ORIGINAL ARTICLE

# Barriers and facilitators to methadone maintenance therapy use among illicit opiate injection drug users in Vancouver

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## ABSTRACT

*Methadone maintenance therapy (MMT) has been increasingly implemented as the treatment of choice for opiate-addicted individuals and has been associated with reduced harm related to opiate addiction. Barriers to MMT uptake still exist, however, and many opiate-addicted individuals do not access this form of treatment.*

*We examined barriers to and facilitators of MMT access among opiate users enrolled in a prospective cohort study of injection drug users (IDUs). We identified individuals who had initiated MMT during follow-up interviews and used generalized estimating equations to identify sociodemographic and drug-related variables associated with MMT access.*

*Of the 1,587 participants recruited into the Vancouver Injection Drug User Study, 1,463 individuals were eligible for the present analysis. Factors negatively associated with MMT use included male gender (odds ratio [OR] = 0.41; 95 percent confidence interval [CI], 0.32 to 0.52), Aboriginal ethnicity (OR = 0.37; 95 percent CI, 0.29 to 0.48), recent incarceration (OR = 0.82; 95 percent CI, 0.72 to 0.93), Downtown Eastside residence (OR = 0.86; 95 percent CI, 0.75 to 0.97), sex-trade involvement (OR = 0.80; 95 percent CI, 0.67 to 0.95), syringe lending (OR = 0.76; 95 percent CI, 0.66 to 0.89), denied addiction treatment (OR = 0.81; 95 percent CI, 0.68 to 0.96), heroin injection (OR = 0.51; 95 percent CI, 0.44 to 0.59), nonfatal overdose (OR = 0.59; 95 percent CI, 0.51 to 0.68), and injecting in public (OR = 0.75; 95 percent CI, 0.63 to 0.89). Older age (OR = 1.03; 95 percent CI, 1.01 to 1.04), human immunodeficiency virus (HIV) positivity (OR = 1.89; 95 percent CI, 1.52 to 2.23), and crack cocaine smoking (OR = 1.41; 95 percent CI, 1.22 to 1.62) were positively associated with MMT use.*

*Our study identified a large number of barriers to and facilitators of MMT use among IDUs. While some populations such as HIV-positive individuals are frequently accessing MMT, identified barriers among men and Aboriginal IDUs are of great concern. These findings indicate the need for additional interventions aimed at maximizing coverage of MMT and other treatments for opiate-addicted individuals.*

*Key words: methadone maintenance therapy, injection drug use, opiate addiction, treatment*

## INTRODUCTION

The high rates of opiate addiction in Vancouver, British Columbia, is of particular concern due to the array of health and social harms associated with illicit injection drug use, including high rates of human immunodeficiency virus (HIV), hepatitis C, and overdose deaths.[1-3] One treatment option for opiate-addicted individuals is methadone maintenance therapy (MMT). Methadone is a synthetic opiate with a half-life of approximately 24 to 36 hours, which allows for once-daily administration. MMT has been widely recognized and implemented as the treatment of choice for reducing the harms associated with opiate addiction.[4-9]

MMT has been shown to be successful in blocking the effects of opiate withdrawal symptoms and the euphoria produced by opioids, such as heroin, and may correct and stabilize a lesion or defect in the endogenous opioid system.[10-12] Consequently, MMT is the most cost-effective strategy for reducing major risks, harms, and costs associated with untreated opiate addiction among patients attracted to and successfully retained in MMT.[9,13,14] Retention in MMT has been associated with reductions in, and even the elimination of, use of opiates,[15-20] as well as reductions in criminal activity, unemployment, and mortality rates.[15,16,21-26] MMT has also been shown to reduce

HIV and viral hepatitis transmission rates.[23,27-30] Reductions in risk behaviors, including needle sharing, number of sexual partners, engaging in sex without condom use, and exchange of sex for drugs or money have also been demonstrated.[18,31-34]

Despite considerable evidence to support the efficacy of MMT,[5,15] problems with uptake of MMT, as well as its limited success in retaining patients in treatment, remain major concerns. Studies of community-treated opiate addicts indicate that MMT programs may lose one-third of their original treatment population within the first 12 months and another one-third within the following 24 months.[35,36] Barriers to MMT uptake were examined in a cohort of opiate users in Toronto, Ontario, and the findings indicated that homelessness, illegal income generation, illicit opiate and other drug use, illicit drug market activities, and increased use of emergency care were more common among those who did not access treatment.[12]

While there are numerous studies examining patient retention in and treatment outcomes from MMT, data examining barriers to MMT are lacking.[37] Additionally, the majority of evaluations of MMT efficacy that have been presented have a number of key limitations. In particular, these studies have generally been restricted to clinic-based populations that are willing to initiate MMT[38] and who are retained in treatment long enough for outcomes to be evaluated.[39] We therefore undertook the present study to evaluate the barriers to MMT use among opiate users within a community-recruited cohort of injection drug users (IDUs) in Vancouver.

