



Treatment Adherence in Schizophrenia and Other Psychotic Disorders: A Cross-sectional Study of Treatment Collaboration Portal-registered vs. Non-registered Patients

Tedavi İş Birliği Portalı'na Kayıtlı Olan ve Olmayan Şizofreni ve Diğer Psikotik Bozukluk Tanılı Hastaların Tedavi Uyumunun Karşılaştırılması - Kesitsel Bir Çalışma

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ABSTRACT

Objective: This study aimed to compare medication adherence and hospitalization rates before and after enrollment in the treatment collaboration program (TCP) among patients with schizophrenia and other psychotic disorders at the community mental health center, between those registered in the TCP and those who were not.

Methods: The sample was divided into two groups those registered and those not registered in the TCP. Socio-demographic data and questionnaire forms, Positive and Negative Syndrome Scale (PANSS), Personal and Social Performance Scale (PSP), and Medication Adherence Rating Scale (MARS) were administered to the groups. Additionally, hospitalization rates and types (voluntary-involuntary) before and after enrollment were examined for patients registered in the TCP.

Results: The study included a total of 107 patients, with 75 registered in the TCP and 32 not registered. The group of patients

ÖZ

Amaç: Şizofreni ve diğer psikotik bozukluk tanıları ile Toplum Ruh Sağlığı Merkezi'nde (TRSM) takipli hastalardan Tedavi İş Birliği Portalı'na (TİP) kayıtlı olan ve olmayanların tedavi uyumları ile TİP'e kayıt öncesi ve sonrası yatarak tedavi oranlarının karşılaştırılması planlanmıştır.

Yöntemler: Örneklem; TİP'e kayıtlı olan ve olmayan olarak iki gruba ayrılmıştır. Gruplara sosyodemografik veri ve anket formu, Pozitif ve Negatif Sendrom Ölçeği (PNSÖ), Bireysel ve Sosyal Performans Ölçeği (BSPÖ) ve Tıbbi Tedaviye Uyum Oranı Ölçeği (TTUOÖ) uygulanmıştır. Ayrıca TİP'e kayıtlı hastaların kayıt öncesi ve sonrası yatış sayıları ve yatış şekilleri (istemli-istemli) incelenmiştir.

Bulgular: Çalışmaya, TİP'e kayıtlı 75, TİP'e kayıtlı olmayan 32 olmak üzere toplam 107 hasta alınmıştır. TİP'e kayıtlı olan hasta grubunda erkek cinsiyet daha fazla saptanmıştır. İki grup arasında BSPÖ, TTUOÖ, PNSÖ toplam puan ve alt ölçek puanları

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ABSTRACT

registered in the TCP consisted predominantly of males. There was no significant difference between the two groups in terms of PSP, MARS, PANSS total scores, and subscale scores. In comparing hospitalization rates, a statistically significant decrease was found in the post-registration hospitalization rate of TCP-registered patients ($p<0.05$). A Standard Multiple Regression analysis for PSP score revealed that gender, time until treatment, and PANSS subscale scores explained 37% of the total variance.

Conclusion: While we did not find any immediate association between TCP and factors such as symptom severity or medication adherence, it could be suggested that TCP had a positive contribution in reducing hospitalization rates in the long term.

Keywords: Community mental health center, schizophrenia, psychotic disorders, treatment collaboration program, medication adherence

ÖZ

açısından anlamlı bir fark bulunmamıştır. Yatış sayısında yapılan karşılaştırmada TİP'e kayıt sonrası hastaların yatış oranında istatistiksel olarak anlamlı bir azalma olduğu tespit edilmiştir ($p<0,05$). BSPÖ puanı için yapılan Standart Çoklu Regresyon analizinde; cinsiyet, tedaviye kadar geçen süre ve PNSÖ alt ölçek puanlarının toplam varyansın %37'sini açıkladığı bulunmuştur.

Sonuç: TİP'in, kısa vadede hastalık belirti şiddeti veya ilaç uyumu gibi durumlarla ilişkisini tespit etmemiş olsak da uzun vadede hastaneye yatış oranında azalma şeklinde olumlu katkısı olduğu söylenebilir.

