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ORIGINAL ARTICLE

Outcome predictors of smoking cessation treatment provided by an addiction care unit between 2007 and 2010

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Objective: To analyze the predictors of smoking cessation treatment outcomes in a sample with a high rate of medical and psychiatric disorders and addictions.
Methods: Analysis of predictors of success of a 6-week treatment provided by an addiction care unit (CAPS-AD) to 367 smokers in Brazil from 2007 to 2010. Forty variables were collected at baseline. Success was defined as abstinence from smoking for a period of at least 14 consecutive days, including the last day of treatment. Twenty variables were selected for the logistic regression model.
Results: The only condition correlated with successful treatment after logistic regression was smoking one's first cigarette 5 minutes or more after waking (beta = 1.85, 95% confidence interval [95%CI] = 1.11-3.10, p = 0.018). Subjects with hypertension and alcohol use disorders and those who were undergoing psychiatric treatment showed success rates comparable to or greater than the average success rate of the sample (34.2-44.4%).
Conclusions: These findings support the importance of the variable time to first cigarette in treatment outcomes for a sample with a high rate of clinical and psychiatric disorders. Good success rates were observed for pharmacological treatment, which was combined with group therapy based on cognitive-behavioral concepts and integrated into ongoing treatment of other addictions and psychiatric disorders.

Keywords: Tobacco; treatment; psychiatric patients; alcohol; group therapy; CBT

Introduction

The World Health Organization has identified smoking as the leading cause of preventable death in the world. About 6 million people die each year as a result of diseases related to tobacco, and this figure is expected to rise to 8 million by the year 2030.[1] In Brazil, 200,000 deaths per year are estimated to be caused by smoking.[2] Tobacco control programs, which involve the direct treatment of addicts and social policies to invest in taxes and advertising regulation, can be considered directly responsible for the decline in smoking during the last half century and for approximately 40% of the drop in deaths due to lung cancer between 1991 and 2003 in the United States.[3] The prevalence of smoking among patients with mental health and addictive disorders (MHA) is 2-4 times higher than in the general population.[4] The treatment of smoking in MHA patients appears to be beneficial, and recent studies[5] have highlighted treatment as a variable related to smoking cessation in this population.[6] Several studies have addressed smoking among MHA patients.

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Available treatment

Care protocols that involve a health professional (a psychiatrist or an addiction doctor) and behavioral psychotherapy combined with pharmacotherapy may increase success rates of smoking cessation.[7] The latest review[8] to examine the effectiveness of interventions for smoking cessation identified the following success rates after 1 year: approximately 3.5% when trying to quit alone, 7-16% when receiving behavioral therapy, and 24% when receiving behavioral therapy combined with pharmacotherapy (including nicotine replacement, bupropion, or varenicline). Other studies have suggested an increase in the abstinence rate when bupropion or nortriptyline are added to nicotine replacement therapy as compared with nicotine replacement therapy alone.[9] In the present study, treatment success was defined as abstinence from smoking for a period of at least 14 consecutive days, including the last day of treatment, which follows the approach of a recent, short-term study.[10]

All types of nicotine replacement therapy can help people quit smoking, and these methods are associated with a 50-70% increase in success rates over trying to quit smoking unaided.[11] Group psychotherapy based on behavioral concepts is considered a good approach for psychotherapy with the intent of smoking cessation. In a

recent review, group therapy was found to be more effective than self-help and other, less intensive therapies.[12] In a systematic review that assessed the most successful therapeutic interventions for smoking cessation, group psychotherapy had the highest odds ratio for success, ahead of bupropion and nicotine replacement therapy.[13] Individual counseling from a smoking cessation specialist[14] and motivational interviewing[15] may also help smokers make a successful attempt at quitting.

