Psychiatry and Clinical Neurosciences (2006), **60**, 444–451 doi:10.1111/j.1440-1819.2006.01530.x

Regular Article

Recidivism among male subjects incarcerated for illicit drug use in Taiwan

SHU-CHUAN CHIANG, MD, MS,[1] HUNG-YU CHAN, MD,[1] CHIUNG-HSU CHEN, MD,[1] HSIAO-JU SUN, MD,[1] HUNG-JUNG CHANG, MD,[1] WEI J. CHEN, MD, DSc,[2] SHIH-KU LIN, MD[3] AND CHIH-KEN CHEN, MD, PhD[4,5]

[1]*Department of Health, Executive Yuan, Tao-Yuan Psychiatric Center,* [5]*Chang Gung University School of Medicine, Tao-Yuan,* [2]*Institute of Epidemiology, College of Public Health, National Taiwan University,* [3]*Department of General Psychiatry, Taipei City Psychiatric Center, Taipei and* [4]*Department of Psychiatry, Chang Gung Memorial Hospital, Keelung, Taiwan*

Abstract Illicit drug users are generally considered both patients and criminals in Taiwan. This study presents drug use behaviors and criminal recidivism of male subjects incarcerated for illicit drug use in Taiwan after detoxification at a detention center. This study also examined the relationship between drug use behaviors and subsequent recidivism. Charts and crime records of 794 male patients from the acute detoxification unit in a detention center in northern Taiwan were reviewed. These subjects were incarcerated for methamphetamine or/and heroin use. The authors examined the relationship between the variables collected during detoxification and subsequent recidivism of illicit drug use in the following 5 years after detoxification. Of 794 subjects, 539 (67.9%) were repeat offenders during the following 5 years after detoxification. Their recidivism occurred primarily within the first 2 years after being released into the community. The recidivism rate for heroin users was significantly higher than that of methamphetamine users. Aged under 30 years, a previous criminal record, and a positive urine analyses test for illicit drugs upon entering the detoxification unit were significantly associated with recidivism. Recidivism rates of illicit drug users in Taiwan after detoxification in the detention center were substantially high. The efficacy of detoxification programs at detention centers in Taiwan needs to be re-evaluated.

Key words heroin, methamphetamine, recidivism, relapse, substance abuse.

INTRODUCTION

A key goal of substance abuse treatment is to assist patients in abstaining from drug use.[1] Perhaps the most frustrating aspects of substance abuse treatment is the high rate of relapse after treatment.[2] Rates for relapse vary for substances and among studies. A primary cause of variations among studies is the differences in definitions employed for relapse. For example, Llorente *et al*. defined relapse in heroin consumption as using heroin three times in 1 month after 5 months of abstinence.[3] Hall *et al.* [4] and Moore and Budney[5] defined a lapse as the first self-reported use of a substance or a positive substance urine screen finding following an initial 2-week abstinence, and defined relapse as at least 4 days of substance use during any 7-day period.

There have been several studies in lapse and relapse rates among patients addicted to alcohol, cocaine, nicotine, opiates, and marijuana.[2,5–7] Methamphetamine abuse and resulting methamphetamine psychosis have become major public health issues in the Asia–Pacific region.[8–13] However, there are no detailed analyses of post-treatment relapse rates for methamphetamine dependence. Compared with dependence on other substances, relatively lower rates of relapse have been observed for cocaine dependence.[7,14] Do these results suggest that psychostimulant users have lower rates of lapse or relapse after treatment than users of other drugs?

Correspondence address: Chih-Ken Chen, MD, PhD, Department of Psychiatry, Chang Gung Memorial Hospital, 222 Mai-Chin Road, Keelung, 204 Taiwan. Email: kenchen@cgmh.org.tw

Received 27 July 2005; revised 11 January 2006; accepted 29 January 2006.

Heroin and methamphetamine are the main illicit drugs used in Taiwan.[10] The limited number of studies investigating drug abuse in Taiwan were mainly descriptive and cross-sectional. Drug users in Taiwan typically have high morbidity of physical and mental illnesses,[15,16] but have little access to mental health services.[16,17] For example, of 325 methamphetamine abusers at a detention center in Taipei, only 8.9% had seen a mental health professional and only 3.1% had been admitted to a psychiatric facility, despite 36.6% reporting that they experienced mental disturbances and 24.3% reporting that they experienced occupational impairment.[16] The majority of these drug abusers did not reveal their use to professionals. Most users undergo mandatory detoxification and risk assessment by psychiatrists for risk of continuous use for the first time at these detention centers. In Taiwan, the law regarding illicit drug use undertook a major revision in 1998: offenders for first-time illicit drug use were dually identified both as a criminal and a patient. Detoxification programs in the detention centers in Taiwan started only a few years ago. There are probably some unofficial evaluations of the efficacy. However, there is no published study yet which examines systemically the efficacy of detoxification programs in detention centers in Taiwan. This study presents drug use behaviors and criminal recidivism of male heroin users and methamphetamine users in Taiwan after detoxification at a detention center. This study adopts recidivism of a drug offence as its outcome indicator rather than relapsed drug use. This study also examined the relationship between drug use behaviors and subsequent recidivism.