Anahtar Kelimeler: Toplum ruh sağlığı merkezi, şizofreni, psikotik bozukluklar, tedavi iş birliği portalı, tedavi uyumu

Introduction

Schizophrenia and other psychotic disorders are chronic and progressive conditions characterized by various clinical presentations, relapsing courses, and frequent hospitalizations (1,2). Pharmacotherapies alongside psychoeducation are the first-line treatment options for these disorders. Therefore, adherence to medication is highly important (3,4); however, serious difficulties regarding treatment adherence are frequently encountered in this patient group (2). Multiple factors, such as younger age, male gender, lack of insight, illness severity, low socioeconomic status, and comorbid alcohol or substance use negatively affect treatment adherence (2). Non-adherence in these patients leads to increased hospitalization, morbidity, and mortality, consequently reducing the patient's quality of life (5). For all these reasons, improving treatment adherence is crucial not only for the patient but also for their relatives, the broader society, and the healthcare system (6). Treatment adherence refers not only to the patient's use of psychopharmacological agents but also to compliance with regular follow-ups and behavioral recommendations, encompassing all aspects of treatment (7). Due to the challenges associated with adherence, desired clinical outcomes often cannot be achieved, prompting the search for alternative approaches. Accordingly, the World Health Organization has recommended a community-based mental health model (8). In community mental health centers (CMHCs), established to provide psychosocial support to individuals with severe mental disorders such as schizophrenia, bipolar disorder, and other psychotic conditions, specialized treatments are administered alongside pharmacotherapy to maintain well-being. This model aims to ensure continuity of care within the community and to reduce hospitalization. Several studies have shown decreased hospitalization rates in patients regularly followed up in CMHCs (9-11). In CMHCs, patients' follow-up appointments are monitored, psychoeducation is provided to patients and their families, and skill training is offered to patients (12). Therefore, in order for the programs implemented in CMHCs to be recommended and applied as part of treatment, they must be evidence-based (13).

Another system specifically developed for Türkiye to support treatment adherence in patients diagnosed with schizophrenia and other psychotic disorders is the treatment collaboration portal (TCP). This system has been used by CMHCs since 2010, following approval by the Ministry of Health. It is a web-based (IVR) system used to remind relatives of patients monitored by CMHCs after obtaining written informed consent-about the patients' appointments, medical tests, activities, and injection schedules. Participants in the program are assigned a file number by the CMHC treatment team in order to maintain anonymity, and no personal data, including health information, is entered into the system. By entering patient information into the portal, the treatment team ensures that reminders related to appointments, injections, therapy sessions, family education, and blood tests are sent via the voice response system to the mobile phones of either the patient or their caregiver. The aim of the TCP is to increase adherence to medication and rehabilitation services, and to facilitate the active engagement of both patients and their families in monitoring and participating in the treatment process.

In the literature, there are studies focusing on weekly group therapies, post-discharge telephone-based symptom monitoring, and telehealth applications in relation to disease course, treatment adherence, and hospitalization rates (3-6); however, no program or study comparable to the TCP-which is not limited solely to the post-discharge period and has a broader scope-has been identified (14-17). Currently, TCP is not implemented in all CMHCs across our country. Although its use is becoming increasingly widespread, we aimed to evaluate, in an evidence-based manner, the benefits and impacts of the system as one of the few centers actively using it. To this end, the study was conducted to compare medication adherence and hospitalization rates before and after registration in TCP among individuals diagnosed with schizophrenia and other psychotic disorders who were being followed in a CMHC, based on whether they were registered in the TCP program or not.

Methods

Participants

This study included individuals aged 18-65 who presented to the Psychotic Disorders Outpatient Clinic of Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital between 01.02.2021 and 01.02.2022, were literate, provided written informed consent to participate, and were clinically stable. Clinical stability was defined as scoring 3 or less on the following items of the Positive and Negative Syndrome Scale (PANSS): P1, P2, P3, N1, N4, N6, G5, and G9. Participants were diagnosed with schizophrenia, schizoaffective disorder, or delusional disorder. Individuals with organic mental disorders, such as dementia or intellectual disability, were excluded from the study.

Participants were grouped based on whether they were registered in the TCP. To evaluate the effect of appointment and treatment reminders via TCP, only those who had been registered in the system for at least six months were included; patients with shorter registration durations were excluded. Each participant was assessed once using a sociodemographic data and questionnaire form, the PANSS, the Personal and Social Performance Scale (PSP), and the Medication Adherence Rating Scale (MARS). Additionally, for TCP-registered patients, the number and type (voluntary/involuntary) of hospitalizations before and after portal registration were examined.

All participants signed an Informed Consent Form and were informed about the study's purpose and procedures. The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Clinical Research Ethics Committee of Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital on 27.01.2021 with decision number 2021-01/985.