Recent studies have encouraged smoking treatment for MHA patients. Psychotherapy based on cognitive-behavioral concepts and/or motivational interviews and pharmacotherapy integrated with ongoing psychiatric/addiction treatment has shown the best success rates.[5] Treatment for smoking in MHA patients seems to have no adverse effects on psychiatric symptoms, and a patient's clinical condition may even improve during treatment, regardless of smoking abstinence.[5]

Smoking treatment in Brazil

In Brazil, the National Cancer Institute (Instituto Nacional do Câncer, INCA) has implemented a National Anti-Smoking Program. This initiative includes decentralized actions, which use the Brazilian Unified Health System (SUS) in partnership with states and municipalities to reach the whole population,[16] even outside the major cities of Brazil. SUS services are organized by region and comprise addiction care units (Centro de Atenção Psicossocial para Álcool e Drogas, CAPS-AD). These care units promote comprehensive care for people with severe and persistent mental disorders, including substance dependence. Their work aims to enable patients to live in society, secure access to employment and education, and have their civil rights respected.[17] These units are staffed by multidisciplinary teams comprising several health professions.[18]

CAPS-AD units represent an interesting location for the National Anti-Smoking Program. Almost all of the recommendations made in recent studies, as discussed above, could be implemented in these health units. CAPS-AD units provide access to MHA patients, who generally are not treated for nicotine dependence.[5] Because CAPS-AD staff teams include professionals specialized in mental health or addiction, smoking cessation treatment can be integrated with ongoing treatment of psychiatric disorders and other addictions. Professional care is available during business hours, which allows for the close monitoring of MHA patients who are undergoing smoking cessation treatment, as recommended in a recent study.[19]

The present study analyzed the different types of variables affecting smoking cessation treatment outcomes in a population with high rates of medical, psychiatric, and addiction disorders in a CAPS-AD unit in Brazil between 2007 and 2010. We hypothesize that any of the variables related to smoking or to the medical and psychiatric profile of the patients, as collected at baseline, could predict the success of smoking cessation treatment in this population.

Methods

Treatment protocol

The treatment under study was performed in a CAPS-AD unit located in the city of São Caetano do Sul, state of São Paulo, Brazil, and began in April 2007. The total duration of the intervention was 6 weeks. During this period, each patient had 1) six scheduled sessions of group therapy and 2) four scheduled visits with a psychiatrist (t1 = 0; t2 = 1 week; t3 = 3 weeks; t4 = 6 weeks). Any patient absences during the treatment excluded the patient from the current treatment, but not from the study (they were included as treatment failures). However, each patient could repeat the treatment as often as necessary. Data for the patients who elected to have the treatment twice or more were only included in the sample once (on the occasion of their first treatment).

The groups included up to 15 people for each 6-week treatment. The main topics for discussion in the group therapy sessions were the dangers of smoking, craving, tactics for coping and recognition of withdrawal symptoms, difficulties and benefits of treatment, and relapse avoidance. The treatment groups were based on the principles of cognitive-behavioral psychotherapy.

The medical consultations were conducted on a one-on-one basis and focused on the possibility of pharmacological treatment (nicotine replacement therapy, bupropion, and nortriptyline). Varenicline was not available through the National Anti-Smoking Program. Possible side effects and dosage adjustments were also evaluated during the consultations. The physician could also refer a patient to another medical specialist or psychiatrist, if necessary, during or after the 6-week treatment. The physicians were typically psychiatry residents supervised by the preceptor, a fully qualified psychiatrist.

Successful treatment was defined as abstinence from smoking for a period of at least 14 consecutive days, including the last day of treatment, which follows the approach of a recent, short-term study.[10] Despite this non-usual measure of success (only 14 days of abstinence), more and more studies are using measures of success in the initial time of abstinence.[20-22] During the initial period of abstinence, the smoker attempting to quit experiences severe withdrawal symptoms and a higher likelihood of relapse.

Patients were asked about their abstinence status in all four medical consultations alone (if patients reported being abstinent, they were asked: "How long has it been since your last cigarette?"). Respecting physician-patient confidentiality, no information about the patients' abstinent status was disclosed by the physician to the other patients of their group intervention or to the other members of the CAPS-AD unit staff. The physicians did not participate in any of the group interventions.