## METHODS

The Vancouver Injection Drug User Study (VIDUS) is a prospective study of injection drug using individuals who have been recruited through self-referral and street outreach from Vancouver's Downtown Eastside since May 1996. The cohort has been described in detail previously.[3,40] Briefly, persons were eligible if they had injected illicit drugs at least once in the previous month and resided in the greater Vancouver region. At baseline and semiannually, subjects provided blood samples and completed an interviewer-administered questionnaire. The questionnaire elicited demographic data, as well as information about drug use, HIV risk behavior, and enrollment into addiction treatment. All participants provided informed consent and were given a stipend ($20 Canadian) at each study visit. The study was approved by the University of British Columbia's Research Ethics Board.

The present analyses included participants who were enrolled in the VIDUS cohort between May 1, 1996, and May 30, 2004. Current guidelines specify that MMT provision should be restricted to individuals addicted to opiates, and therefore the sample was restricted to individuals who reported opiate use of some kind in the six months before their interview. In total, 1,463 individuals in the VIDUS cohort were identified as eligible for MMT during follow-up.

The primary endpoint in this analysis was access to MMT during the previous six months. Explanatory variables of interest in this analysis included sociodemographic information: gender, age, Aboriginal ethnicity (yes/no), and unstable housing. As in previous analyses,[3] unstable housing was defined as living in hotels, hostels, or recovery houses, or being homeless. The drug use variables considered refer to behaviors in the past six months, and included heroin and cocaine injection, crack cocaine smoking, nonfatal overdose, injecting in public, and borrowing and lending used syringes. Also, as in our previous analyses,[3] the variables for cocaine and heroin injection and crack smoking were defined as "daily" versus "nondaily" use. Other risk characteristics considered included sex-trade involvement and incarceration in the past six months, being denied addiction treatment, residing in the Downtown Eastside (i.e., Vancouver's illicit drug use and HIV epicenter), having a history of sexual abuse, and HIV sero status (positive/negative).

Our analyses of factors potentially associated with MMT use during follow-up included serial measures for each subject; we used generalized estimating equations (GEE) for binary outcomes with logit link for the analysis of correlated data to determine which factors were independently associated with reporting MMT use throughout the follow-up period. These methods provided standard errors adjusted by multiple observations per person using an exchangeable correlation structure. This approach has been used successfully in previous studies examining correlates of addiction treatment access in prospective cohort studies of IDUs.[41] Variables potentially associated with MMT use were examined in bivariate GEE analyses. To adjust for potential confounding, we also fit a multivariate GEE model using an a priori defined model-building protocol of adjusting for all variables that were statistically significant at the $p < 0.05$ level in bivariate analyses. All statistical analyses were performed using SAS software version 8.0 (SAS Inc., Cary, NC). All p values are two sided.

## RESULTS

In total, 1,587 participants were recruited into the VIDUS cohort between May 1, 1996, and May 30, 2004. This sample for this analysis was, however, restricted to 1,463 individuals who reported using opiates at baseline or during follow-up. Among these participants were 538 (36.8 percent) women and 389 (26.6 percent) individuals of Aboriginal ethnicity. The median age of the sample was 33.2 years (interquartile range, 25.6 to 39.9). Overall, these participants contributed to 7,006 observations during the follow-up period, and the median number of follow-up