Data Collection Tools

Sociodemographic and Clinical Data Form: This form was developed by researchers to obtain information about the sociodemographic and clinical characteristics of the study participants.

Positive and Negative Syndrome Scale (PANSS): The scale was developed by Kay et al. (18) in 1987. It consists of 30 items and includes three subscales: "Positive Symptoms", "Negative Symptoms", and "General Psychopathology". Items are rated on a 7-point Likert scale. The Turkish validity and reliability study of the scale was conducted by Kostakoglu et al. (19) in 1999. The Cronbach's alpha coefficients for the subscales range from 0.73 to 0.83.

Personal and Social Performance Scale (PSP): Developed by Morosini et al. (20) in 2000, this scale includes four dimensions evaluated by the interviewer: "socially useful activities", "personal and social relationships", "self-care", and "disturbing and aggressive behaviors". Items are scored using a 6-point Likert scale, and a total score between 0 and 100 is calculated based on a reference scoring chart. The Turkish validity and reliability

study of the scale was conducted by Aydemir et al. (21) in 2009. Cronbach's alpha internal consistency coefficient was calculated as 0.8327.

Medication Adherence Rating Scale (MARS): This scale was developed by Thompson et al. (22) in 2000, and the Turkish validity and reliability study was conducted by Koç (23) in 2006. The scale consists of 10 yes/no questions. Higher scores indicate better treatment adherence. Items seven and eight are reverse-coded. MARS scores are classified as follows: 10= full adherence; 9-7= partial adherence; 5-6= poor adherence; <5= non-adherence (24). The Cronbach's alpha internal consistency coefficient was found to be 0.92.

Statistical Analysis

The data obtained from the participants were statistically analyzed using version 25 of SPSS. In descriptive statistics, continuous variables were expressed as mean $\pm$ standard deviation and minimum-maximum (min-max) values, while categorical variables were presented as frequencies and percentages. The normality of distribution for the variables was assessed using the Kolmogorov-Smirnov test. For comparisons between groups, the t-test was used for normally distributed data, and the Mann-Whitney U test was used for non-normally distributed data. For comparisons of categorical variables between groups, the chi-square test was applied. To examine the relationships between continuous variables, Pearson correlation was used for normally distributed data, and Spearman correlation was used for non-normally distributed data. To assess whether there was a significant difference in the number of hospitalizations before and after registration among TCP-registered among registered patients, the Wilcoxon signed-rank test was applied. Finally, standard multiple regression analysis was conducted to evaluate the factors predicting medication adherence and individual/social performance.

Results

A total of 107 patients were included in the study, comprising 75 patients registered in the TCP and 32 patients who were not registered. Among 163 patients who presented to the psychotic disorders outpatient clinic within one year, 56 were excluded from the study due to coexisting intellectual disability, inability to complete the forms due to active symptoms, recent hospitalization within the last three months, not being in remission, or unwillingness to participate.

The sociodemographic and clinical characteristics of the groups are presented in Table 1. The mean age of the TCP-registered group was 45.7 ± 10.8 years (min-max: 25-71), while the mean age of the non-registered group was 46.06 ± 12.7 years (min-max: 23-70). Among all participants, 106 (99.1%) were diagnosed with schizophrenia, and 1 (0.9%) was diagnosed with schizoaffective disorder. No statistically significant differences were found between the two groups in terms of age, illness duration, employment status, educational level, or marital status. However, a statistically significant difference was found between the groups regarding gender ($p < 0.05$). The proportion of male

patients was higher in the TCP-registered group compared to the non-registered group.

There were no statistically significant differences between the two groups in PSP, MARS, or PANSS total and subscale scores (Table 2).

In the TCP-registered patient group, hospitalization rates were calculated over specific index periods to examine whether the number of hospitalizations changed following registration. Two variables were created: the “pre-registration hospitalization rate”, calculated by dividing the number of hospitalizations before registration by the duration of illness prior to registration; and the “post-registration hospitalization rate”, calculated by dividing the number of hospitalizations after registration by the duration of time the patient had been registered in TCP. A comparison of hospitalization rates revealed a statistically significant decrease in hospitalization following TCP registration ($p<0.05$).