Sample

The study sample consisted of 367 patients who sought smoking cessation treatment in the São Caetano

do Sul CAPS unit between April 2007 and April 2010. Patient information was collected via questionnaires, which were completed at baseline and through consultations with the patients, with the assistance of health professionals (all were included in the final sample, including patients who dropped out of treatment and were absent in the subsequent consultations). The inclusion of patients in the sample was conditional to the following criteria.

Inclusion/exclusion criteria

The CAPS unit treatment included the following patients: 1) patients who consulted with any member of the CAPS-AD unit staff in the city of São Caetano do Sul at least once within the framework of the Anti-Smoking Program; 2) patients who freely agreed to participate in the Anti-Smoking Program (completed and signed a pledge); 3) patients who adequately completed the initial questionnaire; 4) patients who had medical, psychiatric, or addiction disorders or no disorder.

The CAPS unit excluded the following patients: 1) patients living outside the city of São Caetano do Sul; 2) patients younger than 18 years or older than 65 years at treatment onset; 3) patients who did not adequately complete the initial questionnaire; and 4) pregnant women.

Variables

At the beginning of the Anti-Smoking Program treatment in the São Caetano do Sul CAPS-AD unit, the patients completed an initial questionnaire designed to collect data related to smoking. These questionnaires explored 35 variables that were divided into six groups (sociodemographic profile, medical profile, smoking profile, motivation/expectation, comorbidities, and other personal information). This study did not include a diagnostic tool to assess the presence of MHA disorders, and these variables were based only on patient reports.

At the end of the treatment, the protocols were analyzed for the type of pharmacological treatment used. The research team then created five more variables about type of treatment (nicotine patch, nicotine gum, bupropion, nortriptyline, bupropion or nortriptyline), for a total of 40 variables. Based on the criteria defined above, the research team also created a variable to evaluate the treatment outcome success, i.e., the primary outcome measure.

Statistical analysis

Descriptive analysis

The data from the questionnaires were initially entered into a database and analyzed with the STATA version 11 software. A descriptive analysis was also performed using the chi-square test. All 40 variables were analyzed for treatment success.

Logistic regression

Using the Enter method, the authors decided to include 20 variables in the logistic regression model, following two criteria: (i) a low p-value ($p \leqslant 0.15$) on the chi-square test (age, time to first cigarette [TTFC], most difficult cigarette to quit, nicotine patch, educational attainment, hypertension, heart palpitations, currently undergoing medical care, number of years smoking, problems with drugs other than alcohol, and smoking cessation recommended by a doctor); and clinical relevance, which was previously studied by other authors (sociodemographic,[23] Fargestrom Test for Nicotine Dependence,[23] psychiatric/addiction profile[5] and type of treatment[8] variables: gender, income, cigarettes per day, difficulty being in non-smoking areas, tendency to smoke most of the day during sick leave, previous attempts to quit, currently undergoing psychiatric treatment, problems with alcohol, and bupropion or nortriptyline). We analyzed the linear correlations between the 20 selected variables.

Ethical approval

This study was approved by the Ethics Committee of the Medical School of Fundação do ABC.

Results

Table 1 presents the sociodemographic and clinical profile of the sample. Overall, 146 patients (approximately 46%) attended all 10 sessions (four psychiatrist visits plus six group therapy sessions), and 137 (37%) had success in the treatment (14 consecutive days of abstinence). Approximately 30% of the participants were undergoing psychiatric treatment and 18% reported problems with alcohol. Over one-quarter of the sample had hypertension. Approximately two in three were undergoing some form of medical care and using medication. Almost all patients had a symptom that could be connected to smoking (93.2%). The most frequent symptom was breathlessness, which affected more than 60% of the patients. The vast majority of the patients identified their families as an incentive to quit (89.1%) and believed that quitting smoking with medical assistance would be easier (77.6%) than trying to quit alone. With respect to the smoking profiles, almost 60% of the sample smoked their first cigarette within 5 minutes of waking, and the majority (61%) smoked up to 30 cigarettes per day. Nicotine patches were the most commonly used treatment ($>$ 90% of people served), and more than half of the patients used bupropion or nortriptyline.

