Journal of Addictive Diseases

ISSN: 1055-0887 (Print) 1545-0848 (Online) Journal homepage: http://www.tandfonline.com/loi/wjad20

Incarcerated intravenous heroin users: Predictors of post-release utilization of methadone maintenance treatment

Huang-Chi Lin MD, MS, Peng-Wei Wang MD, MS, Yi-Hsin Yang PhD, Jih-Jin Tsai MD, PhD & Cheng-Fang Yen MD, PhD

To cite this article: Huang-Chi Lin MD, MS, Peng-Wei Wang MD, MS, Yi-Hsin Yang PhD, Jih-Jin Tsai MD, PhD & Cheng-Fang Yen MD, PhD (2016) Incarcerated intravenous heroin users: Predictors of post-release utilization of methadone maintenance treatment, Journal of Addictive Diseases, 35:2, 109-118, DOI: 10.1080/10550887.2015.1122467

To link to this article: http://dx.doi.org/10.1080/10550887.2015.1122467

Accepted author version posted online: 15 Dec 2015.
Published online: 15 Dec 2015.

JOURNAL OF ADDICTIVE DISEASES
2016, VOL. 35, NO. 2, 109–118
http://dx.doi.org/10.1080/10550887.2015.1122467

Routledge
Taylor & Francis Group

ARTICLE

Incarcerated intravenous heroin users: Predictors of post-release utilization of methadone maintenance treatment

Huang-Chi Lin, MD, MS[a,b], Peng-Wei Wang, MD, MS[a,b], Yi-Hsin Yang, PhD[c,d], Jih-Jin Tsai, MD, PhD[e,f,g], and Cheng-Fang Yen, MD, PhD[a,b]

[a]Department of Psychiatry, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan; [b]Department of Psychiatry, Faculty of Medicine and Graduate Institute of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan; [c]School of Pharmacy, Kaohsiung Medical University, Kaohsiung, Taiwan; [d]Division of Medical Statistics and Bioinformatics, Department of Medical Research, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan; [e]Department of Infectious Diseases, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan; [f]Tropical Medicine Center, Kaohsiung Medical University Hospital, Kaohsiung, Taiwan; [g]Department of Internal Medicine, Faculty of Medicine and Graduate Institute of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

ABSTRACT

Incarcerated intravenous heroin users have more problematic patterns of heroin use, but are less likely to access methadone maintenance treatment by their own initiative than heroin users in the community. The present study examined predictors for receiving methadone maintenance treatment post-release among incarcerated intravenous heroin users within a 24-month period. This cohort study recruited 315 incarcerated intravenous heroin users detained in 4 prisons in southern Taiwan and followed up within the 24-month period post-release. Cox proportional hazards regression analysis was applied to determine the predictive effects of sociodemographic and drug-use characteristics, attitude toward methadone maintenance treatment, human immunodeficiency virus serostatus, perceived family support, and depression for access to methadone maintenance treatment after release. There were 295 (93.7%) incarcerated intravenous heroin users released that entered the follow-up phase of the study. During the 24-month follow-up period, 50.8% of them received methadone maintenance treatment. After controlling for the effects of the detainment period before and after recruitment by Cox proportional hazards regression analysis, incarcerated intravenous heroin users who had positive human immunodeficiency virus serostatus (HR = 2.85, 95% CI = 1.80–4.52, $p < .001$) and had ever received methadone maintenance treatment before committal (HR = 1.94, 95% CI = 1.23–3.05, $p < .01$) were more likely to enter methadone maintenance treatment within the 24-month follow-up period. Positive human immunodeficiency virus serostatus with fully subsidized treatment and previous methadone maintenance treatment experiences predicted access of methadone maintenance treatment post-release. Strategies for getting familiar with methadone maintenance treatment during detainment, including providing methadone maintenance treatment prior to release and lowering the economic burden of receiving treatment, may facilitate entry of methadone maintenance treatment for incarcerated intravenous heroin users.

KEYWORDS

Heroin; methadone maintenance treatment; predictor

Introduction

Because of its high addictive property, heroin is one of the most widely used illicit drugs in Taiwan.[1] According to the Taiwan Ministry of Justice, Schedule I drugs accounted for one-third of illicit drug use among drug users apprehended in 2012 in Taiwan, and the majority of these offences were for heroin.[2] Over the past 30 years, the Taiwan government has organized legal, educational, and public health systems for combating illicit drug use problems. The criminal justice system has included correctional facilities and prisons, as well as a suppressive policy in these programs in the past decades. According to the Taiwan Statute for Narcotics Hazard Control, heroin users have one chance to discontinue habitual heroin use under supervision and rehabilitation in compulsory detoxification centers before prosecution. If they resume heroin use, they will subsequently be apprehended, sentenced, and imprisoned. However, detainment in a correctional facility, or imprisonment based on the concepts

