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The reductions in monetary cost and gains in productivity with methadone maintenance treatment: One year follow-up

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ABSTRACT

While methadone maintenance treatment (MMT) is beneficial for heroin dependence, there is little information regarding the reductions in monetary cost and gains in productivity following MMT. The aim of this study was to evaluate the changes in the monetary cost of heroin addiction and productivity after one year of MMT. Twenty-nine participants from an MMT clinic were included. The monetary cost, productivity, quality of life (QOL) and mental health status were assessed at both baseline and one year follow-up. The average annual total cost was approximately US$26,485 (1.43 GDP per capita in 2010) at baseline, and decreased by 59.3% to US$10,784 (0.58 GDP) at follow-up. The mean number of months of unemployment dropped from 6.03 to 2.79, the mean income increased to exceed the basic salary, but only reached 45.3% of the national average monthly earnings. The participants' mental health improved, but their QOL scores did not increase significantly. After one year of MMT, the monetary cost of heroin addiction fell, both the productivity and mental health of the participants' improved, but limited gains were seen with regard to their QOL.

1. Introduction

Heroin is one of the most prevalent used illicit drugs worldwide (Degenhardt et al., 2011), and the use of opioids (heroin, opium and prescription opioids) has increased in Asia since 2009 (United Nations Office on Drugs and Crime, 2013). In Taiwan, heroin has been the most commonly abused drug for more than a decade, accounting for 79.9% of illicit drug use in 2011 (Chi et al., 2013). The impacts of opioid dependence include a high prevalence of virus infections due to needle-sharing, such as the human immunodeficiency virus (HIV), hepatitis C virus (HCV), and hepatitis B virus (HBV) (Mathers et al., 2008; Chu et al., 2009; Nelson et al., 2011); comorbid psychiatric illness (Brooner et al., 1997; Kidorf et al., 2004; Fan et al., 2014); high criminal behavior (Degenhardt et al., 2013a); and low employment (French et al., 2001; DeSimone, 2002). These consequences cause heavy social and economic burdens, even when using different approaches to evaluate the related costs. For example, opioids were the most significant contributor to the 20 million disability-adjusted life years (DALYs) caused by illicit drugs worldwide in 2010, according to a recent cost utility analysis (Degenhardt et al., 2013b). Costs of illness studies establish values for illnesses, health care services and programs by identifying the cost-generating components and attributing a monetary value to them. The monetary value is the "opportunity cost" of the forgone opportunity to use in a different way those resources that are used or lost due to illness (Hodgson and Meiners, 1982). The annual cost of substance abuse or addiction in specific countries has been estimated in monetary terms (Healey et al., 1998; Single et al., 1998; Xie et al., 1998; Yu et al., 1998; Cartwright, 1999; Mark et al., 2001; Fenoglio et al., 2003; Cartwright, 2008; Wickizer, 2013), ranging from US$ 0.3 to 143 billion per year, with the cost of heroin addiction being estimated to be US$ 21.9 billion in the USA (Mark et al., 2001). Although the monetary cost of heroin addiction might vary across countries and studies, the proportions of the Gross Domestic Product (GDP) per capita are comparable across studies and geographic regions, at around 0.11–0.29% (Lin et al., 2013a), and high productivity losses were noted (Yu et al., 1998; Cartwright, 2008). The productivity losses from heroin addiction might be due to premature death, unemployment and incarceration, and it has been found that such losses account for

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about 30% of the total cost, more than the medical costs, not including those related to premature death (Mark et al., 2001; Lin et al., 2013a).

Methadone maintenance treatment (MMT) is a common and effective treatment for heroin addiction (Barnett, 1999; Mattick et al., 2009). The benefits of MMT include reductions in mortality (Huang et al., 2011) and HIV-related risk behavior (Corsi et al., 2009; Department of Health et al., 2010; Chen et al., 2012), and improvements in quality of life (QOL) (Xiao et al., 2010; Wang et al., 2012). In Taiwan, an MMT pilot project started in six clinics in 2005, and was extended to 136 clinics across the country by the end of June 2013, with 42,431 patients receiving the treatment in total (Center for Disease Control (Taiwan), 2014). However, previous research has shown that only 40–50% of MMT users remain in such programs for more than one year without dropping out (Gossop et al., 2001), and it has also been reported that pay-for-treatment programs have high drop-out rates (Booth et al., 2004). Although National Health Insurance is not reimbursed for MMT, it is funded by the local government, and the one-year retention rate for such treatment is 41.6% (Lin et al., 2013). MMT has been widely researched in North America and Europe, and there is now a growing body of literature on MMT-related issues in Taiwan (Huang et al., 2011; Yen et al., 2011; Chen et al., 2012; Lee et al., 2012; Wang et al., 2012; Chen et al., 2013; Lin et al., 2013; Lin et al., 2013a; Wang et al., 2013). However, information regarding the changes in monetary cost and productivity following MMT is relatively limited. The aim of this study was therefore to evaluate the changes in the monetary cost of heroin addiction and productivity after one year of MMT in Taiwan.