Table 2 presents the success rates for each variable and the results of the descriptive analysis. Only three variables were correlated with treatment success. Participants over the age of 50 had higher success rates (43.6%) than those younger than 50 years old (30.2%), and this result was significant ($p < 0.05$). With respect to the smoking profile, participants who smoked their first cigarette within 5 minutes of waking were less successful at quitting smoking following treatment, as were the participants who reported that the most difficult cigarette to quit was not the

Table 1 Descriptive data of 367 smokers who received treatment in an addiction care unit, São Caetano do Sul, Brazil, 2007-2010

	n	%		n	%
Sociodemographic data			**Smoking profile**		
Sex			Number of years smoking		
Male	125	34.1	⩽ 39	199	54.4
Female	242	65.9	> 39 years	167	45.6
Age			Cigarettes per day		
⩽ 50 years	172	46.87	< 30	224	61.0
> 50 years	195	53.13	> 29	143	39.0
Educational attainment (years of schooling)			Time to first cigarette		
⩽ 8 years	133	36.2	⩽ 5 minutes	219	59.7
9-12 year	141	38.4	> 5 minutes	148	40.3
University	93	25.3	Difficulty being in non-smoking areas		
Income			Yes	211	57.7
⩽ 1 × minimum wage	70	19.6	No	155	42.3
2-3 × minimum wage	160	44.8	Most difficult cigarette to quit		
> 3 × minimum wage	127	35.6	First one in the morning	239	66.0
Year of the treatment			Any other	123	34.0
2007	55	15.0	Tendency to smoke most of the day during sick leave		
2008	106	28.9	Yes	239	66.4
2009	140	38.1	No	121	33.6
2010	66	18.0	Previous attempts to quit		
			⩽ 4	310	84.5
Medical profile			> 4	57	15.5
Hypertension					
Yes	99	27.0	**Comorbidity**		
No	268	73.0	Currently undergoing psychiatric treatment		
Arrhythmia			Yes	105	28.6
Yes	15	4.1	No	262	71.4
No	352	95.9	Problems with alcohol		
Any disease			Yes	66	18.0
Yes	121	33.0	No	301	82.0
No	246	67.0	Problems with drugs other than alcohol (and tobacco)		
Cough			Yes	24	6.5
Yes	160	43.6	No	343	93.5
No	270	56.4			
Phlegm			**Motivation/expectation**		
Yes	189	51.5	Expectation in quitting smoking with medical assistance		
No	178	48.5	It should be easier	215	77.6
Breathlessness			It should be difficult	62	22.4
Yes	224	61.0	Smoking cessation recommended by doctor		
No	143	39.0	Yes	138	37.7
Poor physical fitness			No	228	62.3
Yes	176	48.0	Any objective motivation		
No	191	52.0	Yes	172	47.1
Paresthesias			No	193	52.9
Yes	135	36.8			
No	232	63.2	**Type of treatment**		
Palpitations			Nicotine patch		
Yes	97	26.4	Yes	344	6.0
No	270	73.6	No	22	94.0
Heartburn			Nicotine gum		
Yes	115	31.3	Yes	77	21.0
No	252	68.7	No	289	79.0
Any symptom			Bupropion		
Yes	342	93.2	Yes	173	47.1
No	25	6.8	No	194	52.9
Currently receiving medical care			Nortriptyline		
Yes	255	69.5	Yes	21	5.7
No	112	30.5	No	345	94.3
Currently taking some medication			Bupropion or nortriptyline		
Yes	244	66.7	Yes	191	52.0
No	122	33.3	No	176	48.0
Other personal information			**Outcome**		
Other smokers at home			Adherence		
None	163	44.5	Yes	169	46.2
Anyone	203	55.5	No	197	56.8

Continued on next page

Table 1 Continued

	n	%		n	%
Identified their families as an incentive to quit			Success		
Yes	327	89.1	Yes	137	37.3
No	40	10.9	No	230	62.7
Any physical activity regularly					
Yes	157	43.1			
No	207	56.9			

first cigarette of the day ($p < 0.05$). Use of the nicotine patch almost reached statistical significance ($p = 0.05$) for correlation with successful treatment.