**Table 1. Bivariate and multivariate generalized estimating equation of factors associated with methadone maintenance therapy use during follow-up (n = 1,463)**

| Characteristic | Unadjusted OR (95 percent CI) | p value | Adjusted OR (95 percent CI) | p value |
|---|---|---|---|---|
| Older age (per year older) | 1.04 (1.03 – 1.05) | < 0.001 | 1.03 (1.01 – 1.04) | < 0.001 |
| Gender (male vs. female) | 0.60 (0.50 – 0.73) | < 0.001 | 0.41 (0.32 – 0.53) | < 0.001 |
| Aboriginal ethnicity (yes vs. no) | 0.54 (0.43 – 0.68) | < 0.001 | 0.37 (0.29 – 0.48) | < 0.001 |
| HIV positivity (yes vs. no) | 2.23 (1.86 – 2.69) | < 0.001 | 1.89 (1.52 – 2.23) | < 0.001 |
| Homelessness (yes vs. no) | 0.74 (0.62 – 0.89) | 0.001 | 0.86 (0.71 – 1.05) | 0.141 |
| Incarceration* (yes vs. no) | 0.67 (0.59 – 0.76) | < 0.001 | 0.82 (0.72 – 0.93) | 0.002 |
| DTES residency** (yes vs. no) | 0.79 (0.70 – 0.90) | 0.004 | 0.86 (0.75 – 0.97) | 0.018 |
| Sex-trade involvement* (yes vs. no) | 0.73 (0.61 – 0.87) | 0.003 | 0.80 (0.67 – 0.95) | 0.011 |
| Borrowed syringes* (yes vs. no) | 0.62 (0.54 – 0.72) | < 0.001 | 0.88 (0.76 – 1.02) | 0.086 |
| Lent syringes* (yes vs. no) | 0.58 (0.50 – 0.68) | < 0.001 | 0.76 (0.66 – 0.89) | 0.003 |
| Denied addiction treatment* (yes vs. no) | 0.66 (0.56 – 0.78) | < 0.001 | 0.81 (0.68 – 0.96) | 0.016 |
| Daily heroin injection* (yes vs. no) | 0.47 (0.41 – 0.54) | < 0.001 | 0.51 (0.44 – 0.59) | < 0.001 |
| Daily cocaine injection* (yes vs. no) | 0.73 (0.65 – 0.83) | < 0.001 | 0.95 (0.84 – 1.08) | 0.473 |
| Daily crack smoking (yes vs. no) | 1.35 (1.19 – 1.54) | < 0.001 | 1.41 (1.22 – 1.62) | < 0.001 |
| Nonfatal overdose* (yes vs. no) | 0.51 (0.44 – 0.58) | < 0.001) | 0.59 (0.51 – 0.68) | < 0.001 |
| Sexual abuse (yes vs. no) | 1.43 (1.19 – 1.72) | 0.002 | 1.18 (0.94 – 1.49) | 0.155 |
| Injecting in public* (yes vs. no) | 0.66 (0.56 – 0.77) | < 0.001 | 0.75 (0.63 – 0.89) | 0.008 |

CI, confidence interval; OD, odds ratio. *Denotes activities/events in the previous six months; ** DTES, Downtown Eastside.

visits was 5.6. Use of MMT was reported for 2,362 (33.7 percent) of all observations, and by 623 (42.6 percent) individuals.

The bivariate GEE analyses shown in Table 1 indicate that all sociodemographic and drug use factors considered were significantly associated with MMT. Factors positively associated with MMT use included: older age (odds ratio [OR] = 1.04; 95 percent confidence interval [CI], 1.03 to 1.05), HIV positivity (OR = 2.23; 95 percent CI, 1.86 to 2.69), crack cocaine smoking (OR = 1.35; 95 percent CI, 1.19 to 1.54), and a history of sexual abuse (OR = 1.43; 95 percent CI, 1.19 to 1.72). Factors negatively associated with MMT use included male gender (OR = 0.60; 95 percent CI, 0.50 to 0.73), Aboriginal ethnicity (OR = 0.54; 95 percent CI, 0.43 to 0.68), homelessness (OR = 0.74; 95 percent CI, 0.62 to 0.89), recent incarceration (OR = 0.67; 95 percent CI, 0.59 to 0.76), Downtown Eastside residence (OR = 0.79; 95 percent CI, 0.70 to 0.90), sex-trade involvement (OR = 0.73; 95 percent CI, 0.61 to 0.87), syringe borrowing (OR = 0.62; 95 percent CI, 0.54 to 0.72), syringe lending (OR = 0.58; 95 percent CI, 0.50 to 0.68), having been denied addiction treatment (OR = 0.66; 95 percent CI, 0.56 to 0.78), daily heroin injection (OR = 0.47; 95 percent CI, 0.41 to 0.54), daily cocaine injection (OR = 0.73; 95 percent CI, 0.65 to 0.83), nonfatal overdose (OR = 0.51; 95 percent CI, 0.44 to 0.58), and injecting in public (OR = 0.66; 95 percent CI, 0.56 to 0.77).