METHODS

This study reviewed the charts and crime records of male patients from the acute detoxification unit in the Tao Yuan Detention Center, Taiwan, who entered that facility during three randomly chosen months (January, May, and August) in 1999. The authors examined the relationship between the variables collected during the detoxification and subsequent recidivism of illicit drug use in the following 5 years after detoxification. Study approval was obtained from the institutional review boards of the Tao-Yuan Psychiatric Center and the Ministry of Justice, Taiwan. Patient anonymity was preserved.

Of the 876 subjects whose charts were reviewed, 82 were excluded form analysis for the following reasons: 20 did not return to the community; 21 returned to the community but received follow up for less than 20 months; 38 had incomplete information; and three died. The number of subjects remaining for analysis was 794. All subjects were male and predominantly single (60.8%). These subjects all tested positive for at least one illicit drug during their urine drug test performed after their arrest. According to the Controlled Drugs Act in Taiwan, heroin is a schedule 1 drug and methamphetamine is a schedule 2 drug. Illicit drug users are generally considered both patients and criminals. According to the code of criminal procedure, law enforcement personnel can order compulsory urinalysis for a suspect if illicit drug use was indicated, for example, the finding of pills distributed in a party or device for smoking or injecting drugs. By the end of 2003, users who were found to have a positive urinalysis for illicit drugs are incarcerated in the Detoxification Unit of the detention center for up to 1 month for the first offence. During incarceration, they underwent mandatory detoxification and risk assessment using semistructured interview by psychiatrists for continued drug use. Although some detainees with positive urine for a single dose of drug use might not need detoxification, they still have to receive the educational program for at least 1 week until a psychiatric evaluation can be conducted. Repeat offenders and users who were identified as having a high risk of continued drug use were incarcerated for a further 3–6 months for forced abstinence mandatory treatments in the prison-affiliated drug abstention and treatment centers for repeat offenders. Users who offended more than twice were imprisoned for 6 months to 5 years. In the detention centers, detoxifications and educational programs such as introduction of addiction and impairments associated with drug use were provided. Whereas in the prison-affiliated drug abstention and treatment centers, in addition to educational programs, supportive psychotherapy, group therapy, or medical treatments were provided if indicated. These detoxification and treatment centers were under the supervision of the Ministry of Justice, Taiwan.

Of the subjects, approximately 80% (617/794) were transferred directly to the detention center after being arrested. Approximately 20% (177/794) of subjects were released to the community and waited to enter the detention center. The reason that they were released to the community was that these subjects denied drug use although they were arrested due to suspicion of illicit drug use. These subjects were requested to enter the detention center after they were proved to have positive urine tests for illicit drugs. Some subjects were exposed to drug use while waiting to enter the detention center. Upon entering the detention center, each subject underwent a drug urine test and risk assessment for continued drug use using semistructured interview in a private room by an experienced psychiatrist. Assessments obtained the following

data: history of drug abuse; criminal record; and urine drug test. Among the subjects, 33% were repeat offenders or identified as having a high risk of continued drug use, and were incarcerated for a further 3–6 months for forced abstinence mandatory treatments in the prison-affiliated drug abstention and treatment centers. The follow-up periods started after these additional abstinence treatments, and did not include any periods of incarceration for other reasons. The people in the detention center were incarcerated mainly due to illicit use of methamphetamine or/and heroin. The subjects in this study were grouped into 'heroin users' if they met lifetime criteria of heroin abuse or heroin dependence, and 'methamphetamine users' if they met lifetime criteria of methamphetamine abuse or methamphetamine dependence but did not use heroin. All of the methamphetamine users were incarcerated due to methamphetamine use. Of the 166 heroin users, 61 (36.7%) admitted previous use of methamphetamine and five (3.0%) reported previously using other illicit drugs.

With authorized access to criminal data from the Ministry of Justice, Taiwan, recidivism following the index detention was adopted as the outcome (dependent) variable. Data analyses were performed with a statistical software package (SPSS version 12.0 for Windows; SPSS Inc., Chicago, IL, USA). Descriptive analyses comprised the following: demographics; history of drug abuse; criminal record; urine drug tests; family support; and occupational status. Survival analyses were applied to determine the relationship between these factors and recidivism. Cox regression analysis was applied for multivariate analyses of recidivism.

