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Article

The potential of an integrated pharmaceutical care model with telepharmacy in adherence and knowledge about pharmacological treatment in patients with mental disorders: A clinical trial

Núbia Cristina Burgo Godoi de Carvalho[1*], Ana Carolina Figueiredo Modesto[2], Mércia Pandolfo Provin[3]

[1]Postgraduate Program in Collective Health, Institute of Tropical Pathology and Public Health (IPTSP), Federal University of Goiás, Goiânia, Goiás, Brazil,
[2]Hospital of Clinics, Federal University of Goiás, Goiânia, Goiás, Brazil,
[3]School of Pharmacy, Federal University of Goiás, Goiânia, Goiás, Brazil

The level of understanding about disease and treatment is an important factor to consider in achieving favorable outcomes in patients with mental disorders, and adherence to pharmacological treatment is crucial in this regard. The aim of this study was to assess to what extent patients with MD undergoing an integrated pharmaceutical care model with telepharmacy showed improvements in factors related to treatment adherence and their level of knowledge about pharmacotherapy. A parallel randomized clinical trial was conducted with a two-arm study in two Psychosocial Care Centers located in a state capital in Brazil. Participants in the intervention group received a comprehensive pharmaceutical care model that included attitudinal, technical, and educational interventions, while the control group received standard routine care. Predictive factors for adherence to pharmacological treatment and level of medication knowledge were assessed before and after the intervention. In the intervention group (33), significant improvements were found in the scores of adherence predictors ($p<0.001$) and the level of knowledge of pharmacotherapy ($p<0.001$) from baseline to follow-up, compared to the control group (33). The telepharmacy model demonstrated effectiveness in enhancing the scores of adherence predictors for pharmacological treatment and improving the level of knowledge of pharmacotherapy among patients with mental disorders.

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Keywords: Mental disorders. Medication adherence. Knowledge. Controlled clinical trial. Telepharmacy.

INTRODUCTION

Mental disorders (MD) are characterized by clinically relevant dysfunctions in a person's behavior, learning, and emotional structuring that reflect alterations in the biological, developmental, or psychological systems underlying mental activity. MD are usually associated with disabilities and suffering that influence family, social, and professional responsibilities (Cordioli *et al.*, 2014).

In the early 21st century, the World Health Organization signaled the growth of MD, and it is estimated that more than 450 million individuals worldwide suffer from MD or behavioral disorders (WHO, 2021; Quadros *et al.*, 2020). In Brazil, its prevalence is 29.6% in the population (Kohn *et al.*, 2018). As a result of their high frequency, they are characterized as a public health problem since they cause absenteeism and increase the demand for health services, resulting in high social and economic costs for the country (Quadros *et al.*, 2020; Moraes *et al.*, 2017).

The care for patients with MD in Brazil is structured as a network of services and actions organized within the Unified Health System (UHS), forming the so-called Psychosocial Care Network (RAPS). Psychosocial Care

***Correspondence:** N. C. B. G. de Carvalho Instituto de Patologia Tropical e Saúde Pública (IPTSP) Universidade Federal de Goiás Rua 235, Setor Leste Universitário, Goiânia, Goiás, Brasil CEP: 74605-020 Telefone/Fax: +55 62 3209-6530 E-mail: nubiaburgo@hotmail.com https://orcid.org/0009-0008-1856-2534

Centers (PCC) are strategic points of the RAPS, where a multiprofessional team assists people with MD in crisis episodes or in psychosocial rehabilitation processes (Silva, Lima, Ruas, 2018).

In PCC, the treatment of patients with MD comprises different therapeutic modalities, including social activities that work on self-esteem, strengthening family and community ties, and their reintegration into society (Borba *et al.*, 2018a). Even in this context, pharmacological treatment remains largely prioritized (Quemel *et al.*, 2021).

In pharmacotherapy, adherence to treatment is essential for therapeutic success. However, unfortunately, it is estimated that only 51% of patients adhere to treatment (Borba *et al.*, 2018b). Adherence to treatment is as important as it is complex because, although it is often described as a dichotomous variable (adherence versus non-adherence), the term can vary along a continuous gradient. Moreover, numerous factors can influence adherence, such as socioeconomic status and social support, which might have a positive impact. Belonging to an ethnic minority might have a negative impact on adherence (Gast, Mathes, 2019).