Participants with hypertension or alcohol problems and those enrolled in psychiatric treatment had success rates comparable to or greater than the overall success rate of the sample: 44.4% and 37.9% vs. 34.3%, respectively. We also observed rates below the overall success rate for participants who had problems with any drug other than alcohol (20.8%).

Table 2 Results of descriptive analyses of 367 smokers who received treatment in an addiction care unit, São Caetano do Sul, Brazil, 2007-2010

	Percentage of success in each category			p-value
Sociodemographic data				
Gender	F (39.67)		M (32.80)	0.19
Age (in years)	⩽ 50 (30.23)		> 50 (43.59)	< 0.01
Educational attainment (years of schooling)	⩽ 8 (43.61)	9-12 (31.91)	> 12 (36.56)	0.13
Income (× minimum wage)	⩽ 1 (35.71)	2-3 (35.63)	> 3 (42.52)	0.44
Year of treatment	2007 (30.91) 2008 (41.51)		2009 (37.86) 2010 (34.85)	0.58
Medical profile				
Hypertension	Yes (44.44)		No (34.70)	0.08
Arrhythmia	Yes (26.67)		No (37.78)	0.38
Any disease	Yes (38.84)		No (36.59)	0.67
Cough	Yes (38.13)		No (36.71)	0.78
Phlegm	Yes (38.10)		No (36.52)	0.75
Shortness of breath	Yes (38.84)		No (34.97)	0.45
Poor physical fitness	Yes (34.09)		No (40.31)	0.21
Paresthesias	Yes (37.04)		No (37.50)	0.93
Palpitations	Yes (30.93)		No (39.63)	0.12
Heartburn	Yes (33.04)		No (39.29)	0.25
Any symptom	Yes (38.01)		No (28.00)	0.31
Currently receiving medical care	Yes (40.00)		No (31.25)	0.11
Currently taking some medication	Yes (39.34)		No (33.61)	0.28
Smoking profile				
Number of years smoking	< 40 (36.18)		> 39 (38.92)	0.58
Cigarettes per day	< 30 (40.63)		> 29 (32.17)	0.10
Time to first cigarette (in minutes)	⩽ 5 (31.51)		> 5 (45.94)	< 0.01
Difficulty being in non-smoking areas	Yes (34.12)		No (41.29)	0.16
Most difficult cigarette to quit	First (41.84)		Other (29.27)	0.01
Tendency to smoke most of the day during sick leave	Yes (35.15)		No (42.15)	0.19
Previous attempts to quit	⩽ 4 (38.71)		> 4 (29.82)	0.20
Comorbidities				
Currently undergoing psychiatric treatment	Yes (34.29)		No (38.55)	0.44
Problems with alcohol	Yes (37.88)		No (37.21)	0.91
Problems with drugs other than alcohol (and tobacco)	Yes (20.83)		No (38.48)	0.08
Other personal information				
Other smokers at home	Zero (35.58)		> 0 (38.92)	0.51
Identified their families as incentive to quit	Yes (37.92)		No (32.50)	0.50
Any regular physical activity	Yes (39.49)		No (36.23)	0.52
Motivation/expectation				
Quitting smoking with medical assistance	Easier (37.67)		Harder (29.03)	0.21
Smoking cessation recommended by a doctor	Yes (42.03)		No (34.21)	0.13
Any objective motivation	Yes (40.70)		No (34.20)	0.20
Type of treatment				
Nicotine patch	Yes (38.66)		No (18.18)	0.05
Nicotine gum	Yes (40.26)		No (36.68)	0.56
Bupropion	Yes (39.88)		No (35.05)	0.33
Nortriptyline	Yes (42.86)		No (37.10)	0.59
Bupropion or nortriptyline	Yes (40.31)		No (34.09)	0.21