RESULTS

Demographics

A total of 794 entered final analyses. The mean age of the subjects upon entering the detention center was 28.4 ± 7.7 years. Heroin users were significantly older than methamphetamine users (30.2 ± 7.0 vs 28.1 ± 8.0 years, $P < 0.001$; Table 1). The majority were single (60.8%; 475/794). Of the subjects, 431 (54.3%) had education levels of high school or lower. A total of 99 (12.5%) subjects were unemployed. A total of 118 (15.1%) subjects reported having marital discord and 240 (30.8%) reported poor relations with their families. The majority of subjects (95%, 755/794) had poor parental relations or had a single parent. Roughly 12% (95/794) of subjects reported having a serious physical illness and only 20 (2.5%) reported having a history of mental illnesses.

Drug use history

The mean age of first drug use of methamphetamine users and heroin users were 24.5 ± 8.4 years and 25.8 ± 7.1 years, respectively. The mean durations between the first illicit drug use and arrest (time exposure to illicit drugs) were 3.6 ± 3.1 years for methamphetamine users and 4.5 ± 3.7 years for heroin users. The time exposure to illicit drug of the heroin users was

Table 1. Demographic data and drug use behavior of subjects prior to intake

		Methamphetamine users ($n = 628$)	Heroin users ($n = 166$)	T/χ^2
Age	Mean (SD)	28.1 (8.0)	30.2 (7.0)	–3.06**
Age of first drug use	Mean (SD)	24.5 (8.4)	25.8 (7.1)	–1.71
Exposure time (Year)	Mean (SD)	3.6 (3.1)	4.5 (3.7)	–2.98**
% Education	<7 years	8.9	9.6	14.80**
	7–9 years	46.3	41.0	
	>9 years	44.6	49.4	
% Criminal records	Nil	22.1	7.8	24.43**
	Other crimes	15.8	12.7	
	Drug crimes	17.5	16.3	
	Both	44.6	63.3	
% Urinalysis at intake	Negative	17.4	10.9	528.22**
	Heroin	0	17.0	
	Methamphetamine	82.6	17.6	
	Both	0	54.5	

Statistical significance levels are shown as: $^{**}P < 0.01$.

significantly higher than that of the methamphetamine users ($P < 0.001$). According to the self-reported information collected at intake, 179 (22.5%) subjects had no criminal record, 182 (22.9%) had committed drug offences, 132 (29.2%) had committed non-drug offences, and 301 (37.9%) had committed both drug and non-drug crimes. Self-reported data supplemented with government records, showed that 152 (19.3%) had no criminal record, 137 (16.5%) had committed drug crimes, 120 (15.1%) had committed non-drug crimes, and 385 (49.1%) had committed drug and non-drug crimes. The heroin users had significantly higher rates of past criminal records than the methamphetamine users ($P < 0.001$).

Results for urine tests for illicit drugs performed upon entry to the detention center were as follows: 127 (16.0%) subjects tested negative; 28 (3.5%) subjects tested positive for heroin; 542 (68.0%) subjects tested positive for methamphetamine; and 90 tested positive for more than one illicit drug. Of 16 heroin users who were released to the community, only one tested negative upon entry to the detention center. Of 161 methamphetamine users who were released to the community, 104 tested positive for methamphetamine and 57 tested negative upon entry to the detention center.

Recidivism

During the study, 539 (67.9%) subjects were recidivists. Of the 628 methamphetamine users, 406 (64.7%) re-offended and had a median survival time of 16.0 months (95% confidence interval [CI], 12.6–19.4 months). Of the 166 heroin users, 133 (80.1%) were recidivists and had a median survival time of 12.0 months (95% CI, 9.3–14.7 months). The recidivism rate for heroin users was significantly higher ($P < 0.001$) than that of methamphetamine users. Figure 1 shows the survival curves and hazard function of re-offense of the heroin users and methamphetamine users. Their recidivism occurred primarily within the first 2 years after being released into the community. Survival analyses identified that the significantly associated risk factors for recidivism were as follows: age; exposure time between first drug use and arrest in 1999; previous criminal record; and urine tests results for illicit drug performed upon entering the detention center. As Table 2 shows, the recidivism rate of those with ages under 24, those with ages between 25 and 30, and those with ages above 30 were 67.9%, 73.4% and 63.1%, respectively. The median survival time for these three age groups was 13.0 months (95% CI, 8.7–17.7 months), 13.0 months (95% CI, 10.6–15.4 months),

