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Factors Influencing Methadone Treatment Adherence of Drug Abusers: A Study in a Typical Medical Center in Vietnam

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ABSTRACT

Objective: Analyze factors influencing Methadone treatment adherence (MTA) of drug addicts to guide intervention solutions to improve treatment effectiveness.

Research Method: Cross-sectional descriptive study combining quantitative and qualitative methods. A sample of 98 patients undergoing Methadone treatment at a typical Methadone Treatment Center (MTC) in Vietnam was selected, along with interviews with health workers and patients' families from September 2019 to September 2020.

Results: This study identified several factors affecting treatment adherence include Occupational factors such as Unemployed patients were 4.37 times more likely to be non-adherent to treatment than employed patients ($p<0.05$), Patients experiencing side effects during Methadone treatment were 3.97 times more likely to be non-adherent than those without side effects ($p<0.05$), Substance use such as the Patients using Heroin and other illegal addictive substances during Methadone treatment had lower adherence rates than non-users ($p<0.05$). Other factors such as maintenance dose, HIV infection status, hepatitis B, hepatitis C condition, personal income, total drug use duration, knowledge of treatment adherence, influence of local police, social support policies, and having friends who inject drugs were also associated with treatment adherence, but these associations were not statistically significant ($p>0.05$).

Conclusion: Unemployed patients or those experiencing side effects during Methadone treatment are at higher risk of non-adherence. Patients using Heroin and other illegal addictive substances during Methadone treatment have lower adherence rates.

Keywords: Factors Influencing, Methadone, treatment adherence, drug addiction

INTRODUCTION

Opioids top the list of substances causing health burdens and are associated with deaths related to mental health, HIV/AIDS, hepatitis, and overdose [1].

Globally, methadone maintenance treatment (MMT) has been known since the 1960s as a long-term, controlled, inexpensive treatment administered orally in syrup form. It helps prevent blood-borne diseases like HIV, hepatitis B, and hepatitis C condition, while also helping patients recover psychologically, socially, and occupationally, and reintegrate into the community [2].

In 2013, the Vietnamese government approved the plan to reform drug addiction treatment in Vietnam until 2020 [3]. Vietnam has been implementing the pilot MMT program since 2008, demonstrating the effectiveness of methadone treatment in controlling heroin addiction and gaining approval for nationwide service expansion. Currently, Vietnam is treating 53.818 patients at 299 facilities [4].

Methadone is a synthetic opioids (SOs) with pharmacological effects similar to other SOs (agonists) like heroin and Codein. Thus, when opioid-addicted patients are treated with adequate doses of methadone, they no longer crave heroin [5]. Conversely, poor adherence or inadequate methadone doses can significantly increase the risk of illicit drug use and treatment failure; poor adherence can significantly increase the risk of relapse and predict treatment failure. Daily attendance at the treatment facility is a crucial indicator of treatment adherence. Adherence also depends on the patient and various support activities from the treatment facility, family, friends, fellow methadone users, and society. Successful treatment requires patient adherence to the treatment program's regulations, which is also a criterion for evaluating the program's success.

Understanding the factors influencing treatment adherence will help us gather specific data and evidence to develop appropriate solutions for effective management and treatment. Therefore, we conducted this study at a typical methadone treatment center established in 2019 within the Vietnamese program system. The main objective is to analyze the factors affecting methadone treatment adherence (MTA) of drug addicts at a typical rehabilitation center in Vietnam to guide intervention solutions for improving treatment effectiveness.

RESEARCH BACKGROUND

Research Design: This study used a cross-sectional design, combining quantitative and qualitative methods. A total sample of 98 methadone patients at a Methadone Treatment Center in Vietnam (Do Luong Medical center, Nghe An Province in Vietnam), were selected from September 2019 to September 2020.

Study Participants: Patients: Patients undergoing methadone maintenance treatment for more than one month at the time of the study; **Health workers (HWs):** HWs working at the treatment facility for at least six months; **Family members of patients:** Family members of patients undergoing methadone treatment.