CONTACT Cheng-Fang Yen, MD, PhD p03132006@gmail.com Department of Psychiatry, Kaohsiung Medical University Hospital, 100 Tzyou 1st Road, Kaohsiung 807, Taiwan; or Jih-Jin Tsai, MD, PhD jijits@cc.kmu.edu.tw Department of Infectious Diseases, Kaohsiung Medical University Hospital, No. 100, Tzyou 1st Road, Kaohsiung 807, Taiwan.

of isolation and punishment has limited effectiveness in combating substance-related problems. A study conducted on heroin users in compulsory detoxification centers in China reported that nearly all detainees considered a relapse to heroin use after release as unavoidable.[3] Another study demonstrated the early relapse tendency of substance use after release, in which 42% of former prison intimates returned to substance use within 1 week after release.[4] Such controlled strategies have little effectiveness for terminating heroin use, and limited efficiency for reducing the transmission risks of blood-borne diseases after release or even during detainment.[5]

Because of epidemics of human immunodeficiency virus (HIV) infections among injecting drug users (IDUs), the Taiwan government has taken new steps to manage this public health concern.[6] Aside from the conventional suppressive policy, harm reduction strategies, such as syringe-exchange programs and methadone maintenance treatment (MMT), were introduced to Taiwan in 2005. Methadone is a long-acting opioid agonist which can alleviate opiate withdrawal symptoms and decrease heroin cravings.[7] Research has demonstrated the efficacy of MMT in reducing heroin use,[8,9] decreasing the transmission risk of blood-borne diseases,[8,10,11] increasing employment and socialization,[9] lowering criminal activities,[12] and reducing recidivism and reincarceration.[11] MMT has proven to be the preferred treatment for heroin-related problems because of its cost-effectiveness.[13,14]

Several studies have investigated facilitators and barriers associated with MMT access among heroin users.[15,16] Factors associated with receiving MMT include female gender and older age,[17] free-of-charge programs,[18,19] prior experiences of receiving methadone programs or maintenance treatments,[15,18] and positive HIV serostatus.[17] However, social disadvantages (such as homelessness, lack of income, and lack of insurance),[15,16,20] injection heroin-use behaviors,[17] long waiting lists,[15] and polysubstance use[15] have hindered access to MMT. No cohort study has explored factors that predict participation in MMT programs after release from prison among incarcerated intravenous heroin users (IIHUs), who represent a unique population that differs from heroin users in the community. Incarcerated heroin users are more likely to be IDUs than heroin users in the community,[21] use heroin regularly, and account for most heroin-use related crimes.[22,23] IDU inmates also pose additional risks for criminal recidivism.[24] Although incarcerated heroin users are characterized by problematic patterns of heroin use and are in urgent need of effective intervention to break revolving cycles of relapse and recidivism, they are less likely to access MMT by their own initiative than heroin users who are not recently incarcerated.[16,17,25] As far back as 2007, there had been pilot schemes of implementing MMT during detainment for heroin users in Taiwan. However, these pre-release MMT programs were terminated by the authorities concerned because of the shortage of medical manpower in prisons, security concerns, prisoner's acceptance, and government regulation regarding MMT. The majority of MMT in Taiwan is still a hospital-based service for heroin users in the community. Thus, the Taiwan government has disseminated MMT information to prison inmates to facilitate access to post-release treatment. However, the effectiveness of such advocacies for linkage to aftercare post-release remains unknown. The present study aimed to determine the time points and predictors for access to MMT post-release form four prisons in Southern Taiwan which did not provide pre-release MMT within a 24-month period.

Method

Study design

The study is a cohort study with 24-month follow-up. The authors established a cohort of IIHUs in prisons in southern Taiwan and followed up every 3 months post-release to examine time points and predictors for receiving MMT after release from prisons within a 24-month period.

Participants

IIHUs sentenced for heroin use and detained in four prisons in Southern Taiwan were recruited for this study from May 2008 through April 2009. Eligible participants met the diagnosis of heroin dependence according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)[26] before incarceration, reported injection as the main route for heroin administration, and had complete capacity to sign an informed consent. Those who were younger than 20 or older than 60, those who refused to join the study, and those who could not cooperate (e.g., intellectual disability or in

acute stage of psychosis) were excluded from the study. Written informed consent was obtained from all participants before the study commenced. The study protocol was approved by the Institutional Review Board of Kaohsiung Medical University.

Data collection

Three research assistants explained the purpose and procedures of this study to the inmates and invited them to participate. Written informed consent was obtained from all participants before the study commenced. Research assistants read all the questions to the participants face-to-face to ensure that the participants understood the survey content and to facilitate optimal validity and reliability of the investigation. All of the assessments and baseline data were collected at study entry.

There was a follow up with participants every 3 months during the total 24-month period after they were released from prison. The date of receiving MMT was confirmed using the national case manager system and telephone visits.