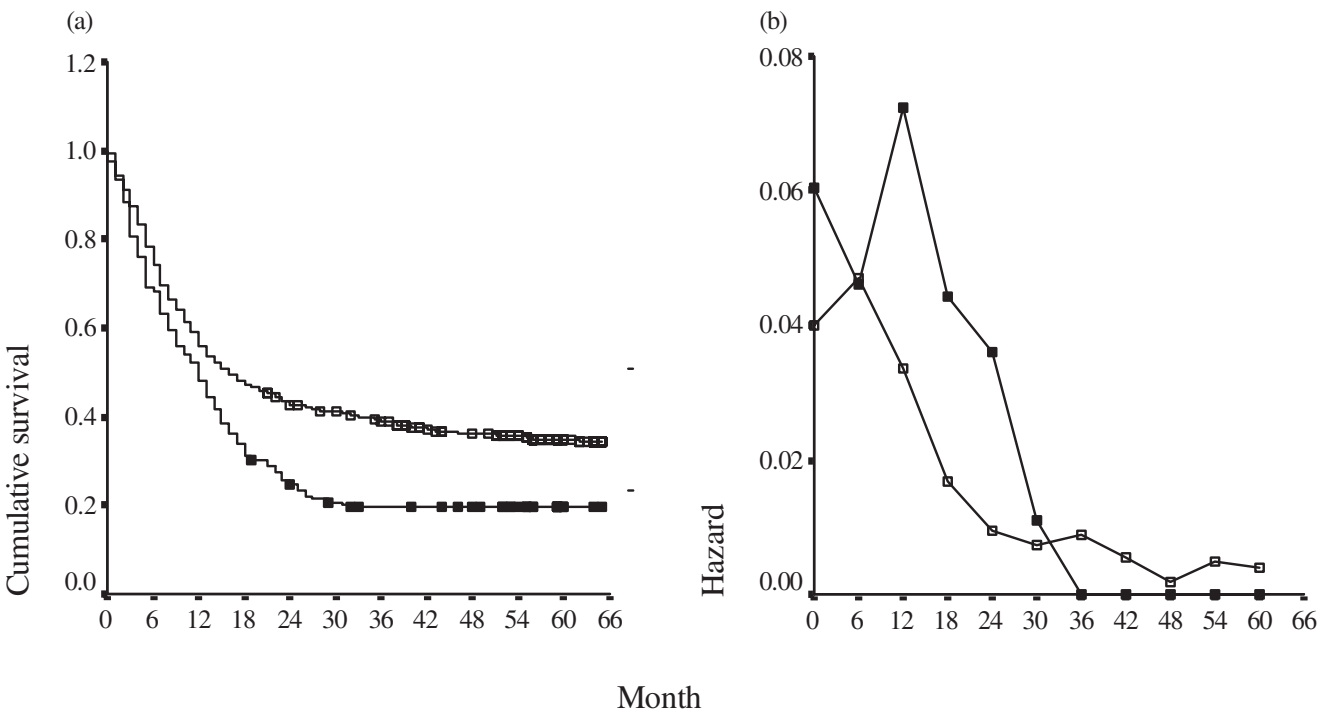

Figure 1. (a) Cumulative survival and (b) hazard functions of recidivism of drug crimes. (■) heroin user; (□) methamphetamine user.

Table 2. Recidivism and survival time of illicit drug users

	n	Recidivism (%)	Survival time Median (95% CI)[1]	Adjusted OR (95% CI)[2]	Wald χ^2 (d.f)[2]
Age					8.9 (2)*
<25 years	293	199 (67.9)	13.0 (8.3–17.7)	1.3 (1.0–1.6)	5.5 (1)*
25–30 years	233	171 (73.4)	13.0 (10.6–15.4)	1.4 (1.1–1.7)	7.8 (1)**
>30 years	268	169 (63.1)	26.0 (13.6–22.3)	1	
Criminal records					45.1 (3)***
Nil	152	75 (49.3)	n.d.	1	
Other crimes	120	67 (55.8)	18.0 (11.0–25.0)	1.4 (0.9–1.7)	1.4 (1)
Drug crimes	137	95 (69.3)	15.0 (8.5–21.6)	1.7 (1.2–2.3)	11.3 (1)***
Both	385	302 (78.4)	11.0 (9.2–12.8)	2.2 (1.7–2.9)	35.5 (1)***
Urinalysis at intake					26.7 (3)***
Negative	127	69 (54.3)	40.0 (22.9–43.3)	1	
Methamphetamine	542	368 (67.9)	13.0 (11.1–14.9)	1.6 (1.2–2.1)	13.0 (1)***
Heroin	28	18 (64.3)	16.0 (4.3–27.7)	1.5 (0.9–2.5)	2.3 (1)
Both	90	78 (86.7)	7.0 (4.3–9.7)	2.4 (1.7–3.3)	26.6 (1)***