The patient's level of knowledge about their health condition and treatment is one of these factors, because the lack of it does not allow the individual to understand the importance of following treatment recommendations, resulting in inappropriate drug use or even changes in the therapeutic scheme according to its parameters (Alcantara *et al.*, 2020). Several strategies that use attitudinal, technical, and educational resources (Torres-Robles *et al.*, 2018) are described in the literature. These techniques are intended to alleviate the problems caused by factors that are often associated with poor adherence. Traditionally, these strategies are carried out by a multidisciplinary team in person, but the health situation worldwide due to the COVID-19 pandemic has brought a new challenge to this scenario. Thus, it was necessary to implement procedures that would help in this moment of health emergency. Information and Communication Technologies (ICT) are presented as an alternative to activities that traditionally required the physical presence of professionals.

In Brazil, both professional bodies in medicine and pharmacy have already regulated the practice of telemedicine (CFM, 2022) and telepharmacy (CFF, 2022), respectively, as a form of technology-mediated care services. However, pharmacists have not yet incorporated telepharmacy into their practice, which, when used with ethical, technical, and legal rigor, can significantly contribute to the integrality of health care.

The aim of this study was to assess to what extent patients with MD undergoing an integrated pharmaceutical care model with telepharmacy showed improvements in factors related to treatment adherence and the level of knowledge about pharmacotherapy.

MATERIAL AND METHODS

Design and setting

This is a parallel randomized clinical trial with two arms: intervention group (IG) and control group (CG), conducted from April to September 2021, in a Brazilian municipality with an estimated population of 1,555,626 inhabitants (IBGE, 2021). The study was conducted in two PCCs, which cater to adult individuals with moderate to severe MD and had at least one pharmacist and one physician as members of the team during the study period.

Population and sample

Eligible participants were adult individuals (aged 18 years or older) with medical records in PCC, diagnosed with MD, undergoing pharmacological treatment, and having the ability to self-administer their medications (self-declared). Individuals who were unable to understand and answer the questions of the instruments used for data collection were discharged, or ceased attendance at the PCC were excluded.

The sample size calculation was estimated using the following parameters: 80% statistical power (β=0.20), 95% confidence level (α=0.05), ratio between groups of 1:1, a probability of finding a four-point difference in mean scores on the scale of predictors of adherence, and a 10% loss rate. Therefore, the minimum sample was

estimated at 62, with 31 participants in the IG and 31 in the CG. Estimates were performed considering the study design and the outcome variables analyzed: the scores of predictors of adherence (primary endpoint) and level of knowledge (secondary endpoint).

The researchers were present at the PCC on random days and at alternate times from April 1 to April 30, 2021. During these visits, patients waiting in the waiting room for care were approached by one of the researchers and invited to participate in the research. After applying the inclusion/exclusion criteria, 123 of these patients were included in the study.

Randomization

Initially, each patient received a numeric code, and their pharmacotherapeutic profile was classified according to the Pharmacotherapy Complexity Index (PCI) (Melchiors, Correr, Fernández-Llimos, 2017). To ensure equitable distribution, patients were stratified into subgroups of low (<7) and high therapeutic complexity (≥7), assessed before the start of the study. Randomization occurred within each stratum, utilizing statistical methods for simple randomization. Each patient was assigned based on their numeric code, and through a lottery program, it was determined who would be in the Intervention Group (IG) and who would be in the Control Group (CG).

Data collection

At recruitment, participants answered a sociodemographic and clinical survey (gender, age, birthplace, diagnosis, education, marital status, religion, skin color, family income, and medications in use).

With data regarding drug use, the complexity of pharmacotherapy was estimated using the Medication Regimen Complexity Index (Melchiors, Correr, Fernández-Llimos, 2017). The PCI was classified as low (up to seven points) and high (above seven points) (Fröhlich, Dal Pizzol, Mengue, 2010).

At T0 and Tf, in both groups (CG and IG), an instrument was applied to assess patients' level of knowledge regarding the prescribed drugs (Fröhlich, Dal Pizzol, Mengue, 2010), consisting of questions that evaluated the patient's knowledge about the expressed items (name, dosage, posology, and duration) and not expressed in the prescription (therapeutic indication, what to do if you forget to take a dose, adverse effects, and interactions). The patient's knowledge was classified in one of the following situations (Ferreira *et al*., 2018): (1) < 7 points: insufficient level; (2) 7 to 9 points: regular level; (3) ≥ 10 points: good level.