Instruments

Client Attitudes Toward Methadone Programs Scale (CAMP)

The 5-item 4-point CAMP scale assesses heroin-user attitudes toward receiving MMT.[27] Higher total scores on the CAMP scale indicate an unfavorable attitude toward receiving MMT.

The Chinese version of the Severity of Dependence Scale ($SDS^{[Ch]}$)

The 5-item 4-point $SDS^{[Ch]}$[28,29] was used to assess participants' severity of heroin use within 1 year before incarceration. Higher scores on the $SDS^{[Ch]}$ indicate a greater degree of psychological dependence.

Decision Balance Questionnaire (DBQ)

The 12-item 5-point DBQ evaluates levels of participants' perceived advantages (six items) and disadvantages (six items) of heroin use.[30] Higher total scores on the subscales indicate more perceived advantages and disadvantages of heroin use, respectively.

Family APGAR Index

The Chinese version of the 5-item Family APGAR Index was applied to measure participant satisfaction with family support.[31,32] Higher total scores indicate higher perceived family support.

The Center for Epidemiological Studies-Depression Scale (CES-D)

The Mandarin-Chinese version of the 20-item CES-D scale is a self-administered 4-point scale assessing frequency of depressive symptoms in the preceding week.[33,34] Higher total scores indicate more severe depression.

The Questionnaire for Experience in Substance Use (Q-ESU)

The Q-ESU items were used to determine the participants' age at initial use of heroin, monthly cost of buying heroin before committal, previous experience with receiving MMT, history of methamphetamine use, and previous criminal records. Participants who spent 1,200 USD (median) or more monthly on buying heroin were classified as high-cost heroin users. Participants with two or more (median) previous criminal convictions for heroin use were classified as having high criminality for heroin use.

Demographic data including gender, age, educational level, marital status, history of employment, and perceived economic burden were also collected simultaneously. Moreover, HIV serostatus was also recorded based on the results of a screening test using enzyme-linked immunosorbent assay (ELISA) and a confirmatory test using Western blotting during detainment.

Statistical analysis

Data were stored and analyzed using the Statistical Package for the Social Sciences (SPSS) 19.0 software (SPSS, Chicago, IL). Cox proportional hazards regression with the likelihood-ratio test was applied to examine the predictive effects of baseline factors obtained during intake interviews. The hazard ratios (HRs) with 95% confidence intervals (CIs) were calculated. Statistical significance was set at $p < .05$.

Results

During the recruitment period, there were 328 intravenous heroin users detained in four prisons in Southern Taiwan. Those who refused to participate in the study ($n = 10$) or had difficulty cooperating (e.g., intellectual disability; $n = 3$) were excluded from the

Table 1. Socio-demographic and heroin-use characteristics, criminal record, experiences, and attitude toward receiving MMT HIV-infected status, perceived social support, and depression of the participants ($N = 315$).

	n (%)	Mean (SD)
Socio-demographic characteristics		
Sex: male	219 (69.5)	
Age (years)		35.3 (6.7)
Education (years)		9.2 (2.2)
Marriage status: single or broken marriage	264 (83.8)	
Have a regular job before incarceration	181 (57.5)	
Perceived high economic burden	78 (24.8)	
Heroin-using characteristics		
Age at initial use of heroin (years)		25.4 (6.9)
Severity of heroin use on SDS[Ch]		8.2 (3.5)
Perceived advantages of heroin use on the DBQ		9.0 (3.2)
Perceived disadvantages of heroin use on the DBQ		18.6 (6.3)
Monthly cost for heroin 1,200 U.S. dollars or more	153 (48.6)	
Criminal record		
Previous criminal record of heroin use more than two times	88 (27.9)	
Have any criminal record other than heroin use	198 (62.9)	
Experiences and attitude toward receiving MMT		
Have ever received MMT before committal	63 (20.0)	
Have acquaintances receiving MMT	129 (41.0)	
Ambivalence attitude toward MMT on CAMP		9.9 (2.3)
Other factors		
Have ever used methamphetamine	247 (78.4)	
Positive HIV serostatus	197 (62.5)	
Family support on the APGAR		15.3 (3.5)
Severity of depression on the CES-D		14.6 (8.6)

CES-D: The Center for Epidemiological Studies Depression Scale; DBQ: Decision Balance Questionnaire; MMT: methadone maintenance therapy; SDS[Ch]: The Chinese version of the Severity of Dependence Scale.

study. A total of 315 intravenous heroin users completed the interviews and were willing to receive follow-up. The values of Cronbach's α of the CAMP, SDS[Ch], DBQ, Family APGAR Index, and CES-D ranged from .70–.90, which indicated acceptable to good internal consistency. The sociodemographic and drug-use characteristics, attitude toward MMT, HIV serostatus, perceived family support, and depression of the 315 intravenous heroin-use inmates are shown in Table 1.