Statistical significance levels are shown as: * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$. Survival analysis by Log Rank. Multivariate analysis by Cox regression.

n.d., no data; OR, odds ratio.

and 26.0 months (95% CI, 13.6–22.3 months), respectively. The subjects with no previous criminal record had a recidivism rate of 49.3% and a mean survival time of 38.7 months (95% CI, 34.3–43.0 months). The recidivism rate and median survival time were 69.3% and 14.0 months (95% CI, 8.3–19.4 months) for the subjects with past histories of at least one drug crime, and 55.8% and 22.0 months (95% CI, 5.3–38.7 months) for the subjects with past histories of crimes other than illicit drug use. Those with histories of both drug crimes and non-drug crimes had a highest recidivism rate (78.4%) and shortest median survival time (11.0 months, 95% CI, 9.3–12.8 months). The subjects with time exposure to illicit drug more than 1 year had a higher recidivism rate than those with exposure time less than 1 year (73.0% vs 60.0%, $\chi^2 = 14.5$, $P < 0.001$). Urine tests results for illicit drug performed upon entering the detention center were significantly related with recidivism rates. Those tested negative had a lowest recidivism rate (69/127, 54.3%) and the longest survival time (40.0 months, 95% CI, 22.9–43.3 months). Those tested positive both for heroin and methamphetamine had the highest recidivism rate (78/90, 86.7%) and shortest survival time (7.0 months, 95% CI, 4.3–9.7 months). The methamphetamine users who tested positive upon entry to the detention center after exposure to the community had a significantly higher rate of recidivism (72/104 vs 31/57, $\chi^2 = 3.52$, $P = 0.045$) than those who tested negative.

Multivariate regression analysis of these variables showed that age, previous criminal record and urine analyses results were still significantly associated with recidivism. Compared with those aged over 30, those aged under 30 had higher recidivism rates (Table 2). Subjects aged between 25 and 30 had the highest recidivism rates (odds ratio, 1.4; 95% CI, 1.1–1.7). Compared with subjects without a previous criminal record, the odds for recidivism for those with a previous criminal drug record, those who committed non-drug crimes and those who committed both drug crimes and other crimes were 1.7 (95% CI, 1.2–2.3), 1.4 (0.9–1.7), and 2.2 (1.7–2.9), respectively. Compared with subjects who had negative urine test results illicit drugs performed upon entry to the detention center, the odds for recidivism was 1.6 (95% CI, 1.2–2.1) for subjects with positive results for methamphetamine, 1.5 (95% CI, 0.9–2.5) for subjects with positive results for heroin, and 2.4 (95% CI, 1.7–3.3) for subjects with positive results both for methamphetamine and heroin.

DISCUSSION

This study identified recidivism rates of 64.7% for methamphetamine users and 80.1% for heroin users during the 5-year follow-up period after detoxification at a detention center in Taiwan. The recidivism rate for heroin users was significantly higher than that for methamphetamine users. Multivariate analyses results also showed that being aged under 30, having a previous criminal record, and a urine tests positive for methamphetamine or positive both for methamphetamine and heroin were significantly associated with recidivism. This study also characterized the heroin users and methamphetamine users in Taiwan, where a user of

illicit drug was dually identified both as a criminal and a patient.

Criminal acts are common among illicit drug users. Around 60% of methamphetamine users and 76% of heroin users in the present study had criminal records other than drug crimes. These rates of criminal records were generally higher than those reported in previous studies[16,17] in Taiwan. Lin *et al.*[17] reported that 45.2% of incarcerated male methamphetamine users had criminal records other than illicit drug use. Their study used subjects' reports as the only information resources, and might underestimate crime rates due to prevarication. The present study combined official criminal records with the self-reported data, and would, therefore, suffer less from under-reporting. Indeed, illicit drug users are not only frequently involved in criminal activities but also frequently diagnosed to have antisocial personality disorder.[15] The heroin users were older and had longer histories of exposure to illicit drugs in this study. Heroin users are more likely to have started using other illicit drugs (e.g. methamphetamine, marijuana, glue, and hypnotics). Whether methamphetamine acts as a gateway drug to heroin use in some cases warrants future investigation. The subjects in this study were grouped into 'heroin users' if they met lifetime criteria of heroin abuse or heroin dependence, and 'methamphetamine users' if they met lifetime criteria of methamphetamine abuse or methamphetamine dependence but did not use heroin. Therefore, the methamphetamine users tested positive for methamphetamine only, but the heroin users might test positive for heroin, methamphetamine, or both.