To verify the predictors of adherence to pharmacological treatment, the Assessment Scale of Factors Related to Adherence to Pharmacological Treatment in Psychiatric Patients (VERUM Scale) was applied (Da Silva *et al.*, 2023). The VERUM Scale, consisting of 18 items, identifies factors that may contribute to non-adherence to pharmacological treatment. It assesses the cumulative effect of these factors unfavorable to adherence. Thus, as the score increases, the likelihood of the patient not adhering to the treatment also grows.

The synthesis of dialogues between researcher and patient was recorded in a field diary.

Intervention Group

The intervention consisted of a pharmaceutical care model based on a combination of attitudinal, technical, and educational strategies (Torres-Robles *et al.*, 2018) developed in four stages (T0, T1, T2, and Tf). The average scheduling period is 30 days, always conducted by the same researcher, totaling 90 days. To mitigate the Hawthorne effect (Spencer, Mahtani, 2017), the Free and Informed Consent Term (FICT) was only obtained in Tf.

As a technical strategy, the use of a medication organizer bag was adopted, specially designed for UHS users. This bag aims to organize medication, allowing the separation of pills by time, period, day, week, and month to simplify medication usage at home. At T0, participants attended the pharmacy service at PCC and received their medications accommodated in the medication organizer bag, in addition to being instructed on its usage.

Subsequently, the researcher conducted a Motivational Interviewing via telephone dialogue, during which the patient could freely express their understanding of their

health problem and treatment. Motivational Interviewing (Miller, Rollnick, 2001; Jungerman Laranjeira, 1999) is based on five essential elements: partnership, acceptance, evocation, compassion, and balanced professional engagement. These components are crucial for the four key processes of Motivational Interviewing: engagement, focus, evocation, and planning. The PARR method (Open-ended Questions, Affirmation, Positive Reinforcement, and Reflections) is strategically applied (Figlie, Guimarães, 2014).

Subsequently, the level of knowledge was evaluated, and the presence of predictors of treatment adherence was identified using instruments (Fröhlich, Dal Pizzol, Mengue, 2010; Da Silva *et al.*, 2023). Based on the responses obtained, the researcher was able to understand the beliefs, doubts, and challenges faced by the participants in adhering to the treatment. With this understanding, an individualized guidance plan was developed and implemented for the next contact. Finally, the next meeting was scheduled.

At T1, with the orientation plan prepared in the previous phase, the researcher conducted, by telephone, an orientation regarding the disease, investigated the presence of individual factors that hinder adherence to treatment, and reinforced the importance of adherence. Doubts were clarified, and through empathy, counseling was provided to promote changes in attitudes, beliefs, or subjective norms regarding their disease state or pharmacotherapy, thus characterizing an attitudinal strategy.

In T2, a new telephone contact was made, during which the researcher checked for persistent doubts and reinforced personalized guidelines regarding the medication usage process. Additionally, the benefits of treatment adherence were reiterated, and the date and time for the next telephone contact were scheduled according to the individual needs of the patient.

During the last telephone contact (Tf), the researcher applied the instruments again to assess patients' level of knowledge regarding their medications and investigated the presence of predictors of pharmacological treatment adherence. The researcher also reinforced some guidelines that help improve treatment adherence, valued the efforts made during the follow-up period, and encouraged patients to continue caring for their treatment.

Control Group

The control group (CG) received routine care provided by the PCC. This care involved the pharmacy delivering medications based on prescriptions and confirming the user's identity, without any additional actions or guidance provided. The medication organizing bag was delivered only at the end of the study. The researcher had contact with the users of this group at two points, T0 and Tf.

At T0, the researcher, by telephone, with the aid of instruments (Fröhlich, Dal Pizzol, Mengue, 2010; Da Silva *et al.*, 2023), assessed the level of knowledge and identified the presence of predictors of treatment adherence. A date and time were scheduled for the next telephone contact after three months.

At Tf, the researcher, by telephone, again assessed the patients' level of knowledge regarding medications and the predictors of adherence to pharmacological treatment, using the same instruments as in T0.

To ensure isonomy, in Tf, the CG patients were offered the same attitudinal, technical, and educational strategies offered to the IG during the study.

Data analysis

All data collected were recorded and stored in a database using the public domain EpiInfoTM Version 3.5.4 program. The data were analyzed using specific STATA software, version 15.0.