In the multivariate GEE analysis shown in Table 1,

factors that were positively associated with MMT use included older age (OR = 1.03; 95 percent CI, 1.01 to 1.04), HIV positivity (OR = 1.89; 95 percent CI, 1.52 to 2.23), and crack cocaine smoking (OR = 1.41; 95 percent CI, 1.22 to 1.62). Factors negatively associated with MMT use included male gender (OR = 0.41; 95 percent CI, 0.32 to 0.53), Aboriginal ethnicity (OR = 0.37; 95 percent CI, 0.29 to 0.48), recent incarceration (OR = 0.82; 95 percent CI, 0.72 to 0.93), Downtown Eastside residence (OR = 0.86; 95 percent CI, 0.75 to 0.97), sex-trade involvement (OR = 0.80; 95 percent CI, 0.67 to 0.95), syringe lending (OR = 0.76; 95 percent CI, 0.66 to 0.89), having been denied addiction treatment (OR = 0.81; 95 percent CI, 0.68 to 0.96), daily heroin injection (OR = 0.51; 95 percent CI, 0.44 to 0.59), nonfatal overdose (OR = 0.59; 95 percent CI, 0.51 to 0.68), and injecting in public (OR = 0.75; 95 percent CI, 0.63 to 0.89). We also conducted a subanalysis in which we restricted the sample to those individuals who were not receiving MMT at baseline. The results of the final model were unchanged in this analysis.

## DISCUSSION

In the present study, 42.6 percent of all eligible individuals had accessed MMT, and a number of barriers to and facilitators of MMT use were identified. Factors negatively associated with MMT use included male gender, Aboriginal ethnicity, recent incarceration, Downtown Eastside residency, sex-trade involvement, being denied addiction treatment, syringe lending, heroin injection, nonfatal overdoes, and injecting in public, while HIV-positive status, frequent crack cocaine use, and older age were independently and positively associated with MMT use. Despite the high uptake of MMT among local IDUs, a high proportion of opiate users in this study have never accessed MMT. This finding is of concern given the substantial health-related harms associated with untreated opiate addiction that have been identified previously.[12]

Male gender was the characteristic most strongly associated with failure to access MMT in this analysis, with our results suggesting that men are approximately 60 percent less likely than women to have accessed MMT. This result is consistent with findings from a previous study of MMT use in a cohort of IDUs in Baltimore[38] and findings from Vancouver,[42] which indicate men are less likely to initiate addiction treatment than women. However, further investigation of the association between gender and MMT use is needed in our setting to explain this result and inform efforts aimed at attracting and retaining male IDUs in treatment.

The finding that Aboriginal IDUs in this cohort were considerably less likely than non-Aboriginal IDUs to use MMT is of particular concern due to the well-noted protective effects of MMT against HIV infection and evidence indicating that Aboriginal IDUs in Vancouver are at heightened risk for HIV infection.[43] It is possible that low uptake of MMT among Aboriginal IDUs reflects a lack of culturally appropriate addiction treatment programs.[44] Low uptake of MMT among Aboriginal IDUs may be further explained by the emphasis on abstinence-based addiction treatment models in Aboriginal communities in Canada.[45] These explanations have not, to our knowledge, been thoroughly examined, and therefore there is a need to more closely examine barriers to MMT uptake among Aboriginal IDUs in Vancouver and elsewhere.

The finding of a negative association between recent incarceration and MMT use may be interpreted in several ways. Participants in this study were asked to indicate whether they had been incarcerated in the previous six months, and therefore the observed association of lower MMT use among those recently incarcerated could be explained by the well-noted impact of MMT in reducing criminal behavior (and, hence, lower rates of incarceration),[15,22] or could alternatively be interpreted as incarceration acting as a barrier to the initiation of MMT.[46] It is important to note that policies are now in place that allow individuals to begin or continue MMT within Canadian correctional settings[47]; however, previous research has demonstrated that difficulties exist in accessing and continuing MMT within prisons.[46] Because of the aforementioned issues, the association between incarceration and MMT use needs to be investigated further.