There are no previous studies employing the same measurement procedures to compare relapse rates between heroin users and methamphetamine users. High rates of lapse (65–80%) have been reported for alcohol, opiates, and tobacco dependence treatments,[6,18–20] and low rates for cocaine dependence.[7,14] Do these results suggest that users of psychostimulants have lower rates of lapse or relapse after treatment than users of other drugs? Indeed, comparisons between relapse rates for various drugs in different studies have been limited due to variations in definitions of relapse and measurement procedures. For example, 6-month relapse rates for treatment of heroin dependence have been reported at approximately 30% when relapse was defined as daily heroin use,[6] and as high as 90% when relapse was defined as at lease 4 days of use in any 7-day period.[4] The strength of this study is that it compared recidivism rates for drug crimes between methamphetamine users and heroin users. The results of this study demonstrated that the recidivism rate of heroin users was significantly higher than of methamphetamine users. This might imply that heroin is more addictive than methamphetamine or that heroin users have greater severity in dependence than methamphetamine users. Indeed, heroin is one of the most addictive and so-called 'hardest' drugs of abuse. However, this finding should be interpreted carefully as it is likely confounded by the fact that there were more polydrug users in the heroin user group than methamphetamine user group in this study. Furthermore, according to Taiwan's Drug Control Act, heroin is a schedule 1 drug and methamphetamine is a schedule 2 substance. The possibility that heroin users, for any number of reasons, were more likely to be arrested could not be ruled out. There is not much difference between the detoxification programs for methamphetamine users and heroin users in detention centers in Taiwan. The recidivism rate for heroin users was significantly higher than that of methamphetamine users in this study. However, due to existing differences in the natures for leading to dependence or continuing use between methamphetamine and heroin, it is very difficult to compare the efficacy of detoxification programs between methamphetamine users and heroin users.

The fact that heroin users had greater severity in dependence than methamphetamine users was also demonstrated by the results of urine tests for illicit drugs performed upon entry to the detention center after exposure to the community. Of 16 heroin users who were released to the community, only one tested negative upon entry to the detention center. Even during the time waiting for entering the detention center, relapse of drug use was more common among heroin users than among methamphetamine users. The methamphetamine users who tested positive upon entry to the detention center after exposure to the community had a significantly higher rate of recidivism than those who tested negative. Therefore, the results of urine drug tests before the start of a detoxification program at the detention center were predictive for recidivism after they went back to the community.

Researchers have made a significant effort to identify relapse risk factors after drug treatment. Marlatt and Gordon identified eight major categories of high-risk situations for relapse: social pressure; negative emotional states; interpersonal conflict; positive emotional states not involving other people; negative physical states; urges and temptations; positive emotional states involving other people; and testing personal control.[21] Willinger *et al*. reported that anxiety and personality traits, such as high novelty seeking and low harm avoidance, were predictive of relapse in detoxified alcohol-dependent patients.[22] Cocaine craving and psychosocial treatment were also reported to be correlated with relapsed cocaine use.[23] Despite the fact that

subjects in this study likely under-reported their aversive social status, the results showed that the majority of subjects had poor levels of family support. Aged under 30 years, a previous criminal record, and urine tests positive for methamphetamine or for both methamphetamine and heroin upon entry to the detention center were significantly associated with recidivism. Those that tested positive only for heroin upon entry to the detention center also had a higher recidivism rate, but did not reach a significant level of difference with those tested negative due to a small number. Whether these variables are predictive factors for relapse among methamphetamine and heroin users requires further investigation.

Like studies of mental disorders, studies of substance abuse outcomes have certain methodological limitations. These limitations include definition of relapse, measurement tools employed, and case selection. For addiction, the term relapse is often employed to signify a return to substance use following a period of abstinence, however, there are no widely adopted criteria for relapse. In addiction research, relapse is commonly defined as either any use of a substance following 1 or more weeks of abstinence or 1 day of heavy use following abstinence. Because drug policy in Taiwan deems drug use a criminal activity, it is very difficult to interview drug users in a community setting, that is, the majority of drug users in a community setting never reveal their use to medical or psychiatric professionals. Therefore, this study used official records for drug crime recidivism as its outcome indicator rather than drug use relapse. This study had several limitations that require acknowledgment.