Among them, 295 (93.7%) inmates were released and entered the follow-up period. The detainment periods before and after study enrollment among the study population were 15.78 (±10.19) months and 140.12 (±174.73) days, respectively.

During the 24-month follow-up period, 150 (50.8%) participants received MMT. The time from release to receiving MMT was 167.4 (±167.9) days (ranging from 1 to 729 days), and 69.3% received MMT within 6 months after release. The national case manager system also recorded any access for buprenorphine substitution therapy (BST), however, none of them received official BST during the follow-up period.

The result of the Cox proportional hazard regression analysis examining the predictive effects of prior experiences of receiving MMT and the attitude toward MMT, sociodemographic characteristics, variables related to heroin use, HIV serostatus, prior criminal record, perceived family support, and depression at baseline are shown in Table 2 (–2LL = 1551.375, $p < .001$). After controlling for the effects of the detainment period before and after recruiting participants, the results indicated that incarcerated heroin users who had positive HIV serostatus (HR = 2.85, 95% CI = 1.80–4.52, $p < .001$) and had ever received MMT before committal (HR = 1.94, 95% CI = 1.23–3.05, $p < .01$) were more likely to enter the MMT program within the 24-month follow-up period. Other factors, including attitude toward MMT, sociodemographic and heroin-use characteristics, prior criminal record, perceived family support, and depression did not significantly predict receiving MMT.

Discussion

Positive HIV serostatus and MMT

MMT is recognized for its effectiveness in decreasing the transmission risk of blood-borne diseases such as HIV.[35] MMT also facilitates HIV-infected consumers to initiate antiretroviral therapy, and improves medical adherence for such treatments.[36,37] The present

Table 2. Prediction of baseline characteristics before and during incarceration for receiving MMT after release within 24-month period: results of Cox proportional hazards regression analysis.

	Wald' χ^2	Hazard Ratio	95% CI of Hazard Ratio
Socio-demographic characteristics			
Sex: male	.164	.917	.600–1.401
Age (years)	.587	1.015	.978–1.055
Education (years)	.121	1.014	.936–1.098
Marriage status: single or broken marriage	1.956	.713	.444–1.145
Have a regular job before incarceration	1.183	.831	.596–1.160
Perceived high economic burden	.771	1.196	.802–1.786
Heroin using characteristics			
Age at initial use of heroin (years)	.010	1.002	.966–1.038
Severity of heroin use on SDS[Ch]	1.697	.967	.919–1.017
Perceived advantages of heroin use on the DBQ	.229	1.013	.962–1.067
Perceived disadvantages of heroin use on the DBQ	.593	.988	.960–1.018
Monthly cost for heroin more than 1,200 dollars	2.327	1.318	.924–1.880
Criminal record			
Previous criminal record of heroin use >twice	.369	1.129	.764–1.667
Have any criminal record other than heroin use	.989	1.217	.826–1.792
Experiences and attitude toward receiving MMT			
Have ever received MMT before committal	8.096**	1.938	1.229–3.049
Have acquaintances receiving MMT	2.802	.712	.478–1.059
Ambivalence attitude toward MMT on CAMP	.003	1.002	.925–1.086
Other factors			
Have ever used methamphetamine	.118	.920	.570–1.484
Positive HIV serostatus	19.849***	2.849	1.799–4.525
Family support on the APGAR	.109	.991	.938–1.046
Severity of depression on the CES-D	.898	.990	.970–1.011
Time from detainment to enrollment (months)	4.398*	.979	.961–0.999
Time from enrollment to release (days)	.003	1.000	.999–1.001

CES-D: The Center for Epidemiological Studies Depression Scale; DB: decision balance; CAMP: Client Attitudes Toward Methadone Programs Scale; SDS: Severity of Dependence Scale; MMT: Methadone Maintenance Therapy.
*$p < .05$;
**$p < .01$;
***$p < .001$.

study revealed that intravenous heroin users with positive HIV serostatus were more likely to access MMT after release from prison than those with negative HIV serostatus. The finding is consistent with a study on a community cohort of IDUs with polysubstance use in Vancouver.[17] The authors attributed the correlation to providing HIV treatment in conjunction with MMT.[17] However, another scenario might exist in Taiwan. As mentioned, an HIV epidemic among IDUs drove national policymakers to switch from an abstinence approach to harm-reduction-oriented strategies in several Asian and Pacific Region countries, including Taiwan.[38] HIV-positive heroin users may receive more intensive referrals to MMT than HIV-negative users. Meanwhile, HIV-infected heroin users can receive fully subsidized MMT in Taiwan. Subsidies have been demonstrated as an effective incentive for engaging IDUs in MMT.[18,19] In the present study, none of participants accessed official BST which was more expensive than MMT during follow-up period. Such a phenomenon also reflects that the treatment fee is one of the determinants for accessing treatment. The current findings have some implications that lowering the threshold of MMT, including free-of charge service, may intensify the effectiveness of such a harm reduction intervention.