Research Framework: Based on Richard Jessor's (1987) health behavior theory and existing literature, this study identified four key factors influencing methadone treatment adherence:

1. Individual factors: Personal characteristics, knowledge, and attitudes.
2. Treatment factors: Quality of methadone treatment services.
3. Environmental factors: Social support, community environment.
4. Family and social factors**:** Family support and influence.

Factors Influencing Methadone Treatment Adherence

- **Individual Factors:** Age, gender, marital status, education level, occupation, income, duration of drug use, HIV infection status, hepatitis B, hepatitis C condition, economic situation, knowledge, attitudes, and practices regarding methadone treatment and adherence
- **Family and social Factors:** Support from family members in terms of finances and spirit; Discrimination.
- **Treatment Factors:** Access to Methadone Treatment center (MTC): Distance to MTC, transportation; Treatment process: Examination, counseling, testing, medication intake; MTC regulations: Fees for services, working hours of the MTC; Healthcare workers (HWs): Support, attitude from healthcare workers.
- **Environmental Factors:** Drug addicts; Law enforcement; Police support during treatment; Supportive social policies

Ethical Considerations: The study obtained approval from the Methadone Treatment Center's leadership and consent from patients, family members, and HWs. The research protocol was reviewed and approved by the Ethics Committee of the Hanoi University of Public Health, Ministry of Health, Vietnam.

Data Analysis: Data were collected using questionnaires and interviews. Data were entered and managed using Epidata 3.1 software. Statistical analysis was performed using Stata 15.0. Descriptive analysis was conducted to describe the characteristics of the study participants and their adherence to methadone treatment. Multivariate analysis was used to identify factors associated with treatment adherence.

RESULTS

Factors influencing of the individual characteristics to Methadone Treatment Adherence

Socio-demographic characteristics of study participants

All 98 participants were an ethnicity (Kinh ethnicity), residing mainly in the district. The average age was 37.9 ± 7.8 years, ranging from 19 to 52 years. The majority (80.6%) were 30 years old or older. Most participants (93/98, 94.9%) lived in the area, while 5.1% lived in neighboring areas.

Regarding education, 41.9% had a high school diploma or lower, while 58.1% had a high school diploma or higher. Most participants (87.8%) were employed, while 12.2% were unemployed. In terms of marital status, 26.5% were single, 65.3% were married, and 8.2% were divorced or separated.

Socio-demographic and social factors

Table 1: Factors associated with socio-demographic characteristics and methadone treatment adherence

Socio-demographic and social factors		Treatment Adherence		OR (95% CI)	P
		Yes	No		
Age	< 30 years	11	4	0.76 (0.22-2.67)	>0.05
	≥ 30 years	65	18		
Education level	High school diploma or higher	30	11	65 (0.25-1.69)	> 0.05
	< High school diploma	46	11		

Occupation	Employed	70	16	4.37 (1.24-15.2)	<0.05
	Unemployed	6	6		
Marital status	Single	23	3		>0.05
	Married	48	16		
	Divorced/separated/widowed	5	3		
Living arrangement	Alone	3	0		>0.05
	With family/friends	73	22		
Income	Self-supporting	52	13	1.50	>0.05
	Dependent on family	24	9	0.56-3.99	

Table 1 shows that occupation had a significant impact on treatment adherence at the Methadone treatment center (MTC). Employed participants were 4.37 times more likely to adhere to treatment than unemployed participants (OR = 4.37, 95% CI: 1.24-15.2; P < 0.05).
Self-supporting participants were 1.5 times more likely to adhere to treatment than those dependent on their families, but this difference was not statistically significant (P > 0.05).

Table 2: Factors influencing the relationship between behavioral characteristics and Methadone Treatment Adherence (MTA)