From the perspective of drug-specific correlates, the grouping of illicit drug users as heroin versus methamphetamine users led inevitably to some overlapping in illicit drug use (e.g. some heroin users also used methamphetamine). However, as revealed in a large-scale twin analysis, heroin abuse is distinct from other categories of drugs in terms of vulnerability.[24] Although there exists a general propensity toward substance abuse, that is, an individual who abuses one category of drugs is more likely to abuse other categories of drugs, heroin use has the largest amount of unique genetic variance and the least amount of shared genetic variance of any of the drugs.[24] The differences found in contrasting heroin users with methamphetamine users (non-heroin users) in this study attests to the uniqueness of heroin use.

Recidivism results cannot be generated to relapse without caution. Among current approaches to substance use assessment, retrospective self-reporting is practical for most settings and is the most frequently used methodology. However, its drawbacks include the potential for memory failure or sources of data distortion.[25] A possible source of reporting bias in this study is prevarication as use of heroin or methamphetamine is illegal in Taiwan. Subjects in this study might have also had ulterior motives for deliberately underreporting their drug use frequency, symptoms, or criminal history. For example, 386 of the subjects claimed that they had not been convicted of previous drug crimes, whereas the official records showed that only 243 subjects did not have drug-related records. This discrepancy was most likely due to prevarication. Therefore, combining official criminal records with the self-reported data was essential.

The advantages of the system that a user of illicit drug was dually identified both as a criminal and a patient are controversial. Detailed discussion of the pros and cons of this system may be beyond the scale of this study. Some officials in the justice system argue that the punishments in this system are less strict than the previous one which considered all illicit drug users as criminals, and that this system has less threatening effects in forbidding drug use. Repeat offenders who were eventually imprisoned after forced detoxification and abstinence argue that it is unfair for them to receive repeated incarceration. This system provides opportunities for forced detoxification or abstinence. The majority of these drug abusers did not reveal their use to professionals in the past. Most users undergo mandatory detoxification and risk assessment by psychiatrists for risk of continuous use for the first time at these detention centers. However, the treatments in the detention are clearly inadequate. The treatment modalities are not yet validated, and the detention centers in Taiwan run severely short of professionals in mental health.

Despite the above limitations, analytical results of this study showed that recidivism of illicit drug users in Taiwan were very high after detoxification at the detention center. The recidivism rate was roughly 65% for methamphetamine users, and as high as 80% for heroin users during the 5-year follow-up period. Furthermore, their recidivism occurred primarily within the first 2 years after their release into the community. Prison-based intervention, especially when followed by residential aftercare, have been demonstrated to be effective for reducing postrelease recidivism rates.[26] However, there are no well-established models of behavioral treatments employed at the detention centers in Taiwan. The efficacy of detoxification programs in detention centers in Taiwan requires re-evaluation. Coping skills have been reported to be a strong predictor of improved outcome for cocaine users and adolescent drug and alcohol users.[14,27] Gossop *et al*. reported that clients who avoided a full relapse of heroin use

after treatment consistently made more use of cognitive, avoidance and distraction coping strategies.[28] Treatment services for drug users in detention centers in Taiwan should strengthen relapse prevention and relapse coping skills, and adopt a continuum of care from institution to community.

ACKNOWLEDGMENTS

This study was supported by the Department of Health, Taiwan. Additional support was obtained from the National Science Council, Taiwan (NSC93-2314-B-182A-210) and Chang Gung Memorial Hospital (CMRPG2019) for Dr C.K. Chen. The authors are grateful to the staff and participants at the Tao Yuan Detention Center for their assistance.