History of access to MMT

Cycling in and out of MMT is common among heroin users' treatment careers.[39] A cohort study conducted in Vancouver revealed that 61% of injection heroin users had ceased MMT and then reinitiated MMT on more than one occasion during an 85-month follow-up.[17] Studies on heroin users in communities have demonstrated that prior MMT experiences promoted receiving MMT again.[15,18] Except for effective harm reduction from the public perspective, MMT is beneficial for consumers by improving their personal, physical, and mental

health,[40] and quality of life.[41] MMT also satisfies the immediate needs of heroin users, such as alleviating opiate withdrawal symptoms, controlling their chaotic lifestyle, and facilitating resocialization.[42] A study conducted in China revealed that more than 80% of heroin users in the MMT program believed that entering the MMT could help them normalize life and attenuate craving.[43] Thus, heroin users who had previously received MMT held a more positive attitude toward methadone than did those undertaking other treatment modalities[44] or those detained in compulsory correction facilities without MMT.[43] The current study finding also indicated that actual MMT experiences shaped the viewpoints and preferences toward MMT.[43] These findings implied that familiarizing incarcerated heroin users with MMT and providing MMT during imprisonment might facilitate entry to community MMT after release.

Except for propaganda and education for strategies of harm reduction including MMT, prison-based opioid maintenance therapy provides an opportunity to engage heroin users in treatment. Pilot research has demonstrated the effectiveness of pre-release MMT for reducing IDU and risky behaviors during detainment, facilitating treatment entry, and reducing heroin use and related crimes after release.[45]

Demographic characteristics and heroin-use variables

In the present study, demographic characteristics did not predict receiving MMT after release from prison. Even in community studies, the correlation between these baseline factors and entry into MMT remained inconclusive.[15–18] The differences in MMT modalities and various study populations might partially account for the discrepancies in the results of these studies. In contrast to the findings of most previous studies,[15,16,20] this study did not reveal a significant association of socioeconomic burden and inferiority with receiving MMT. Because MMT is part of the national policy-based harm reduction programs in Taiwan, the hospital-based MMT programs scaled up rapidly with government encouragement.[46] Furthermore, subsidies for entry to and no waiting lists for most MMT programs in Taiwan make them low-threshold programs. Thus, social disadvantage seems less problematic in Taiwan than Western societies for accessing MMT.

Heroin-related detainment and MMT

In the present study, 50.8% of IIHUs entered MMT after release from prison within the 24-month follow-up period. This result indicated that nearly half of the IIHUs did not receive MMT after release. Although heroin users with a history of recent incarceration are more likely to be recommended for MMT than are those without recent incarceration,[47] previous studies have revealed that recent incarceration is negatively associated with entering into MMT among intravenous heroin users.[16,17,25] There was a study which also reported that heroin users with a history of arrest were more likely to enter a detoxification program rather than MMT.[48] Moreover, a study in China revealed that detainees of compulsory detoxification centers preferred MMT less than heroin users currently receiving MMT did.[43] The possible explanations for recent incarceration as a barrier to accessing MMT included the fear of being targeted and traced by police systems during regular attendance for treatment.[49] Heroin users might also consider that they had overcome habitual heroin use during detainment in a controlled environment and underestimate the importance of maintenance therapy for preventing relapse.

Other factors and MMT

Research has shown that enhanced family support is associated with higher motivation to receive treatment[50] and optimal intervention outcomes[51] for substance use among substance users in the community. However, the current results did not demonstrate a predictive effect of perceived family support on access to MMT post-release. Because the present sample had been separated from family during the detainment period, isolation from family might have influence for reflecting actual family support and diminished the predictive effect for access to treatment.

Combined use of other substances typically hinders MMT entry;[18,52] however, the current study revealed no predictive effects of lifetime use of

methamphetamine on MMT post-release. Compared with a previous study in the United States that reported the lifetime prevalence of amphetamines use among heroin users receiving treatment as 17 and 28% for men and women, respectively,[53] the prevalence of lifetime methamphetamine use in the current sample was relatively high (78.4%), which was similar to the results of studies for treatment-seeking heroin users in Taiwan (60.1–83.9%).[46,54] The authors hypothesized that lifetime use of methamphetamine might be a subculture among heroin users in Taiwan, and its predictive effect for access to MMT is limited.

Previous studies have also indicated that psychiatric comorbidities, such as depression, were associated with increased use of substance abuse treatments among substance users.[55,56] A greater severity of substance use among substance users with a dual diagnosis[57] and an increased referral rate when visiting mental health specialists[58] might contribute to such correlations. In the current study, the severity of depression on the CES-D was not correlated with access to post-release MMT. A study revealed that substance users comorbid with major depressive episodes within the preceding year were more likely to receive all types of treatment for substance use disorder, except for treatment in prisons.[58] CES-D is a tool for assessing frequency of depressive symptoms in preceding weeks which fluctuates with time instead of a diagnosis of a depressive disorder. In addition, imprisonment is a distressing circumstance; thus, the predictive effect of the self-rating severity of depression during detainment on access to MMT might be unremarkable. However, impact of depressive disorders on receiving post-release MMT needs to be further studied.