Normality analysis and descriptive statistics of the variables were conducted. The Kolmogorov-Smirnov test with Lilliefors correction was applied to analyze the normality of quantitative variables. Variables with a normal distribution were presented as mean and standard deviation (SD), while those with a non-normal distribution were presented as median and interquartile range (IQR). Qualitative variables were expressed as absolute (n) and relative (%) frequencies.

The CG and IG had their sociodemographic and clinical characteristics compared. Pearson's chi-square,

likelihood ratio, or Fisher's exact tests were utilized to compare qualitative variables. Student's t-tests for independent samples or Mann-Whitney tests were employed to compare quantitative variables when appropriate. The groups were considered homogeneous for a given characteristic when a p-value > 0.05.

To analyze the effect of the intervention on primary and secondary outcomes, the Mann-Whitney test was conducted. Differences were deemed statistically significant when p-values were ≤ 0.05.

Ethical approval

Ethical approval was granted by the Research Ethics Committee of the Federal University of Goiás under protocol N. 4.584.416. A written, informed consent was obtained from all participants.

RESULTS

Among the 123 users recruited, 43 were excluded because they were discharged or stopped attending PCC. The remaining 80 users were randomized, with 40 allocated to the IG and 40 to the CG (Figure 1). A higher number of participants in relation to the sample calculation was included considering the possibility of losses.

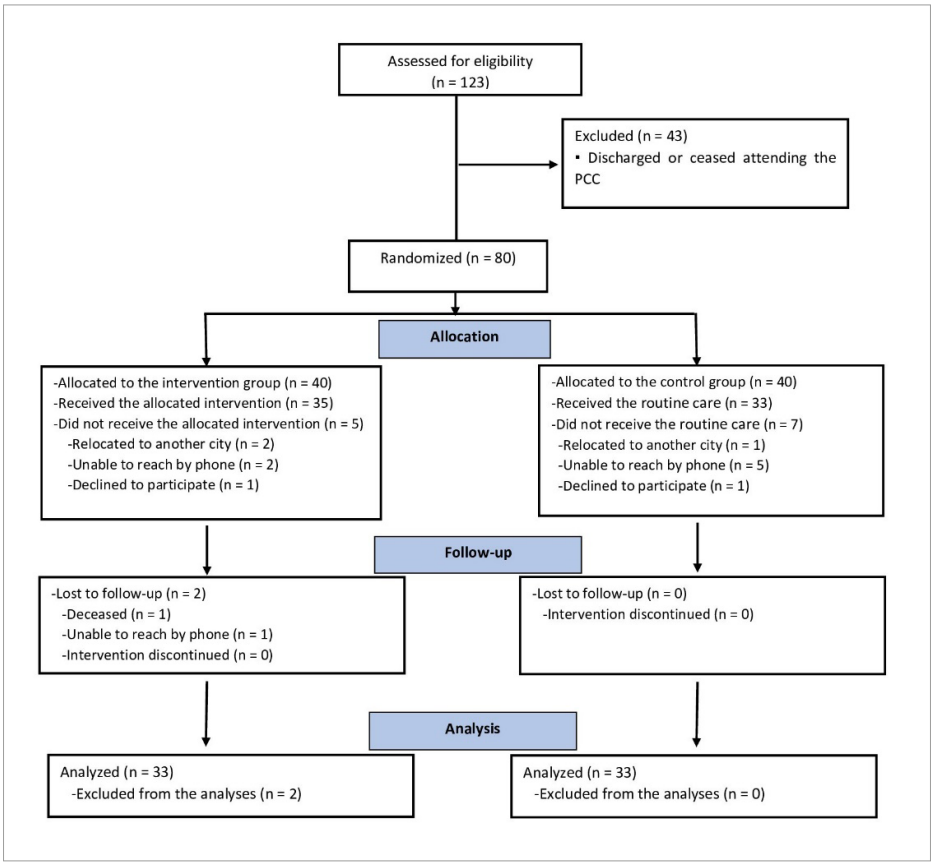

FIGURE 1 - Diagram representing the flow of participants at each stage of the study.

During the follow-up, two participants in the intervention group were lost, one due to death and the other due to loss of contact. The final sample consisted of 66 individuals. There was homogeneity between both groups ($p > 0.05$) regarding sociodemographic and clinical features. Similarly, there was homogeneity between the adherence and knowledge prediction scores at baseline ($p > 0.05$) (Table I).