REFERENCES

1. Marlatt GA. Cognitive factors in the relapse process. **In**: Marllat GA, Gordon JR (eds). *Relapse Prevention: Maintenance Strategies in the Treatment of Addictive Behaviors*. Guilford Press, New York, 1985; 128–200.
2. Hunt WA, Barnett LW, Branch LG. Relapse rates in addiction programs. *J. Clin. Psychol.* 1971; **27**: 455–456.
3. Llorente JM, Fernandez C, Gutierrez M. Prediction of relapse among heroin users treated in Spanish therapeutic communities. A comparison of different models. *Subst. Use Misuse* 2000; **35**: 1537–1550.
4. Hall SM, Havassy BE, Wasserman DA. Commitment to abstinence and acute stress in relapse to alcohol, opiates, and nicotine. *J. Consult. Clin. Psychol.* 1990; **58**: 175–181.
5. Moore BA, Budney AJ. Relapse in outpatient treatment for marijuana dependence. *J. Subst. Abuse Treat.* 2003; **25**: 85–89.
6. Gossop M, Green L, Phillips G, Bradley B. Lapse, relapse and survival among opiate addicts after treatment. A prospective follow-up study. *Br. J. Psychiatry* 1989; **154**: 348–353.
7. Siegal HA, Li L, Rapp RC. Abstinence trajectories among treated crack cocaine users. *Addict. Behav.* 2002; **27**: 437–449.
8. Yoshida T. Use and misuse of amphetamines: an international overview. **In**: Klee H (ed.). *Amphetamine Misuse: International Perspectives on Current Trends*. Harwood Academic Publishers, Amsterdam, 1997; 1–16.
9. Konuma K. Use and abuse of amphetamines in Japan. **In**: Cho AK, Seqal DS (eds). *Amphetamine and its Analogs: Psychopharmacology, Toxicology, and Abuse*. Academic Press, San Diego, 1994; 415–435.
10. Chou P, Liou MY, Lai MY, Hsiao ML, Chang HJ. Time trend of substance use among adolescent students in Taiwan, 1991–1996. *J. Formos. Med. Assoc.* 1999; **98**: 827–831.
11. Sattah MV, Supawitkul S, Dondero TJ *et al.* Prevalence of and risk factors for methamphetamine use in northern Thai youth: results of an audio-computer-assisted self-interviewing survey with urine testing. *Addiction* 2002; **97**: 801–808.
12. Ahmad K. Asia grapples with spreading amphetamine abuse. *Lancet* 2003; **361**: 1878–1879.
13. Farrell M, Marsden J, Ali R, Ling W. Methamphetamine: drug use and psychoses becomes a major public health issue in the Asia Pacific region. *Addiction* 2002; **97**: 771–772.
14. McKay JR, Alterman AI, Mulvaney FD, Koppenhaver JM. Predicting proximal factors in cocaine relapse and near miss episodes: clinical and theoretical implications. *Drug Alcohol Depend.* 1999; **56**: 67–78.
15. Chen CC, Tsai SY, Su LW, Yang TW, Tsai CJ, Hwu HG. Psychiatric co-morbidity among male heroin addicts: differences between hospital and incarcerated subjects in Taiwan. *Addiction* 1999; **94**: 825–832.
16. Chen CK, Lin SK, Sham PC *et al.* Pre-morbid characteristics and co-morbidity of methamphetamine users with and without psychosis. *Psychol. Med.* 2003; **33**: 1407–1414.
17. Lin SK, Ball D, Hsiao CC, Chiang YL, Ree SC, Chen CK. Psychiatric comorbidity and gender differences of persons incarcerated for methamphetamine abuse in Taiwan. *Psychiatry Clin. Neurosci.* 2004; **58**: 206–212.
18. Brandon TH, Tiffany ST, Obremski KM, Baker TB. Postcessation cigarette use: the process of relapse. *Addict. Behav.* 1990; **15**: 105–114.
19. Hughes JR, Gulliver SB, Fenwick JW *et al.* Smoking cessation among self-quitters. *Health Psychol.* 1992; **11**: 331–334.
20. Miller WR. What is a relapse? Fifty ways to leave the wagon. *Addiction* 1996; **91** (Suppl.): S15–S27.
21. Marlatt GA, Gordon JR. *Relapse Prevention*. Guilford, New York, 1985.
22. Willinger U, Lenzinger E, Hornik K *et al.* Anxiety as a predictor of relapse in detoxified alcohol-dependent patients. *Alcohol Alcohol.* 2002; **37**: 609–612.
23. Weiss RD, Griffin ML, Mazurick C *et al.* The relationship between cocaine craving, psychosocial treatment, and subsequent cocaine use. *Am. J. Psychiatry* 2003; **160**: 1320–1325.
24. Tsuang MT, Lyons MJ, Meyer JM *et al.* Co-occurrence of abuse of different drugs in men: the role of drug-specific and shared vulnerabilities. *Arch. Gen. Psychiatry* 1998; **55**: 967–972.
25. Carey KB. Challenges in assessing substance use patterns in persons with comorbid mental and addictive disorders. *NIDA Res. Monogr.* 1997; **172**: 16–33.
26. Hiller ML, Knight K, Simpson DD. Prison-based substance abuse treatment, residential aftercare and recidivism. *Addiction* 1999; **94**: 833–842.
27. Tapert SF, Brown SA, Myers MG, Granholm E. The role of neurocognitive abilities in coping with adolescent relapse to alcohol and drug use. *J. Stud. Alcohol* 1999; **60**: 500–508.
28. Gossop M, Stewart D, Browne N, Marsden J. Factors associated with abstinence, lapse or relapse to heroin use after residential treatment: protective effect of coping responses. *Addiction* 2002; **97**: 1259–1267.