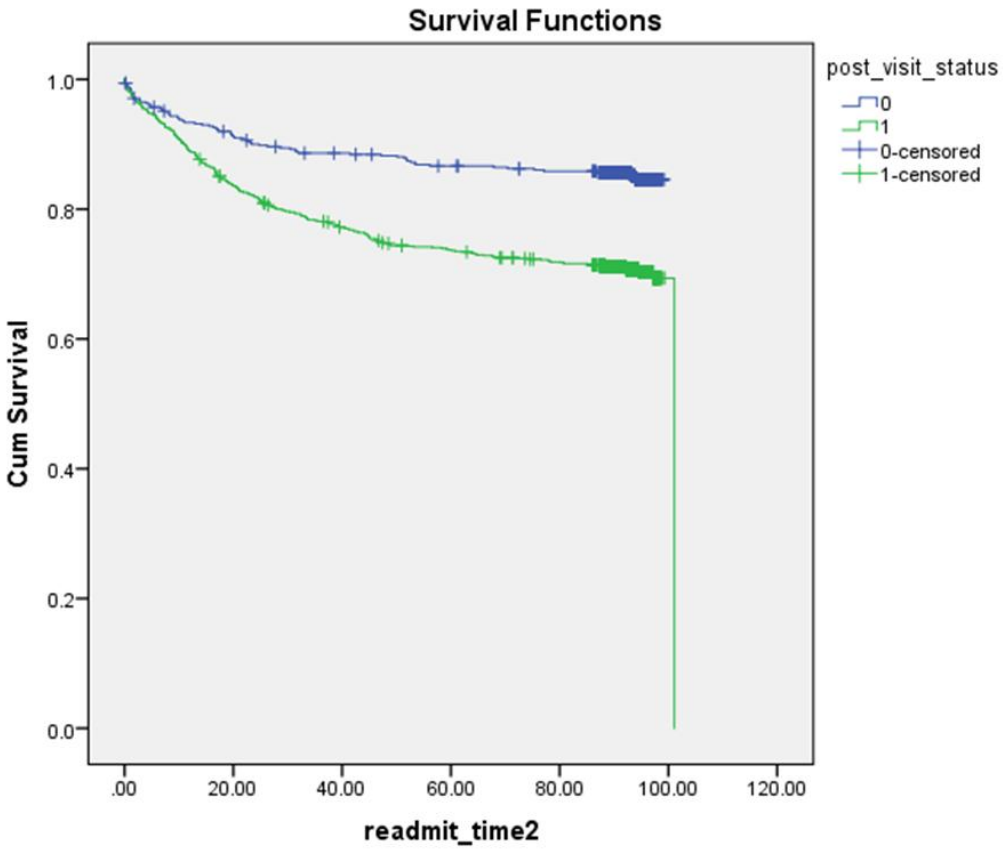


Figure 4. Duration between First Hospitalization and Readmission based on The Post-Discharge Visit

Cox regression analysis results on readmission times indicated that having a post-discharge visit was associated with earlier readmission. Patients who attended such visits were readmitted sooner (HR = 1.912, 95% CI, df = 1, p-value = 0.00).

The results of Cox regression analysis on the timing of the first visit after discharge revealed that factors such as the type of discharge and the hospital's location were statistically significant. Hospitalization at Iran Hospital and discharge by doctor's order were associated with earlier post-discharge visits (HR = 0.615, P-value = 0.00, 95% CI), (HR = 0.509, P-value = 0.00).

Discussion

Examining the readmission rate is crucial as it serves as a key indicator of healthcare management quality, particularly in mental health settings. Furthermore, the financial implications of repeated hospitalizations on the healthcare system are substantial and cannot be overlooked (1, 2). This study investigated the impact of post-discharge outpatient visits on the likelihood and timing of readmission among psychiatric patients, utilizing an 8-year follow-up period encompassing all patients hospitalized in 2011.

In the current study, post-discharge visits have been identified to enhance the likelihood of hospitalization while concurrently reducing the interval to readmission. However, a contrasting trend emerges when considering the impact of multiple outpatient visits: as the number of visits increases, the probability of readmission diminishes and the timing of readmission is delayed. This inconsistency in findings is not uncommon in related research.

A comprehensive review by Lane, spanning 28 papers from 1990 to 1999, highlighted that follow-

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up visits were less correlated with readmission risk among psychiatric patients (9). Similarly, a study by Nelson et al. in 1998, involving over 3,000 psychiatric patients, revealed that individuals without post-discharge visits were twice as likely to face readmission (10). Grinsphun et al. identified a significant link between post-discharge outpatient visits within 6 months and a prolonged interval until readmission (7).

Interestingly, the outcomes of this study align most closely with a review by Sfetcu et al., where patient follow-up within one month post-discharge was deemed a protective measure, while referrals to specialized psychiatric facilities were associated with increased readmission rates (3). Notably, referrals to specialized psychiatric centers (such as Iran and Rasoul Akram hospitals) escalated the readmission risks.

An additional challenge arises from the absence of a current active follow-up system for psychiatric patients, potentially leading to a higher likelihood of hospital visits for more acute patients or those with limited family support. Post-discharge visits sometimes occur when patients exhibit relative, though not complete, recovery, potentially heightening the chances of readmission.

In this study, it was found that approximately 70% of patients had the timing of their post-discharge visits documented in their medical records. Moreover, around 65% of all patients were referred for subsequent visits after hospitalization, and those for whom follow-up visits were arranged were more inclined to attend scheduled appointments. Interestingly, scheduling a post-discharge visit by a physician in our study was correlated with an increased likelihood of readmission.