Factors influencing the relationship between behavioral characteristics and Methadone		**Methadone Treatment Adherence**		**OR (95% CI)**	**P**
		Yes	**No**		
Initial treatment dose	≥ 20 mg	21	8	0.67 (0.24-1.82)	> 0.05
	< 20 mg	55	14		
Maintenance treatment dose	≥ 60 mg	42	8	2.16 (0.81-5.76)	> 0.05
	< 60 mg	34	14		
Assessment of withdrawal syndrome at the beginning of treatment	Mild	40	14	0.63 (0.24-1.69)	> 0.05
	Moderate to severe	36	8		
Factors related to side effects of the drug	None	37	7	3.97 (1.02-7.63)	< 0.05
	Yes	33	15		
Common side effects of the drug	Sweating	9	2	1.19 (0.22-6.5)	> 0.05
	Constipation	33	7	1.89 (0.45-7.78)	
	Decreased libido	20	7	0.50 (0.13-1.95)	
	Tooth decay	0	0		
	Sleep disturbances	4	1	1.03(0.10-10.22)	
Factors related to the history of using SOs with MTA					
Age of starting drug use	< 30 years	11	4	0.76 (0.22-2.67)	> 0.05
	≥ 30 years	65	18		
Total duration of drug use	≥ 3 years	63	17	1.42 (0.45-4.56)	> 0.05
	< 3 years	13	5		
History of use shared syringes and needles	Yes	11	4	0.77 (0.22-2.72)	> 0.05
	None	64	18		
History of overdose	Yes	6	4	0.39 (0.1-1.51)	> 0.05
	None	70	18		
History of drug addition rehabilitation	Yes	46	12	1.27 (0.49-3.32)	> 0.05
	None	30	10		
Factors related to the use of heroin, other illicit drugs, alcohol, and tobacco during MMT					
Heroin test in urine	Negative	56	8	4.9 (1.78-13.42)	< 0.05
	Positive	20	14		
Alcohol use during MMT	Yes	61	18	0.90 (0.27-3.07)	> 0.05
	None	15	4		
Use of other illicit drugs during MMT	Yes	62	12	3.69 (1.33-10.23)	< 0.05
	None	14	10		
Factors related to the HIV infection status, hepatis B condition, hepatis C condition with					

MMT					
HIV infection status	Positive	11	4	0.76 (0.22-2.67)	> 0.05
	Negative	65	18		
Hepatis B condition	Positive	3	3	0.26 (0.49-1.39)	> 0.05
	Negative	73	19		
Hepatis C condition	Positive	45	11	1.45 (0.56-3.76)	> 0.05
	Negative	31	11		

Table 2 shows that heroin use during MMT has a significant negative impact on adherence to MMT. Patients who used heroin during MMT were 4.9 times less likely to adhere to MMT compared to those who did not use heroin during MMT (OR = 3.69, p <0.05).

Results of the survey on the relationship between knowledge factors related to the Methadone Maintenance Treatment (MMT) program and adherence to MMT

Table 3: Relationship between knowledge of MMT program and adherence to MMT

Factors related to MMT program		**Methadone Treatment Adherence**		**OR (95% CI)**	**P**
		Yes	**No**		
Knowledge of MMT program	Good	6	3	0.54 (0.12-2.37)	> 0.05
	Poor	70	19		
Knowledge of MTA program	Good	61	14	2.32 (0.82-6.55)	> 0.05
	Poor	15	8		

Table 3 shows that patients' knowledge of the MMT program or MTA program was not statistically significant impact on adherence to MMT (p > 0.05)

Factors influencing of the family and social to Methadone Treatment Adherence

Table 4: Relationship between discrimination and adherence to MMT

Factors related to MMT program		**Methadone Treatment Adherence**		**OR (95% CI)**	**P**
		Yes	**No**		
Discrimination	Yes	62	16	1.66 (0.55-5.00)	> 0.05
	None	14	6		
Total (n)		76	22		
Total (n)		**n = 98**			

Table 4 shows that patients who experienced discrimination were 1.66 times more likely to adhere to MMT compared to those who did not experience discrimination. However, this difference was not statistically significant (p > 0.05).