Table 3 Results of linear correlation between the 21 selected variables to the logistic regression model of 367 smokers who received treatment in an addiction care unit, São Caetano do Sul, Brazil, 2007-2010

Variables	Sex	Age	EA	Income	NYS	CPD	TTFC	DBNA	MDCQ	TSMD	PATQ	CUPT	PWA	PWDA	NP	BN	H	PALP	SCRP	CRMC
Sex	1.00																			
Age	0.08	1.00																		
EA	-0.03	-0.19	1.00																	
Income	0.01	-0.02	0.42	1.00																
NYS	0.04	0.02	0.03	-0.04	1.00															
CPD	0.20	-0.03	0.01	0.01	0.09	1.00														
TTFC	0.05	0.03	-0.02	-0.10	0.08	0.29	1.00													
DBNA	-0.06	-0.04	-0.01	-0.03	-0.06	0.16	0.22	1.00												
MDCQ	0.06	-0.07	0.08	-0.09	0.02	0.10	-0.04	0.01	1.00											
TMSD	-0.14	-0.14	0.08	-0.06	0.07	0.05	0.16	0.38	0.02	1.00										
PATQ	-0.04	-0.08	-0.01	-0.01	0.01	-0.01	0.15	0.11	0.01	0.06	1.00									
CUPT	0.02	0.01	-0.11	-0.08	-0.08	0.01	0.01	0.02	0.01	0.02	-0.04	1.00								
PWA	0.36	0.08	-0.15	-0.10	0.01	0.08	0.01	-0.06	-0.09	-0.07	0.07	0.17	1.00							
PWDA	-0.01	0.02	0.05	-0.02	0.03	0.07	0.06	0.04	0.10	-0.02	0.02	0.16	-0.12	1.00						
NP	-0.15	0.01	0.02	0.05	-0.08	-0.01	-0.01	-0.02	-0.02	0.12	0.10	-0.01	-0.03	0.01	1.00					
BN	-0.08	-0.01	0.07	0.07	-0.02	0.02	0.04	0.07	0.04	0.07	-0.05	-0.19	-0.18	-0.10	0.10	1.00				
H	-0.01	0.21	-0.06	0.05	-0.09	0.02	-0.01	-0.01	0.01	-0.02	-0.13	-0.12	-0.04	-0.04	0.02	-0.01	1.00			
PALP	-0.08	-0.10	0.02	-0.02	0.02	-0.02	0.01	0.16	0.03	0.12	0.08	0.09	-0.01	-0.01	-0.01	-0.08	0.06	1.00		
SCRP	0.02	0.21	-0.15	-0.07	-0.06	-0.07	0.04	0.01	-0.05	0.01	0.03	0.02	0.01	0.01	0.06	0.05	0.16	-0.01	1.00	
CRMC	-0.08	0.18	0.11	-0.02	-0.08	0.01	-0.06	-0.01	0.03	-0.05	-0.01	0.29	0.04	0.08	-0.01	-0.11	0.31	0.11	0.26	1.00

BN = bupropion or nortriptyline; CPD = cigarettes per day; CRMC = currently receiving medical care; CUPT = currently undergoing psychiatric treatment; DBNA = difficulty being in non-smoking areas; EA = educational attainment; H = hypertension; MDCQ = most difficult cigarette to quit; NP = nicotine patch; NYS = number of years smoking; PALP = palpitations; PATQ = previous attempts to quit; PWA = problems with alcohol; PWDA = problems with drugs other than alcohol; PWT = problems with tranquilizers; SCRP = smoking cessation recommended by a physician; TSMD = tendency to smoke most of the day during sick leave; TTFC = time to first cigarette.
Strength of correlation (modulus of r): null if $r = 0$; very weak if $0 < r < 0.2$; weak if $0.2 < r < 0.4$; moderate if $0.4 < r < 0.7$; strong (significant) if $0.7 < r < 0.9$; very strong (significant) if $0.9 < r < 1$; perfect (significant) if $r = 1$.