While no specific studies investigating this aspect independently were identified in the literature search, related findings from other research include the following: Lane's review study highlighted that having a well-structured discharge plan is pivotal in reducing readmission rates. Similarly, in a systematic review by Vigod et al., which examined the efficacy of interventions at discharge in minimizing psychiatric readmissions through a review of 15 articles, psycho-educational interventions pre and post-discharge were deemed effective in reducing readmission rates (11).

Although our study did not directly explore the impact of psycho-education, the act of scheduling post-discharge visits during the discharge process, which can be seen as a form of psycho-education, serves to motivate patients to attend outpatient appointments and thereby increases the likelihood of readmission.

The discrepancy in our study results compared to existing literature can be attributed to the absence of a robust patient follow-up system and a comprehensive educational program for patients at the time of discharge. Furthermore, the emphasis placed by treating physicians on more acute patients during outpatient visits could contribute to their higher likelihood of readmission.

According to our study, an increase in the number of outpatient physicians is associated with a higher likelihood of readmission. This finding contrasts with the limited number of studies on this topic, likely influenced by varying referral systems across different countries. In Iran, for instance, patients have access to multiple psychiatrists within the government system, which can sometimes disrupt regular follow-up care.

Fortunately, a study by Sung-Yup Lee supports our findings, demonstrating that outpatient visits overseen by the attending physician during hospitalization increase patient adherence to these visits and yield outcomes similar to our study (8). Another pertinent issue is instances where families insist on hospitalizing patients despite the physician's preference for outpatient care, leading them to seek opinions from other doctors.

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The frequency of outpatient visits and the continuity of care with a specific physician are critical factors influencing treatment adherence and, significantly, patient readmission rates in our study. These findings underscore the importance of psycho-education both at discharge and during outpatient visits, as well as the necessity for a robust monitoring system to ensure comprehensive patient care.

In summary, our study emphasizes the impact of outpatient visit dynamics and physician continuity on patient readmission rates, highlighting the need for structured psycho-educational interventions and an effective patient monitoring system to optimize psychiatric care outcomes.

Finally, in this study, the readmission rate was 23%, which was lower compared to similar studies with shorter follow-up periods (ranging from 29.17% to 50%) (2, 9, 12-14). However, the lack of a unified national system for recording hospitalized patient information posed a limitation, potentially resulting in slightly underreported percentages.

Other factors contributing to the lower readmission rate included the stigma associated with psychiatric hospitalization, the supportive role of Iranian families, and the limited number of hospital beds. These aspects warrant further exploration in future studies to better understand their impact on readmission rates.

Recommendations

- Based on this study and similar research, the following strategies can be implemented to help reduce psychiatric readmission rates:
- Increase the frequency of post-discharge visits to provide ongoing support and monitoring for patients.
- Incorporate scheduling follow-up visits by the attending physician post-discharge or consider limiting the number of physicians involved in a patient's psychiatric care for consistency.
- Emphasize the importance of comprehensive psycho-education, including guidance on appropriate follow-up protocols during discharge and scheduling outpatient appointments at the time of discharge.
- Tailor psycho-education efforts with a special focus on women, individuals with higher education, and patients discharged against medical advice who may require additional support to engage in post-discharge care.
- Establish an effective follow-up system to monitor high-risk patients through phone calls or in-person visits, and consider implementing reminder systems to prompt patients about upcoming appointments.
- Develop a unified inter-hospital information system to facilitate seamless access to patients' medical records for healthcare providers across different facilities.

Limitations of the plan and their corresponding reduction methods include:

1. Limited Access to Patient Information in Different Centers: When patients were readmitted to facilities where obtaining comprehensive information was challenging (e.g., different centers or cities), follow-up was hindered. To address this, efforts were made to establish communication with another hospital in Tehran (Rouzbeh) to enhance the follow-up process.
2. Incomplete Recording of Initial Patient Visits: Instances where a patient's first visit was not adequately documented in hospital records posed a challenge, especially if they visited private practitioners. To mitigate this limitation,

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improvements can be made in recording all initial visits promptly or considering alternative methods for tracking patient history.

3. Incorrectly Registered Contact Information: Challenges arose when dealing with inaccurately recorded contact numbers or workplace details, along with legal barriers impeding access to information. While cooperation from certain organizations might be limited, exploring avenues for collaboration with other psychiatric facilities could help overcome this constraint.

4. Difficulty in Reminding Follow-Up Dates: Patients or their companions sometimes faced challenges in recalling exact visit dates after discharge or readmission to different centers during phone follow-ups. To address this issue, efforts were made to record dates to the best extent possible. In cases where only the year of readmission was recalled, a standardized date (e.g., September 30 of that year) was registered as a reference point.

Conclusion

Having a post-discharge visit, scheduling a post-discharge visit, and involvement of more physicians were identified as risk factors for readmission, while having more visits served as a protective factor. Post-discharge visits were linked to quicker readmissions; however, an increased number of outpatient visits correlated with delayed readmissions. Factors such as male gender, longer hospital stays, higher number of previous hospitalizations, experience of restraint during the index hospitalization, and scheduling post-discharge visits were associated with higher follow-up rates, while individuals with a diploma or higher education had lower follow-up rates. Male gender, hospitalization at Iran Hospital, and being discharged on doctor's orders were factors associated with earlier post-discharge visits.

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Conflict of interest

None of the authors involved in this study have declared any conflicts of interest regarding the publication of this article.

Authors' contributions

M.H., M.A. were responsible for the study design. B.SH., M.H. collected the data. M.N. conducted the data analysis. M.KH., F.D. oversaw the process and reviewed and revised all sections of the manuscript. B.SH., M.H., M.A. drafted the manuscript. All authors have reviewed and approved the final version of the manuscript.

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