Various study designs and time points for assessment also accounted for a discrepancy in the present results compared with previous studies regarding the association of family support, lifetime methamphetamine use, and depression with MMT entry. Most previous studies were cross-sectional surveys that inquired about these variables of the preceding days before treatment entry. However, in the current cohort study, these dynamic variables were only evaluated at study entry, and the predictive effects for future access to MMT were attenuated after release.

Limitations

Based on a review of the literature, the present study was the first cohort study to examine the predictors of receiving MMT after release from prison among IIHUs. However, several limitations should be addressed. First, participants provided their own baseline factors, and no information from other sources was obtained. Second, research has revealed that ongoing heroin use might facilitate treatment entry.[18] Although a relapse to heroin use after release seems to be inevitable,[3] some participants might actually maintain abstinence and would not access MMT during the study period. However, this study did not examine when the participants restarted heroin use and thus did not include the relapse time in the analysis. Third, this study did not exclude factors hindering access to MMT, such as re-incarceration and death, for the analysis. Fourth, this study did not examine the predicting effects of convenience and availability of MMT programs on receiving MMT after release from prison, although MMT clinics have rapidly increased in Taiwan based on government support. Finally, this study did not assess use of other treatment modalities for heroin use disorder, such as residential treatment and 12-step programs, though other modalities of maintenance therapy for heroin use disorder were relatively underdeveloped in Taiwan.

Conclusion

Because IIHUs may represent a subgroup of heroin users with severe heroin-use-related problems, engaging them in harm reduction programs is crucial. This study revealed that only half of the IIHUs entered the MMT program within the 24-month follow-up period after release from prison. Based on the results, it is suggested that addiction professionals and prison workers should provide information regarding the benefits of MMT to incarcerated heroin users to increase their motivation to receive MMT. Inviting heroin users who have undergone MMT to share their experiences in a group discussion may inform other heroin users on how to access MMT and resolve their doubts and misunderstandings regarding MMT. More direct and aggressive strategy is providing prison-based MMT which has been demonstrated for facilitating MMT entry after release.[45] This study supports the notion that the authorities concerned should reconsider initiation of MMT during detainment as

preparation for aftercare post-release. Furthermore, this study revealed that IIHUs with positive HIV serostatus were more likely to access MMT, and fully subsidized treatment for MMT might account for this. The finding has important implications for policy makers, that is, measures to lower the threshold of MMT including elimination of financial barriers in treatment should be adopted to facilitate initiation of MMT for IIHUs post-release.

Funding

This study was supported by a grant DOH97-DC-1004, awarded by the Centers for Disease Control, Department of Health, Executive Yuan, R.O.C. (Taiwan).