In both groups, it was observed that the average age was over 40 years, the majority were women, without a partner, of mixed race, with a monthly family income of < 2 minimum wages, and did not have regular or occasional work. Regarding the participants' education, there was no difference between the groups (Table I).

Both groups had an illness duration of around 25 years. The main MD diagnoses in CG and GI were schizophrenia and mood disorders. Most participants in both groups had a high complexity of pharmacotherapy, and approximately 30% had comorbidities, with hypertension, diabetes, hypercholesterolemia, and hypothyroidism being the most prevalent in both groups (Table I).

TABLE I – Social, demographic and clinical profile of participants with mental disorders, assisted by PCC, according to the allocation group, at baseline. Goiania – GO

Variables	Control Group (n = 33)	Intervention Group (n = 33)	p-value
Age (years), mean (SD)	45.2 (12.9)	44.0 (9,8)	0.676[a]
Sex, n (%)			
Female	18 (54.5)	19 (57.6)	0.804[b]
Male	15 (45.5)	14 (42.4)	
Education, n (%)			
Level I	19 (57.6)	15 (45.5)	0.325[b]
Level II	14 (42.4)	18 (54.5)	
Marital status, n (%)			
With partner	7 (21.2)	11 (33.3)	0.269[b]
Without partner	26 (78.8)	22 (66.7)	
Skin color (self-reported), n (%)			
White	11 (33.3)	11 (33.3)	0.340[c]
Brown	18 (54.5)	21 (63.6)	
Black	4 (12.1)	1 (3.0)	
Monthly family income (minimum wages), n (%)			
< 2	20 (60.6)	26 (78.8)	0.269[c]
2-<4	9 (27.3)	5 (15.2)	
4-10	4 (12.1)	2 (6.1)	
Regular or occasional work, n (%)			
No	29 (87.9)	28 (84.8)	0.720[c]
Yes	4 (12.1)	5(15.2)	
Main diagnosis of MD, n (%)			
Schizophrenia	17 (51.5)	16 (48.5)	
Mood disorder	13 (39.4)	10 (30.3)	0.248[c]
Neurotic and stress disorders	2 (6.1)	4 (12.1)	
Other	1 (3)	3 (9)	
comorbidities, n (%)	11 (33.3)	13 (29.4)	0.609[b]

Variables	Control Group (n = 33)	Intervention Group (n = 33)	p-value
Specific comorbidities, n (%)			
Hypertension	4 (12.1)	6 (18.2)	0.492[b]
Diabetes	3 (9.1)	4 (12.1)	1.000[d]
Hypothyroidism	3 (9.1)	2 (6.1)	1.000[d]
HIV/Aids	0	1 (3.0)	1.000[d]
Others	2 (6.1)	5 (15.2)	0.427[d]
Age of illness, mean (SD)	25.8 (12.6)	25.1 (12.1)	0.804[a]
History of psychiatric hospitalization, n(%)	12 (36.4)	14 (42.4)	0.614[b]
Number of seizures, median (IQR)	2 (4)	1 (4)	0.322[e]
Treatment time, median (IQR)	10.0 (16.0)	12.0 (11.6)	0.812[e]
Number of psychiatric medications, median (IQR)	3 (1)	3 (2)	0.132[e]
PCI, mean (SD)	9.4 (4.0)	9.8 (5.2)	0.773[a]
PCI classification, n (%)			
Low	11 (33.3)	12 (36.4)	0.796[b]
High	22 (66.7)	21 (63.6)	
Adherence prediction score, mean (SD)	9.5 (5.9)	10.7 (6.1)	0.418[a]
Knowledge score, mean (SD)	6.3 (2.5)	6.2 (2.1)	0.746[a]
Level of knowledge, n (%)			
Insufficient	14 (42.4)	16 (48.5)	0.882[c]
Regular	18 (54.5)	16 (48.5)	
Good	1 (3.0)	1 (3.0)	

Level I of schooling: Illiterate/incomplete elementary school; Completed elementary school/incomplete high school and Level II: Completed high school or more; MT=mental disorder; SD=standard deviation; AIDS= Acquired Immunodeficiency Syndrome; HIV= human immunodeficiency virus; PCI= Pharmacotherapy Complexity Index; IIQ=Interquartile range; a Student's t test for independent samples; b. Pearson's chi-square test; c. Liability ratio test. d. Fisher's exact test; e. Mann-Whitney U test.