Factors influencing of the treatment to Methadone Treatment Adherence

Table 5: Factors influencing the relationship between policy-related factors and Methadone Treatment Adherence (MTA)

Factors influencing the relationship between policy-related factors and MTA		**Methadone Treatment Adherence (MTA)**		**OR (95% CI)**	**P**
		Yes	**No**		
Factors related to the distance to the Methadone Treatment Center (MTC)					
Distance to MTC	< 3 km	26	9	0.75 (0.28 - 1.98)	> 0.05
	≥ 3 km	50	13		
Factors related to satisfaction with treatment services					> 0.05
Satisfaction with HWs	Satisfied	60	21	0.18 (0.02-1.43)	> 0.05
	Not satisfied	16	1		
Satisfaction with	Satisfied	65	22		> 0.05

professional process	Not satisfied	11	0		
Satisfaction with medication intake time	Satisfied	72	22		> 0.05
	Not satisfied	3	0		
Satisfaction with treatment costs	Satisfied	60	22		> 0.05
	Not satisfied	16	0		
Total (n)		**n = 98**			

Table 5 shows that there was no statistically significant relationship between distance to the MTC, satisfaction with treatment services, and adherence to MMT (p>0.05).

Factors influencing of the environment to Methadone Treatment Adherence

Table 6: Factors influencing the relationship between the influence of friends, law enforcement, and social policies on Methadone Treatment Adherence (MTA)

Factors influencing of the environment to MTA		**Methadone Treatment Adherence (MTA)**		**OR (95% CI)**	**P**
		Yes	**No**		
Factors related to the influence of friends					
Influence of drug addict friends	Yes	59	19	0.55 (0.14-2.08)	> 0.05
	No	17	3		
Factors related to the influence of law enforcement					
Influence of law enforcement	Yes	8	1	2.47 (0.29-20.91)	> 0.05
	No	68	21		
Influence of police support during treatment	Yes	24	7	0.99 (0.36-2.74)	> 0.05
	No	52	15		
Factors related to the influence of social policies					
Influence of supportive social policies	Yes	74	21	1.76 (0.15-20.4)	> 0.05
	No	2	1		
Total (n)		**n = 98**			

Table 6 shows that patients who met with drug addict friends were more likely to have lower adherence to MMT than those who did not meet or rarely met with drug addict friends (OR=0.55, 95% CI: 0.14-2.08), although this difference was not statistically significant. The influence of law enforcement and social policies on adherence to MMT was not statistically significant (p>0.05). However, patients who were influenced by law enforcement were 2.47 times more likely to have higher adherence to MMT than those who were not influenced (OR=2.47, p > 0.05). Additionally, patients who received social support during treatment were 1.76 times more likely to have higher adherence to MMT than those who did not receive such support.

DISCUSSION

Factors influencing of the individual characteristics to Methadone Treatment Adherence

Socio-demographic characteristics (Table 1)

Many studies worldwide have shown that older age is associated with better treatment adherence. Shen J and colleagues in Yunnan found that younger people had a 1.04 times worse treatment adherence rate than older people (p<0.05) [6]; Similarly, Zhou K's study found that being over 30 was a protective factor for treatment adherence (p<0.05) [7].

Studies worldwide have shown that female have better treatment adherence than male. Zhou K's study found that being female was a protective factor for treatment adherence (p< 0.05) [7]. Similarly, women had higher treatment adherence rates than male in studies by Vikas Sharma [8], Adili in Tanzania (2013) [9], and Roux in France (2014) [10]. However, this difference was not statistically significant [7], [8]. Women had a higher adherence rate to Methadone treatment in studies by Adili in Tanzania in 2013 [9] and Roux in France in 2014 [10]. However, female had lower treatment adherence rates than male in a study by Lambers in Amsterdam [11]. In Vietnam, no studies have found a relationship between gender and treatment adherence.

Higher education levels are associated with better treatment adherence. A study in Nepal found that treatment adherence among those with a primary school education or lower was 45.5%, while those with a secondary school education or higher was 81.8%. The difference was statistically significant (p<0.05) [8].

Some studies on occupation and income with treatment adherence worldwide have shown that people with stable jobs and incomes have higher treatment adherence rates than those with unstable employment. In Jing H's study, this difference was 1.69 times [12]. Adili's study in Tanzania in 2013 on 609 Methadone patients at

Muhimbili National Hospital showed that 72.7% had income from work, 56.7% from family and friends, and 42.7% from illegal activities. Patients with income from work had a 1.5 times higher adherence rate than those without income [9].