Similar concerns regarding possible reverse causality apply to the observed association between MMT use and sex-trade involvement. Previous studies have associated MMT use with reduced participation in sex-trade work[33,48]; however, barriers to addiction treatment have also been identified among this population.[49] Given previously observed associations between sex-trade work and increased engagement in various risk behaviors, the observation of lower uptake of MMT among this population is of particular concern.[50,51] As such, further study of the association between sex-trade involvement and potential barriers to MMT use is needed in Vancouver and elsewhere. Despite this limitation, the observed negative associations between heroin use, syringe lending, occurrence of nonfatal overdose, injecting in public, and MMT is more likely representative of the benefits rather than barriers to access of MMT. This is likely given that the most consistently noted benefits of MMT are the reductions in heroin use and injection-related risk behaviors (e.g., syringe sharing).[18,52,53] The negative association between being denied addiction treatment and MMT use is also of particular concern. This relationship may be explained by individuals simply being denied MMT on seeking it; however, this association requires further investigation given evidence indicating that individuals who are unable to access addiction treatment are at a heightened risk for HIV infection.[54]

HIV positivity was most strongly associated with MMT use in this analysis, a finding consistent with a recent analysis involving Vancouver IDUs that showed an elevated rate of initiation of HIV treatment among IDUs receiving methadone.[55] These findings may also reflect an increased motivation on the part of healthcare providers to pair MMT with the provision of HIV medications, as this has been shown to improve patient adherence to the HIV medications.[56,57] Similarly, a positive association between MMT use and crack cocaine smoking was also observed and is somewhat surprising, given that cocaine use has typically been associated with a greater likelihood of discharge from MMT.[58,59] MMT has been shown to reduce use of stimulants in some studies[60,61]; however, this reduction in stimulant use has only been observed in studies of individuals who were retained in treatment.[62] One potential explanation is that on accessing MMT and discontinuing opiate injection, some individuals may substitute crack smoking for cocaine injection to further reduce or eliminate injection-related risks. Additionally, it is possible that some individuals use crack cocaine simply to "get high," which is an effect that they were getting with heroin but are lacking with methadone. Further examination of these issues is necessary to validate these interpretations.

The findings observed here are highly consistent with a previous report from our setting that examined MMT use among polysubstance users.[63] This, coupled with the fact that numerous opiate-addicted individuals are eligible for MMT, but fail to uptake treatment, suggests further work focused on identifying the distinct barriers to MMT use among opiate users is needed. Additionally, further consideration should be given to other opiate-dependence treatment modalities. One possible approach is heroin prescription treatment, which has been implemented with some success in Europe and is currently being evaluated in three major Canadian cities.[64,65] Furthermore, evidence of poor retention in opiate replacement therapies also indicates a need for increased coverage and uptake of nonsubstitution-based inpatient and outpatient opiate addiction treatments.

This study has several limitations. First, there are the aforementioned concerns related to the timing of measurement. While the statistical method used proved to be effective for accommodating individual data in which MMT use was initiated on multiple occasions, it is not known whether some of the observed associations reflect a consequence of MMT use, as behaviors could have occurred after MMT was initiated. However, it is important to emphasize that this limitation does not apply to the strongest associations in this study (e.g., male gender, Aboriginal ethnicity, and HIV positivity). Second, the VIDUS study is not comprised of a random sample, and therefore it is not known if these findings will generalize to other IDU populations. Furthermore, studies relying on self-report and reporting of stigmatized behaviors are always subject to the possibility of reporting biases; as such, behaviors such as syringe borrowing or lending may have been underestimated.[66] Third, our measure of MMT use is limited, as self-report was used to determine MMT uptake, and therefore the exact timing of initiation of MMT and treatment duration cannot be confirmed. Nonetheless, this measure of MMT use produced a number of strong statistical associations, including many consistent with previous studies that used more precise measures of MMT use.[15]

In summary, our study identifies a large number of barriers to and facilitators of MMT among IDUs in a Canadian setting. Male and Aboriginal IDUs in this study were much less likely to access MMT, while HIV positive individuals were much more likely to access MMT. Given the positive outcomes associated with prolonged MMT use, this study points to the need for further study of MMT access in this setting as a means of informing efforts aimed at maximizing uptake of MMT among the target population.

## ACKNOWLEDGMENTS

*We would particularly like to thank the VIDUS participants for their willingness to participate in the study. We also thank Drs. Kevin Craib, Richard Harrigan, David Patrick, Martin Schechter, Mark Tyndall, and Patricia Spittal for their research assistance, and Bonnie Devlin, John Charette, Caitlin Johnston, Vanessa Volkommer, Steve Kain, Kathy Churchill, Dave Isham, Nancy Laliberte, Sue Currie, and Peter Vann for their administrative assistance. The study was further supported by a US National Institutes of Health (R01 DA011591-04A1) and CIHR grant (MOP-67262).*

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