The alpha's Cronbach coefficient of scale adherence was 0.683 (95%CI= 0.560-0.784). The coefficient value was 0.671 (95%CI=0.482-0.814) in CG and 0.700 (95%CI=0.528-0.830) in the IG. The alpha's Cronbach coefficient of the level of knowledge scale was 0.476 (95%CI= 0.261-0.647). The coefficient value was 0.507 (95%CI=0.304-0.668) in CG and 0.477 (95%CI=0.156-0.708) in IG.

In the CG, there was no difference in the scores of predictors of adherence at baseline and follow-up (9.5 [SD=5.9] versus 9.5 [SD=6.8]; p=0.925). The same was observed for the level of knowledge in the knowledge scores at baseline and follow-up (6.03 [SD=2.46] versus 6.06 [SD=2.69]; p=0.909) (Figure 2).

On the other hand, in the IG, there was a decrease in the scores of predictors of adherence, that is, an improvement from baseline to follow-up (10.7 [SD=6 .1] versus 4.2 [SD =3.6]; p<0.001). The same was observed regarding the level of knowledge, in which there was an increase in the scores of patients from baseline to follow-up (6.21 [SD=2.07] versus 9.61 [SD=1, 35]; p<0.001) (Figure 2).

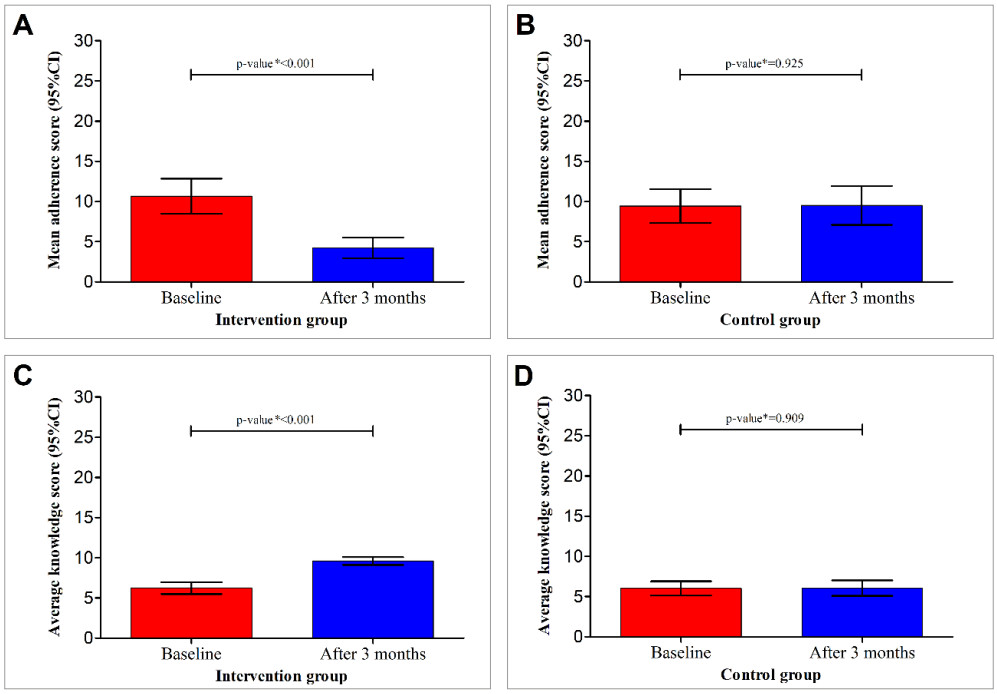

FIGURE 2 - Intragroup analysis of mean adherence and knowledge scores, according to the group. [A] Adherence in the intervention group; [B] Adherence in the control group; [C] Level of knowledge in the intervention group; and [D] Level of knowledge in the control group. *T-test for paired samples.

The IG had lower scores of adherence predictors when compared to control (4.2 versus 9.5; p<0.001) and higher scores of knowledge compared to control (9.61 versus 6.06; p<0.001) (Figure 3).