Behavioral characteristics (Table 2)

Methadone dosage **(Table 2):** Studies worldwide and in Vietnam have shown that the initial, maintenance, and current doses of Methadone influence treatment adherence. A study in Yunnan, China, showed that a daily dose of less than 60 mg was significantly associated with worse treatment adherence, 4.07 times worse than those using doses above 60 mg [13].

Factors related to the history of drug use **(Table 2):** Some studies have shown differences in treatment adherence rates between groups with different durations of drug use, but no significant differences have been found. In Vietnam, a study by Dao TMA found that patients with a longer history of drug use had lower dropout rates. Specifically, the dropout rate of patients with a drug use history of more than 7 years was 0.62 times that of those with a drug use history of less than 7 years ($p<0.05$) [14].

Health status **(Table 2):** This factor also contributes to treatment adherence among patients in MMT programs. A study by Gu in Guangzhou in 2014 found that factors affecting treatment adherence included poor health, negative mood, anxiety/depression, or experiencing unpleasant events, which led to lower adherence compared to normal individuals [15].

Substance use during Methadone treatment **(Table 2):** This also affects treatment adherence. A study by Raffa, which followed 60 patients in Vancouver from 2002 to 2005, found that 93.8% of patients who tested negative for heroin adhered to treatment, while the rate was 84.2% for those who tested positive for heroin. However, amphetamine use did not affect treatment adherence; in fact, adherence rates were higher [16]. Sharma (2016) found that patients who did not use substances for 3 months had a 2.7 times higher adherence rate [8]. Many studies have shown that higher Methadone doses are associated with higher adherence rates [16], [17].

HIV/AIDS infection status and ARV treatment **(Table 2):** According to a study by Zhon K, HIV-positive patients who received ARV treatment had better treatment adherence than those who did not [7].

Knowledge of the treatment program (Table 3)

According to a study by Vikas Sharma in Nepal (2016), patients with good knowledge of Methadone treatment had a 9.4 times higher adherence rate than those with average or poor knowledge [8], demonstrating that patients with good knowledge of Methadone have a better understanding of the importance of this program.

Gu followed 158 patients undergoing Methadone treatment for 18 months (from May 2009 to October 2010) and conducted qualitative interviews with 15 new patients to study misconceptions about Methadone that affected treatment adherence and dropout rates. The study found that the more misconceptions about MMT, the lower the treatment adherence rate [15].

Factors influencing of the family and social to Methadone Treatment Adherence

Family support **(Table 4)** is a factor that strengthens Methadone treatment adherence, including both emotional and financial support. According to Lambers (2010), patients who do not receive family support and have no long-term partners within a month have higher dropout rates (14.2% compared to 7.0% and 12.4% compared to 11.3%). This may be because family members and partners can help remind them to take medication and encourage them during treatment [17].

A study by Sharma (2016) showed that patients who received high levels of family support had higher adherence rates than those who received only moderate or low levels of support (87.2% compared to 66.1%). Similarly, patients who received high levels of support from healthcare providers had an adherence rate of 87.7% compared to those who received moderate or low levels of support (63.9%) [8].

Stigma and discrimination: In a study by Nguyen AH et al, stigma and discrimination were obstacles to maintaining Methadone treatment due to patients' fear of others knowing their status as drug users. This affected their work and family life [18].

Factors influencing of the treatment to the Methadone Treatment Adherence (Table 5)

Accessibility to the MTC (Table 5): The availability and ease of access to services are factors that increase the likelihood of staying in the program and adhering to MMT. A study by Vikas Sharma and colleagues found that the adherence rate among patients who rated the availability of methadone treatment services as high was 83.6%, while those who rated it as moderate to low was only 44.9%, a significant difference ($p<0.01$). A study by Kyle Beardsley showed that patients who lived more than 4 miles from the MTC had shorter program durations than those who lived less than 1 mile ($p<0.05$), as the distance to the treatment facility and transportation can be barriers for patients to attend daily [19].

Fees for services (Table 5): Fees for treatment services are associated with increased dropout rates. A randomized controlled trial in San Francisco showed that providing free methadone treatment led to higher rates

of connecting drug-addicted patients to treatment centers and increased retention in methadone treatment programs compared to fee-based treatment [13].