To evaluate the factors predicting individual and social performance, a standard multiple regression analysis was conducted (Table 3). The independent variables included gender, duration until initiation of treatment, and the subscale scores for positive symptoms, negative symptoms, and general psychopathology from the PANSS. The model was found to explain 37% of the total variance [$R^2=0.37$, $F(5)=11.8$, $p<0.05$]. The variable contributing most to the model was the PANSS negative symptom subscale ($\beta=0.516$), followed by the PANSS positive symptom subscale score ($\beta=0.271$) ($p<0.05$).

A separate model was created to examine the factors predicting medication adherence. In this model, gender, duration until initiation of treatment, and PANSS subscale scores for positive symptoms, negative symptoms, and general psychopathology were included as independent variables. This standard multiple regression analysis was not statistically significant.

Discussion

In this study, the effectiveness of the TCP program, which aims to improve treatment adherence in patients with schizophrenia and other psychotic disorders, was investigated. Patients registered in TCP-a web-based system used to help patients and their families monitor treatment and improve adherence to pharmacological therapy were compared with non-registered patients in terms of medication adherence, individual and social performance, and symptom severity. Based on our analyses, no statistically significant differences were found between the two groups in PSP, MARS, or PANSS total and subscale scores. Within the sample, positive and negative symptom severity emerged as factors influencing individual and social performance.

A higher proportion of male patients was observed in the TCP-registered group. Previous studies on treatment adherence have reported that non-adherence is more common among male patients (25,26). One of the primary aims at our center was to enroll patients with a history of non-adherence in the system to monitor and support their treatment regimen.

Table 1. Sociodemographic and clinical characteristics of patients in both groups

Variables		TCP-registered patients		Non-registered patients		p-value
		n	%	n	%	
Gender	Male	52	69.3	14	43.8	0.017*
	Female	23	30.7	18	56.3	
Educational level	Primary or below	24	32	13	40.7	0.428
	High school	20	41.3	9	28	
	University or higher	20	26.7	10	31.3	
Employment status	Unemployed	36	48	13	40.6	0.530
	Employed	39	52	19	59.4	
Marital status	Single	53	70.7	20	62.5	0.497
	Married	22	29.3	12	37.5	
Tobacco use	No	27	36	17	53.1	0.133
	Yes	48	64	15	46.9	
Alcohol use	No	71	94.7	30	93.8	**
	Yes	4	5.3	2	6.3	
Clozapine use	No	54	72	25	78.1	0.633
	Yes	21	28	7	21.9	
Long-acting antipsychotic use	No	32	42.7	16	50	0.529
	Yes	43	57.3	16	50	
CMHC registration	No	0	0	3	9.4	**
	Yes	75	100	29	90.6	

CMHC: Community mental health centers, *: $p<0.05$, **: Chi-square not applicable

Table 2. Comparison of PSP, MARS, PANSS and subscales between two group-values

Scale	TCP	n	Mean	Standard Deviation	p-value
PSP	Registered	75	62.7	13.2	0.718*
	Not registered	32	62.8	12.1	
MARS	Registered	73	7.74	1.6	0.694*
	Not registered	32	7.78	1.9	
PANSS-positive	Registered	75	12.5	5.2	0.096*
	Not registered	31	10.7	3.1	
PANSS-negative	Registered	75	16.9	6.6	0.794*
	Not registered	31	16.1	4.5	
PANSS-general	Registered	75	26.09	7.6	0.144*
	Not registered	31	23.7	5.9	
PANSS-total	Registered	75	55.4	17.9	0.286*
	Not registered	31	50.5	12.1	

p<0.05,*: Mann-Whitney U test, TCP: Treatment Collaboration Portal, PSP: Personal and Social Performance Scale, MARS: Medication Adherence Rating Scale, PANSS: Positive and Negative Syndrome Scale

Table 3. Regression analysis of factors predicting personal and social functioning

Dependent variable	Independent variables	B	Standard error	β	t	p
PSP	PANSS-positive	-0.725	0.315	-0.271	-2.297	<0.05
	PANSS-negative	-1.092	0.278	-0.516	-3.922	<0.001
	PANSS-general	0.253	0.263	0.142	0.961	0.339
	Duration until treatment initiation	-0.017	0.040	-0.035	-0.429	0.669
	Gender	0.002	2.118	0.000	0.001	0.999

PSP: Personal and Social Performance Scale, PANSS: Positive and Negative Syndrome Scale

Therefore, patients with poor adherence or known predictors of non-adherence who were registered in TCP may have predominantly been male.