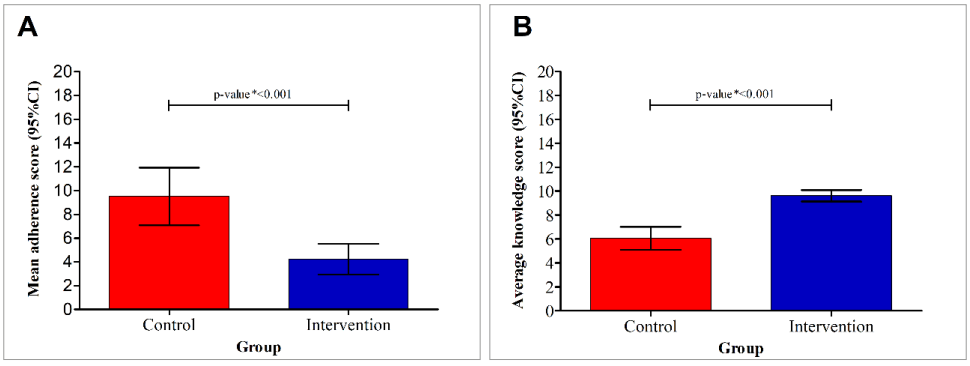

FIGURE 3 - Analysis of the intervention effect on adherence and knowledge scores. *Student's t test for independent samples.

Regarding the adherence and knowledge scores, there was a difference between CG and IG for all subgroups (Table II).

TABLE II - Subgroup analysis of adherence and knowledge scores (n=66)

Adherence score	n	Control Group	Intervention Group	p-value[a]
		Mean (SD)	Mean (SD)	
Sex				
Female	37	9.22 (7.22)	4.42 (4.11)	<0.001
Male	29	9.87 (6.58)	4.00 (3.04)	0.005
Education				
Level I	34	10.32 (7.33)	5.27 (4.35)	0.018
Level II	32	8.43 (6.21)	3.39 (2.79)	0.012
PCI Classification				
Low	23	8.18 (5.70)	2.58 (1.00)	0.006
High	43	10.18 (7.37)	5.19 (3.89)	0.009
Comorbidities				
No	42	10.43 (5.84)	7.24 (6.05)	0.001
Yes	24	9.42 (6.39)	6.25 (1.14)	<0.001
Knowledge score	**n**	**Control Group**	**Intervention Group**	**p-value[a]**
		Mean (SD)	**Mean (SD)**	
Sex			9.37 (1.57)	
Female	37	5.67 (2.64)	9.93 (0.92)	<0.001
Male	29	6.53 (2.77)		<0.001
Education			9.73 (0.70)	
Level I	34	5.84 (3.00)	9.50 (1.72)	<0.001
Level II	32	6.36 (2.27)		<0.001
PCI Classification			9.92 (1.00)	
Low	23	6.36 (5.70)	9.43 (1.50)	<0.001
High	43	5.91 (2.70)		<0.001
Comorbidities			7.74 (2.80)	
No	42	6.02 (2.30)	8.00 (2.75)	<0.001
Yes	24	6.29 (2.22)		0.002

SD= Standard deviation; PCI=Pharmacotherapy Complexity Index; a. Null hypothesis probability for t-Student test for independent samples. Level I of schooling: Illiterate/incomplete elementary school; Completed elementary school/incomplete high school and Level II: Completed high school or more.

After the intervention, the level of knowledge for the CG was: insufficient (n=15, 45.5%), regular (n=17; 51.5%) and good (n=1, 3 .0%). For IG, the results were: insufficient (n=1; 3.0%), regular (11; n=33.3%) and good

(n=21; 63.6%). Thus, it was found that the IG had a higher level of knowledge when compared to the CG ($p<0.001$).

DISCUSSION

The proposed pharmaceutical care model, which involved the organization of medications, education about the disease and treatment, and dialogue about attitudes and beliefs hindering adherence, mediated by ICT, was able to reduce the score of non-adherence predictors. Improved adherence can enhance the clinical outcomes of chronic diseases (Milosavljevic, Aspden, Harrison, 2018; Poonprapai, Lerkiatbundit, Saengcharoen, 2022) and reduce the risk of death and hospitalizations (Fitzgerald, 2011).

Similarly, the care model increased patients' level of knowledge about their pharmacological treatment, which can help chronically ill individuals improve their medication usage process, making it safer and more effective (Bukhsh, 2019).