References

1. Taiwan Food and Drug Administration, Ministry of Health and Welfare. The 2012 annual statistic data of substance abuse, 2013; http://www.fda.gov.tw/upload/133/20130718151220808 49.pdf (accessed November 8, 2013).
2. Taiwan National Police Agency, Ministry of the Interior. The 2012 annual report of action against illicit drugs, 2013; http://www.npa.gov.tw/NPAGip/wSite/ct?xItem=63966&ctNode=12594&mp=1 (accessed November 8, 2013).
3. Zhu WX, Dong JQ, Hesketh T. Preventing relapse in incarcerated drug users in Yunnan Province, China. Drug Alcohol Rev 2009; 28:641–7.
4. van Haastrecht HJ, Bax JS, van den Hoek AA. High rates of drug use, but low rates of HIV risk behaviours among injecting drug users during incarceration in Dutch prisons. Addiction 1998; 93:1417–25.
5. Estebanez P, Zunzunegui MV, Aguilar MD, Russell N, Cifuentes I, Hankins C. The role of prisons in the HIV epidemic among female injecting drug users. AIDS Care 2002; 14:95–104.
6. Yang CH, Yang SY, Shen MH, Kuo HS. The changing epidemiology of prevalent diagnosed HIV infections in Taiwan, 1984–2005. Int J Drug Policy 2008; 19:317–23.
7. Kreek MJ, LaForge KS, Butelman E. Pharmacotherapy of addictions. Nat Rev Drug Discov 2002; 1:710–26.
8. Gossop M, Marsden J, Stewart D, Treacy S. Change and stability of change after treatment of drug misuse: 2-year outcomes from the National Treatment Outcome Research Study (UK). Addict Behav 2002; 27:155–66.
9. King VL, Stoller KB, Hayes M, et al. A multicenter randomized evaluation of methadone medical maintenance. Drug Alcohol Depend 2002; 65:137–48.
10. Sorensen JL, Copeland AL. Drug abuse treatment as an HIV prevention strategy: a review. Drug Alcohol Depend 2000; 59:17–31.
11. Dolan KA, Shearer J, White B, Zhou J, Kaldor J, Wodak AD. Four-year follow-up of imprisoned male heroin users and methadone treatment: mortality, re-incarceration, and hepatitis C infection. Addiction 2005; 100:820–8.
12. Peters AD, Reid MM. Methadone treatment in the Scottish context: outcomes of a community-based service for drug users in Lothian. Drug Alcohol Depend 1998; 50:47–55.
13. O'Connor PG. Methods of detoxification and their role in treating patients with opioid dependence. JAMA 2005; 294:961–3.
14. Ward J, Mattick RP, Hall W. The effectiveness of methadone maintenance treatment: an overview. Drug Alcohol Rev 1994; 13:327–35.
15. Deck D, Carlson MJ. Access to publicly funded methadone maintenance treatment in two western states. J Behav Health Serv Res 2004; 31:164–77.
16. Shah NG, Celentano DD, Vlahov D, et al. Correlates of enrollment in methadone maintenance treatment programs differ by HIV-serostatus. AIDS 2000; 14:2035–43.
17. Kerr T, Marsh D, Li K, Montaner J, Wood E. Factors associated with methadone maintenance therapy use among a cohort of polysubstance using injection drug users in Vancouver. Drug Alcohol Depend 2005; 80:329–35.
18. Booth RE, Corsi KF, Mikulich SK. Improving entry to methadone maintenance among out-of-treatment injection drug users. J Subst Abuse Treat 2003; 24:305–11.
19. Kwiatkowski CF, Booth RE, Lloyd LV. The effects of offering free treatment to street-recruited opioid injectors. Addiction 2000; 95:697–704.
20. Appel PW, Ellison AA, Jansky HK, Oldak R. Barriers to enrollment in drug abuse treatment and suggestions for reducing them: opinions of drug injecting street outreach clients and other system stakeholders. Am J Drug Alcohol Abuse 2004; 30:129–53.
21. Noroozi M, Nedjat S, Golestan B, Majdzadeh R. What are differences between non-injecting and injecting drug addicts? Int J Prev Med 2012; 3:414–9.
22. Bukten A, Skurtveit S, Stangeland P, et al. Criminal convictions among dependent heroin users during a 3-year period prior to opioid maintenance treatment: a longitudinal national cohort study. J Subst Abuse Treat 2011; 41:407–14.
23. Gossop M, Marsden J, Stewart D, Rolfe A. Reductions in acquisitive crime and drug use after treatment of addiction problems: 1-year follow-up outcomes. Drug Alcohol Depend 2000; 58:165–72.
24. Hakansson A, Berglund M. Risk factors for criminal recidivism—a prospective follow-up study in prisoners with substance abuse. BMC Psychiatry 2012; 12:111.
25. Callon C, Wood E, Marsh D, Li K, Montaner J, Kerr T. Barriers and facilitators to methadone maintenance therapy use among illicit opiate injection drug users in Vancouver. J Opioid Manag 2006; 2:35–41.
26. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders, 4th ed., Text Revision. Washington, DC: American Psychiatric Association, 2000;