Table 4 Results of logistic regression model of 367 smokers who received treatment in an addiction care unit, São Caetano do Sul, Brazil, 2007-2010

Variable	coef(Beta)	SE	z	95%CI	p-value
Sex	1.44	0.41	1.26	0.81-2.55	0.209
Age	0.63	0.16	-1.78	0.38-1.04	0.075
Educational attainment	1.18	0.21	0.94	0.83-1.67	0.349
Income	0.88	0.16	-0.63	0.61-1.28	0.530
Number of years smoking	0.77	0.18	-1.06	0.47-1.24	0.290
Cigarettes per day	1.02	0.27	0.10	0.60-1.74	0.917
Time to first cigarette	1.85	0.48	2.36	1.11-3.10	0.018
Difficulty being in non-smoking areas	0.98	0.26	-0.05	0.58-1.67	0.964
Most difficult cigarette to quit	1.55	0.41	1.67	0.92-2.60	0.096
Tendency to smoke most of the day during sick leave	1.17	0.32	0.58	0.68-2.03	0.561
Previous attempts to quit	1.25	0.44	0.64	0.62-2.50	0.521
Currently undergoing psychiatric treatment	1.04	0.31	0.13	0.58-1.86	0.894
Problems with alcohol	0.95	0.33	-0.12	0.48-1.89	0.904
Problems with other drug than alcohol (and tobacco)	2.66	1.61	1.61	0.81-8.75	0.107
Nicotine patch	0.37	0.22	-1.63	0.11-1.21	0.102
Bupropion or nortriptyline	0.79	0.19	-0.90	0.49-1.29	0.366
Hypertension	0.86	0.25	-0.49	0.48-1.53	0.627
Palpitations	1.38	0.39	1.15	0.79-2.43	0.252
Smoking cessation recommended by a doctor	0.83	0.21	-0.69	0.50-1.39	0.490
Currently receiving medical care	0.71	0.22	-1.08	0.38-1.31	0.279

95%CI = 95% confidence interval.
The regression was performed using the variable success as the dependent variable.
Treatment failure was the reference category.
Number of observations = 344; Pseudo R^2 = 0.09.

Table 3 presents the results of linear correlation analysis. The strongest correlation found was moderate (0.42). Table 4 shows the results of logistic regression. The majority of the statistically significant correlations were not confirmed. After regression, TTFC was the only variable that correlated with treatment success (beta = 1.85, 95% confidence interval [95%CI] = 1.11-3.10, p = 0.018).

Discussion

The main contribution of this study is its evaluation of the diverse variables (sociodemographic profile, medical profile, smoking profile, psychiatric treatment or other addiction, motivation/expectation, and type of treatment) that affect smoking treatment outcomes in a sample of patients at a CAPS unit that treats MHA patients. Over one-quarter of the patients in our sample were receiving treatment for hypertension or psychiatric disorders and almost one-fifth reported problems with alcohol. However, these variables (hypertension, psychiatric treatment, and alcohol problems) were not more important than TTFC in their correlations with treatment success after logistic regression. This finding is similar to previous results in the general population. For the TTFC variable, we found the highest success rate among the patients who reported smoking their first cigarette at least 5 minutes after waking. This study supports the importance of the variable TTFC in treatment outcomes for a sample with a high rate of clinical and psychiatric disorders, making TTFC a valid predictor of treatment outcome.