Educational interventions are easy to implement, relatively low-cost, and effective among different participant groups (Milosavljevic, Aspden, Harrison, 2018; Ng *et al.*, 2021), so they are widely utilized. They also adapt well to remote models, such as telepharmacy. This type of intervention enhances the level of knowledge, adherence to pharmacotherapy, and quality of life in people with chronic diseases, such as patients with MD (Milosavljevic, Aspden, Harrison, 2018; Amer *et al.*, 2018; Yeni *et al.*, 2018; Ng *et al.*, 2021).

However, considering that adherence is a multifaceted event influenced by the interaction of the patient, treatment, disease, health system, and socioeconomic factors (Capistrano *et al.*, 2019), interventions with multi-approaches have a high potential to overcome barriers to adherence and achieve better results, as observed in this study.

Interventions aimed at changing attitudes and reframing beliefs, such as the one used in our study, can be beneficial in promoting treatment adherence behavior, even when conducted via telepharmacy. They can stimulate greater engagement and adherence in patients with mental disorders (Hartung *et al.*, 2017; Torres-Robles *et al.*, 2018; Readdean, Heuer, Scott Parrott, 2018).

The use of a medication organizer bag, specifically developed for the particularities of UHS users, was an innovation that added the component of safe medication use to the care model. Dispensing medicines organized by time, identified, and signaled through pictograms helps patients in the process of medication use (Hernández *et al.*, 2020; Vicente *et al.*, 2021; Rocha, Pires, Teixeira, 2021).

Advantages observed in the use of telepharmacy included the flexibility of schedules and the elimination of the need to travel to health units, leading to reduced costs, time, and burden on the infrastructure of health services (Hefti, Wei, Engelen, 2022).

As a strength, our study utilized an RCT, providing high-quality data that supports evidence-based treatment (Sharma, Srivastav, Samuel, 2020). Random allocation and measures to prevent the Hawthorne effect were implemented during the study's development to mitigate bias and ensure the impartiality of the results. Additionally, the absence of differences between sociodemographic and clinical characteristics at baseline in both groups reduces the risk of introducing confounding biases.

During the design and execution of this research, other factors that could influence the intervention's effect were also considered, such as the training of the researchers making the calls, language standardization, and information quality. Thus, a script was developed to guide the calls, organize the timing, and ensure successful contact.

Upon analyzing the subgroups, it was observed that regardless of gender, education, complexity of pharmacotherapy, or presence of comorbidities, all subgroups responded positively to the intervention. In other words, there was an improvement in knowledge and predictors of adherence.

Assessing treatment adherence is a challenging task (Amaral, Malerbi, 2019); therefore, selecting an instrument to investigate factors associated with non-adherence was a helpful measure to address this challenge. However, it's important to note that the instrument used does not classify participants as adherent or non-adherent. Instead, lower

scores on non-adherence factors suggest a reduction in the intensity of these factors, indicating a positive trend toward treatment adherence. This suggests that participants in the intervention group are less likely to encounter obstacles typically associated with non-adherence. Nonetheless, it cannot be definitively concluded that all participants have become adherent to the treatment.

Mitigating factors that influence non-adherence to treatment play a crucial role in promoting long-term adherence, offering advantages for clinical management. This approach allows for a deeper understanding of specific barriers to adherence, facilitating the design of targeted and motivational interventions. Moreover, improving these factors can reduce psychosocial barriers, enhance clinical outcomes, lower healthcare costs, and strengthen the trust relationship between patients and healthcare professionals. This results in patient-centered practice and more efficient management of chronic conditions, contributing to advancements in the healthcare field.

Evaluating adherence exclusively through psychometrics may not fully capture the complexity of this behavior, representing an inherent limitation of the study. Additionally, the psychometric scale used for this assessment has its own constraints. Therefore, the inclusion of objective measures, such as electronic monitoring of adherence and determination of possession rates, emerges as promising strategies to mitigate these limitations and enhance the validity of the obtained results.

CONCLUSION

In conclusion, the proposed pharmaceutical care model, which involved medication organization, disease education, treatment discussions, and addressing attitudes and beliefs hindering adherence mediated by ICT, has demonstrated significant potential. It not only reduced non-adherence predictor scores but also enhanced patients' knowledge of pharmacological treatment. This multifaceted approach, incorporating educational interventions, telepharmacy, and innovative tools such as medication organizer bags, has proven effective in promoting adherence, particularly among patients with mental disorders. The flexibility and cost-effectiveness of telepharmacy, coupled with the overall benefits of this intervention, underscore its suitability for various patient groups.

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