2. Methods

2.1. Study subjects

This research was a follow-up to a previous study that was performed on the MMT program of National Cheng Kung University Hospital, Taiwan (Lin et al., 2013a). The parent study is described as follows:

Volunteer patients in the MMT program of the study site, National Cheng Kung University Hospital, Taiwan, were enrolled. The MMT program in Taiwan is sponsored by the government (specifically, by local governments and the Center for Disease Control). Heroin users who turn themselves in or are arrested by the police can be granted deferred prosecution and receive MMT. Heroin users who have been released from jail and still have an addiction to heroin are encouraged to join this program, and HIV carriers with heroin dependence are also referred to it. The MMT program for treating heroin users is promoted by the government, and one of the main aims is to reduce the incidence of HIV infection. To help achieve this, the Department of Health and the Department of Police have an agreement not to heroin users near MMT clinics.

The inclusion criteria were as follows:

1. Participants must fulfill the DSM-IV criteria for opioid dependence and must be enrolled in an outpatient MMT program.
2. Participants must be aged between 18 and 65 years old.
3. Participants must have stable vital signs during enrollment.

Eligible outpatients with heroin dependency were enrolled after being introduced to the study by research assistants and their participation was voluntary. If they agreed to participate, the participants were interviewed before or after they received methadone. At first, 121 heroin-dependent patients were enrolled at baseline, 89.3% of whom were male. The mean age was 39.30 (standard deviation, S.D.=7.37) years, and the mean duration of heroin use was 13.18 (S.D.=6.35) years (Lin et al., 2013a).

This is a naturalistic study. One year after the baseline study the previous participants were contacted and asked to take a follow-up survey, identical to that used in the baseline study. At this point there were a total of 54 baseline participants still enrolled in MMT, with the other 67 having left the program for various reasons, including incarceration, moving to a different location, or being lost to follow-up. A total of 29 of the eligible participants were included, the refusal rate being 46.3%, and no statistical differences were observed in the demographic data, monetary cost, and QOL scores between participants who were included in the follow-up study and those who were not.

The Ethical Committee for Human Research at National Cheng Kung University Hospital approved the study protocol, and all participants gave written informed consent. Those who joined this study received 3.5 USD per hour as compensation, as was the case for the baseline study.

2.2. Measures

The participants were assessed using the following instruments, both at baseline and at the one-year follow-up:

2.2.1. Economic Cost Questionnaire for Drug Abuse

The original version was designed to examine the cost of schizophrenia (Ko et al., 2003; Lee et al., 2008), and it was modified for drug abuse in previous research (Lin et al., 2011; Lin et al., 2013a). The questionnaire was designed by adapting the cost-of-illness study, which is one of the most commonly used models to identify and measure all the costs of a particular disease, including the direct, indirect, and intangible or psychological dimensions, and the total burden of a particular disease to society is expressed in monetary terms (Hodgson and Meiners, 1982; Rice, 1994).

The original tool was found to be valid for measurement of the cost of schizophrenia (Ko et al., 2003; Lee et al., 2008). For drug abuse, the concurrent validity of this instrument was supported by the expenditure on heroin being associated with central dopaminergic activity in a small-sample pilot study (Lin et al., 2011).

The questionnaire included the following sections:

1. Medical care utility: This was assessed by examining the recall frequency for outpatient clinics, emergency services and inpatient treatment related to heroin craving and its complications. The costs of psychotherapy, other hospital services and other non-hospital medical services were also assessed.
2. Employment condition: The participants were asked how many months they had worked, the amount of salary they received, and whether they had lost a job or had received a pay cut due to heroin use in the previous 12 months.
3. Cost of jail: The jail costs were assessed according to the months of incarceration due to heroin addiction.
4. Legal costs: The penalty, the fine and the compensation awarded to others due to heroin addiction.
5. Cost of purchasing heroin and other illegal drugs: The economic expense of heroin use, including the frequency of usage and mean daily expenditure on heroin and other drugs, was assessed.

A literature review of cost of illness studies found considerable variations in the methods used within disease subcategories, and a variety of components of costs. Six components of direct medical costs, including emergency department or hospital services, outpatient physician services, drugs, diagnostic procedures/laboratory tests, other health care services, and ancillary personnel, and five

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