27. Magura S, Goldsmith DS, Casriel C, et al. Patient-staff governance in methadone maintenance treatment: a study in participative decision making. Int J Addict 1988; 23:253–78.
28. Gossop M, Darke S, Griffiths P, et al. The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine, and amphetamine users. Addiction 1995; 90:607–14.
29. Chen VC, Chen H, Lin TY, et al. Severity of heroin dependence in Taiwan: reliability and validity of the Chinese version of the Severity of Dependence Scale ($SDS^{[Ch]}$). Addict Behav 2008; 33:1590–3.
30. Prochaska JO, Velicer WF, Rossi JS, et al. Stages of change and decisional balance for 12 problem behaviors. Health Psychol 1994; 13:39–46.
31. Smilkstein G. The family APGAR: a proposal for a family function test and its use by physicians. J Fam Pract 1978; 6:1231–9.
32. Chen YC, Hsu CC, Hsu SH, Lin CC. A preliminary study of Family Apgar Index. Acta Paediatrica Sinica 1980; 21:210–217.
33. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Applied Psychological Measurement 1977; 1:385–401.
34. Chien CP, Cheng TA. Depression in Taiwan: epidemiological survey utilizing CES-D. Seishin Shinkeigaku Zasshi 1985; 87:335–8.
35. MacArthur GJ, Minozzi S, Martin N, et al. Opiate substitution treatment and HIV transmission in people who inject drugs: systematic review and meta-analysis. BMJ 2012; 345:e5945.
36. Uhlmann S, Milloy MJ, Kerr T, et al. Methadone maintenance therapy promotes initiation of antiretroviral therapy among injection drug users. Addiction 2010; 105:907–13.
37. Reddon H, Milloy MJ, Simo A, Montaner J, Wood E, Kerr T. Methadone maintenance therapy decreases the rate of antiretroviral therapy discontinuation among HIV-positive illicit drug users. AIDS Behav 2014; 18:740–6.
38. Mesquita F, Jacka D, Ricard D, et al. Accelerating harm reduction interventions to confront the HIV epidemic in the Western Pacific and Asia: the role of WHO (WPRO). Harm Reduct J 2008; 5:26.
39. Bell J, Burrell T, Indig D, Gilmour S. Cycling in and out of treatment; participation in methadone treatment in NSW, 1990–2002. Drug Alcohol Depend 2006; 81:55–61.
40. Reimer J, Verthein U, Karow A, Schafer I, Naber D, Haasen C. Physical and mental health in severe opioid-dependent patients within a randomized controlled maintenance treatment trial. Addiction 2011; 106:1647–55.
41. Wang PW, Wu HC, Yen CN, et al. Change in quality of life and its predictors in heroin users receiving methadone maintenance treatment in Taiwan: an 18-month follow-up study. Am J Drug Alcohol Abuse 2012; 38:213–9.
42. De Maeyer J, Vanderplasschen W, Camfield L, Vanheule S, Sabbe B, Broekaert E. A good quality of life under the influence of methadone: a qualitative study among opiate-dependent individuals. Int J Nurs Stud 2011; 48:1244–57.
43. Liu Y, Li L, Zhang Y, et al. Assessment of attitudes towards methadone maintenance treatment between heroin users at a compulsory detoxification centre and methadone maintenance clinic in Ningbo, China. Subst Abuse Treat Prev Policy 2013; 8:29.
44. Rieckmann T, Daley M, Fuller BE, Thomas CP, McCarty D. Client and counselor attitudes toward the use of medications for treatment of opioid dependence. J Subst Abuse Treat 2007; 32:207–15.
45. Hedrich D, Alves P, Farrell M, Stover H, Moller L, Mayet S. The effectiveness of opioid maintenance treatment in prison settings: a systematic review. Addiction 2012; 107:501–17.
46. Lin HC, Chen KY, Wang PW, et al. Predictors for dropping-out from methadone maintenance therapy programs among heroin users in southern Taiwan. Subst Use Misuse 2013; 48:181–91.
47. Bargagli AM, Schifano P, Davoli M, Faggiano F, Perucci CA. Determinants of methadone treatment assignment among heroin addicts on first admission to public treatment centres in Italy. Drug Alcohol Depend 2005; 79:191–9.
48. Schutz CG, Rapiti E, Vlahov D, Anthony JC. Suspected determinants of enrollment into detoxification and methadone maintenance treatment among injecting drug users. Drug Alcohol Depend 1994; 36:129–38.
49. Wickersham JA, Marcus R, Kamarulzaman A, Zahari MM, Altice FL. Implementing methadone maintenance treatment in prisons in Malaysia. Bull World Health Organ 2013; 91:124–9.
50. Grella CE, Joshi V. Gender differences in drug treatment careers among clients in the national Drug Abuse Treatment Outcome Study. Am J Drug Alcohol Abuse 1999; 25:385–406.
51. Knight DK, Simpson DD. Influences of family and friends on client progress during drug abuse treatment. J Subst Abuse 1996; 8:417–29.
52. Fischer B, Cruz MF, Patra J, Rehm J. Predictors of methadone maintenance treatment utilization in a multisite cohort of illicit opioid users (OPICAN). J Subst Abuse Treat 2008; 34:340–6.
53. Back SE, Payne RL, Wahlquist AH, et al. Comparative profiles of men and women with opioid dependence: results from a national multisite effectiveness trial. Am J Drug Alcohol Abuse 2011; 37:313–23.
54. Chiang SC, Chan HY, Chang YY, Sun HJ, Chen WJ, Chen CK. Psychiatric comorbidity and gender difference among treatment-seeking heroin abusers in Taiwan. Psychiatry Clin Neurosci 2007; 61:105–11.
55. Harris KM, Edlund MJ. Use of mental health care and substance abuse treatment among adults with co-occurring disorders. Psychiatr Serv 2005; 56:954–9.
56. Wu LT, Kouzis AC, Leaf PJ. Influence of comorbid alcohol and psychiatric disorders on utilization of mental health services in the National Comorbidity Survey. Am J Psychiatry 1999; 156:1230–6.

57. Cohn AM, Epstein EE, McCrady BS, et al. Pretreatment clinical and risk correlates of substance use disorder patients with primary depression. J Stud Alcohol Drugs 2011; 72:151–7.

58. Chen LY, Strain EC, Crum RM, Mojtabai R. Gender differences in substance abuse treatment and barriers to care among persons with substance use disorders with and without comorbid major depression. J Addict Med 2013; 7:325–34.