The TTFC variable evaluates the self-reported average time, in minutes, elapsed between waking and smoking the first cigarette of the day. Many studies have measured this variable to evaluate levels of nicotine dependence.[24-26] Our findings support the importance of this variable for smoking cessation[24] in different populations. Our results may also indicate that this variable is the best indicator of tobacco dependence, as other studies have shown,[25,26] because it can predict the difficulty a smoker faces in abstaining from cigarettes. The variable cigarettes smoked per day has also been associated with a greater degree of dependence in some studies[27,28] in the general population, but it did not reach statistical significance for correlation with treatment success. In researching a sample different than that of the present study, Meszaros et al.[29] found that sex was not an important variable for smoking treatment outcomes in MHA patients, which is corroborated by our study. The search for variables that influence the outcomes of smoking cessation in patients with other addictions may contribute to the development of new treatments and has been supported in previous studies.[6]

Recent studies have highlighted the importance of the diagnosis and treatment of tobacco dependence in MHA patients.[5] There is a false perception that reducing or abstaining from smoking could affect the clinical status of MHA patients.[5] It does indeed appear that abstinence may exacerbate cognitive symptoms in patients with schizophrenia,[5] but this is not the case for all psychiatric symptoms. In clinical practice, researchers have focused on several groups for a more targeted intervention that is suited to their circumstances and, therefore, more effective.[30-34] Studies of pregnant women,[30] patients with schizophrenia,[31,32] and patients with anxiety disorders[33,34] have been published recently. The present study reinforces the idea that MHA patients must follow the standard treatments used for the general population who seek medical help to quit smoking. A combination of pharmacotherapy and group therapy based on

cognitive-behavioral principles was used in the present sample. Health units that permit the combination of smoking treatments with ongoing pharmacological treatment and close monitoring of patients may have a success rate similar to that of treatments administered to the general population. These recommendations are based on data from reviews of the recent literature.[5,18]

Patients who smoke their first cigarette within 5 minutes of waking should be addressed as patients who face greater difficulty than the rest of the population in quitting smoking, and could be targets for future studies with specific interventions. Nicotine gum is a type of nicotine replacement therapy that has proven efficient in the treatment of nicotine dependence,[35] and studies could test its use among smokers immediately after waking. Fast-release gums[36] would be especially interesting for this purpose. Other inhaled nicotine delivery systems that induce a fast nicotine peak,[36] such as one puff from a normal cigarette, could be used in patients shortly after waking. Interventions based on behavioral therapy could be used to target this craving for the first cigarette[37] by focusing on the earliest period of the day.

The main limitations of this study are attributable to the fact that withdrawal was assessed on the basis of patient reports. Quantitation of salivary cotinine and carbon monoxide could have been useful.[38] In addition, as relapses are not infrequent in abstinent patients,[39] we could have evaluated the action variables over a longer period by monitoring the patients for longer than 6 weeks or recalling them after some time to investigate long-term nicotine withdrawal. Beyond that, the majority of the variables were collected on the basis of patient reports.

Varenicline, an important medication in the treatment of tobacco addiction,[40] was not used in this study because it was not available through the National Anti-Smoking Program. This study did not include a diagnostic tool to assess the presence of MHA disorders, and these variables were based only on patient reports. There was no measure of treatment participation, since patients were excluded from the study when they first missed a visit. There was no measure of counseling service, as perfect attendance was a prerequisite for continuing treatment.

The 6-week protocol used in the present study is short, given that the majority of protocols take 12 weeks. Moreover, this study reports on the outcomes of a smoking cessation intervention using standard practices, including group therapy sessions combined with pharmacotherapy, but it bears stressing that there is no written manual or protocol for this treatment approach. Use of the exact same approach in other settings would be very difficult.

In summary, our findings support the predictive value of TTFC in smoking treatment outcomes in a sample with a high rate of medical, psychiatric and addiction disorders. These findings support those of previous studies in the general population. A combination of pharmacological treatment, group therapy based on cognitive-behavioral concepts, and ongoing treatment for other addiction/psychiatric disorders showed good success rates ($>$ 35% for patients with psychiatric and alcohol use disorders). Units that deal with MHA patients, such as CAPS in Brazil, should be encouraged to treat smoking addiction in this population. Multicenter and prospective studies of longer duration and enrolling a greater number of MHA patients who smoke their first cigarette within the first 5 minutes of the day could provide more information about this patient population.

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Disclosure

The authors report no conflicts of interest.

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