In chronic and recurrent psychotic disorders, pharmacological treatment plays a crucial role both during acute exacerbation periods and in maintenance after symptom stabilization (4,27). In our sample, the mean MARS scores of both groups were close to 8, indicating that both groups demonstrated similarly partial adherence to medication (24). This may explain why no significant difference was found between the two groups in terms of medication adherence. Furthermore, studies have shown that treatment adherence improves in schizophrenia patients after registration with a CMHC (12,28). Most of the patients included in this study were stable patients followed up in CMHCs. Patients who were clinically improved and had relatively better functioning, even if not registered in TCP, were also included in the study as long as they were under CMHC follow-up. Regular monitoring and other CMHC interventions may have enhanced adherence in these individuals, potentially explaining the lack of difference between the groups. Additionally, regular CMHC follow-up may have led to a reduction in positive and negative symptom severity and thus an improvement in individual and social functioning, which may have indirectly contributed to better treatment adherence.

On the other hand, in individuals with psychotic disorders, treatment adherence encompasses more than just medication adherence and requires a broader evaluation. In this regard, the services provided by CMHCs, which are designed to enhance treatment adherence, are of particular importance. At the CMHC within our hospital, a variety of programs and training sessions are offered to both patients with psychotic disorders and their families. Home, workplace, or care facility visits are conducted by the CMHC team when necessary. Patients receive training on cognitive skills, illness self-management, psychological empowerment, and social skills. Family members receive education on illness, treatment, communication with the patient, and stress management. Additionally, healthy living groups are organized focusing on physical activity, healthy nutrition, personal hygiene, and sleep hygiene.

In addition to all these comprehensive services provided by CMHCs, TCP is a system designed to remind patients' relatives of appointment dates, medical tests, activities, and injection schedules to prevent missed treatments, with written informed consent obtained from each patient. By entering information into the portal, the treatment team ensures that reminders regarding "appointments, injections, therapy, family education, and blood tests" are sent via an IVR system to the mobile phones of the patient or their relative. The aim of TCP is to enhance adherence to treatment and rehabilitation services and

to facilitate treatment monitoring by patients and their families. Our findings indicated that merely reminding patients of medication or appointment dates via TCP did not contribute additional benefits to medication adherence. This is because the TCP system records whether or not the patient responds to the calls, and these records are monitored by the CMHC team, who then attempt to contact the patient by phone and provide the necessary reminders. Whether or not a patient is registered in TCP while under CMHC follow-up does not make a difference in terms of medication adherence, symptom severity, or individual and social functioning. The services provided in CMHCs have been shown in many studies to positively impact treatment adherence, insight, quality of life, functionality, and reduction in illness symptoms (12,28).

However, an important finding of this study was the statistically significant difference observed in the hospitalization rates calculated before and after TCP registration among registered patients. The pre-registration hospitalization rate was found to be higher than the post-registration rate. It has been reported that psychosocial interventions in chronic psychiatric disorders may have long-term effects on insight, quality of life, and hospitalization rates (29). Although this study did not identify a relationship between TCP and short-term outcomes such as symptom severity or medication adherence, the system may have contributed positively in the long term by reducing hospitalization rates.

Study Limitations

One of the limitations of this study was that the majority of the patients were already registered with the CMHC, meaning they were regularly monitored and had relatively high treatment adherence. Additionally, the cross-sectional nature of the study, lack of follow-up, and the small sample size limited the ability to assess the short- and long-term effects of TCP registration. Therefore, follow-up studies with larger samples are needed.

Conclusion

In conclusion, services provided by CMHCs contribute positively to the course of illness in individuals with chronic psychiatric disorders accompanied by psychotic symptoms. In addition, a digital system such as the TCP, which reminds patients of their follow-up information, appears to be a valuable tool in reducing the workload of CMHC teams. Moreover, it may also contribute positively to the course of illness in the long term by reducing hospitalization rates.

Ethics

Ethics Committee Approval: The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Clinical Research Ethics Committee of Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital on 27.01.2021 with decision number 2021-01/985.

Informed Consent: All participants signed an informed consent form and were informed about the study's purpose and procedures.

Footnotes

Authorship Contributions

Surgical and Medical Practices: N.B.B., F.B.E., M.A., Concept: F.B.E., E.H.K., A.Ç., Design: N.B.B., F.B.E., E.H.K., A.Ç., Data Collection or Processing: F.B.E., M.A., Analysis or Interpretation: N.B.B., F.B.E., E.H.K., Literature Search: N.B.B., F.B.E., E.H.K., M.A., Writing: N.B.B., F.B.E., E.H.K., A.Ç.

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