Working hours of the MTC (Table 5): Inconvenient working hours of the MTC can lead to treatment dropout due to conflicts with patients' work schedules. As a result, they may not be able to leave work to attend the center daily [18].

Support from healthcare workers (Table 5): The adherence rate among patients who rated the support from healthcare worker as high was 87.7%, while those who rated it as moderate to low was 63.9% [12].

Attitude of healthcare workers (Table 5): The attitude of healthcare providers can be a factor leading to treatment dropout as patients may feel discriminated against and stigmatized, which can affect their self-esteem [18]. This can affect satisfaction with treatment services and, consequently, treatment adherence.

Factors influencing of the environment to Methadone Treatment Adherence (Table 6)

The influence of drug addicts (Table 6): Having friends who are drug users is a risk factor for dropping out of Methadone treatment. Zhou K's study showed that not having contact with drug users in the past month was a protective factor against dropping out of Methadone treatment [7]. Another study in China on drug users participating in Methadone treatment showed that the retention rate was lower among clients with friends who were drug users compared to those who did not have such friends [20].

Gu's study (2014) showed that among patients adhering to Methadone treatment, 6.8% and 9.8% had interactions with drug users, while 6% were persuaded by drug-using friends to drop out of Methadone treatment, compared to 13.5%, 14.3%, and 9.8%, respectively, among those who did not adhere to treatment [15].

The influence of Law enforcement (Table 6): This is also a factor that hinders treatment adherence. Law enforcement in the area of residence can be a factor in selecting patients to participate in the MMT program. Some patients who are still using drugs may be arrested, or some patients may avoid appearing at the treatment facility (crowded places) due to fear of the police, disrupting treatment [21].

The influence of police support during treatment (Table 6): There are certain effects on participation in and the process of Methadone treatment, such as being stigmatized at Methadone treatment facilities, being discriminated against at work, and being discriminated against at healthcare facilities, which have reduced treatment adherence among patients. This finding was also pointed out in a study by Sanders (2013), where patients sometimes felt ashamed to participate in the MMT program because their drug addiction status was known to many people, which could affect their treatment process [22].

The influence of supportive social policies (Table 6): For patients who adhere well to treatment and do not relapse into heroin use during treatment, they will not be forced into compulsory rehabilitation. For poor households, they will be supported with 95% of the treatment costs at the facility, which is one of the factors influencing the patient's MTA status.

CONCLUSION

This study has identified several factors influencing treatment adherence such as Occupational factors: Unemployed patients were 4.37 times more likely to be non-adherent to treatment than employed patients ($p<0.05$); Side effects: Patients experiencing side effects during Methadone treatment were 3.97 times more likely to be non-adherent than those without side effects ($p<0.05$); Substance use: Patients using Heroin and other illegal addictive substances during Methadone treatment had lower adherence rates than non-users ($p<0.05$).

Other factors such as maintenance dose, HIV infection status, hepatitis B, hepatitis C condition, personal income, total drug use duration, knowledge of treatment adherence, influence of local police, social support policies, and having friends who inject drugs were also associated with treatment adherence, but these associations were not statistically significant ($p>0.05$).

RECOMMENDATIONS

Based on the research findings, we offer the following recommendations:

For patients: Strictly adhere to the treatment facility's regulations, especially avoiding Heroin and other addictive substances during treatment. Actively participate in counseling and group sessions to gain a comprehensive understanding of Methadone treatment.

For family members and caregivers: Actively participate in group sessions to learn about Methadone treatment and adherence to support patients better. Monitor and support patients when they experience side effects. Collaborate closely with the treatment facility to monitor and remind patients to adhere to treatment, helping them improve treatment adherence and enhance the program's effectiveness.

For Methadone treatment centers: Healthcare providers should pay closer attention to counseling, monitoring, and collaborating with families for unemployed patients and those experiencing side effects. Collaborate with the Department of Labor, War Invalids, and Social Affairs to provide job counseling and

placement for unemployed patients. Conduct in-depth analysis of the reasons for non-adherence to develop appropriate strategies to reduce dropout rates. In the short term, focus on educating, reminding, and closely monitoring unemployed patients, those experiencing side effects, and those using Heroin and other illegal addictive substances during treatment.

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