



Methadone Maintenance Treatment as a Crime Control Measure

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INTRODUCTION

This bulletin reviews research that is relevant to answering the question: should the number of persons enrolled in methadone maintenance treatment (MMT) be expanded as part of a larger strategy to reduce drug and property crime among opioid-dependent offenders? First the bulletin summarises what is known about heroin dependence and its influence on crime. Then it reviews research on the impact of MMT on criminal behaviour among heroin-dependent offenders. The next two sections describe the current market for MMT in Australia and consider the ways in which we may increase the number of dependent heroin users who are enrolled in MMT. The bulletin concludes with a discussion of ways in which the number of persons enrolled in MMT can be increased as one way of reducing crime committed by dependent heroin users.

HEROIN DEPENDENCE AND ITS IMPACT ON CRIME

PREVALENCE OF HEROIN USE AND DEPENDENCE

In household surveys of drug use one to two per cent of the adult Australian population say that they have used heroin at some time in their lives (Commonwealth Department of Human Services and Health 1994). These are likely to be underestimates. Heroin users are less likely to participate in household surveys either because they are unavailable at the time the interviewer

calls or they are reluctant to be interviewed, and when they are interviewed, their heroin use is likely to be under-reported because it is illegal. Nevertheless, even if surveys underestimate the number of heroin users by half, the proportion of the Australian population that has ever used heroin is still less than five per cent.

Heroin dependence can be defined as the loss of control over use, as indicated by the continued use of the drug in the face of problems that the user knows or believes are caused by their drug use, such as, legal difficulties, interpersonal problems, and health problems. Dependent heroin users in Australia are daily or near daily injectors of heroin. They are probably a minority of those who ever use heroin. American community surveys (Robins & Regier 1991; Kessler et al. 1994) indicate that about a quarter to a half of those who report ever using heroin become dependent on it. This is between 0.4 per cent (Anthony et al., in press) and 0.7 per cent (Anthony & Helzer 1991) of the American adult population.

Heroin users do not become instantly addicted to heroin. Even those who become dependent on heroin typically report a one to two year period between their first use and their first period of daily heroin use (a reasonable indicator of dependent use). As is true of other types of drug dependence, the development of heroin dependence requires daily use over weeks or months.

In the absence of Australian community survey data on the prevalence of heroin dependence, a variety of imperfect methods have been used to estimate the number of heroin users in Australia. The

most recent guesstimate is that there are 59,000 dependent heroin users. The range of estimates is between 36,000 and 120,000, indicating considerable uncertainty about the total number (Hall 1995).

Just as not all heroin users become dependent on heroin, so not all dependent heroin users become chronic heroin users. Epidemiological research indicates that there are many more persons who are ever heroin-dependent than come to the attention of drug treatment services or the legal system (Anthony et al., in press; Eisenhandler & Drucker 1993). There is also evidence that a substantial proportion of dependent heroin users stop their heroin use without professional assistance (Biernacki 1986; Johnson 1978).

THE CAREERS OF CHRONIC DEPENDENT HEROIN USERS

Once dependent heroin users become integrated into a heroin-using subculture, their dependence is more likely to become a chronic, relapsing condition with a poor prognosis. US research indicates that those heroin users who seek treatment to stop using heroin, and those who come to attention through the legal system, continue to use heroin for decades. In this population periods of daily heroin use are punctuated by detoxification, drug treatment and incarceration for drug-related offences. The proportion who achieve enduring abstinence from opioid drugs after any treatment episode is small, although the proportion who become abstinent gradually increases with age (Goldstein & Herrera 1995; Hser et al. 1993; Vaillant 1973).

The low rates of abstinence after treatment are not surprising as most dependent heroin users enter drug treatment reluctantly (Gerstein & Harwood 1990). They often do so under informal pressure from family and friends, or under legal coercion because they have been charged with a drug or property offence. In these circumstances it is unsurprising that the proportion completing treatment, and the proportion of these who achieve sustained abstinence is so low. In the year after drug treatment, the majority relapse to heroin use, and over 20 years or more, the chances of treated dependent heroin users becoming and remaining abstinent are approximately one in three, roughly equal to their chances of dying prematurely.

Dependent heroin users have a substantially increased risk of dying prematurely from: drug overdoses, violence, infectious diseases spread by sharing contaminated injecting equipment, and alcohol-related causes (Goldstein & Herrera 1995; Hser et al. 1993; Joe & Simpson 1990; Vaillant 1973). Mortality studies among heroin users treated before the advent of HIV/AIDS indicated that they were 13 times more likely to die prematurely than their age peers (English et al. 1995). More recently, HIV/AIDS has been added to the causes of premature deaths among heroin users in the USA and Europe. Emerging evidence suggests that this will become a more important cause of premature death among heroin users in Australia in the future, as will liver disease and cancers caused by infection with the hepatitis C virus (Crofts et al. 1993).

HEROIN USE AND CRIME

Heroin users who come to attention through the legal system and drug treatment services typically engage in high rates of criminal activity, such as drug dealing; robbery; break, enter and steal; forgery; and shoplifting. Heroin-dependent women may be involved in prostitution (Hall et al. 1993; Bell et al. 1992; Bell et al. 1995). Lehman and Simpson (1990) found that 99 per cent of a cohort of 490 American heroin users reported that they had engaged in some form of illegal activity during a 12-year period after treatment, and 60 per cent had spent a year or more in gaol. High

rates of convictions have been reported among methadone applicants in Australia: 90 per cent had one or more convictions, 76 per cent for drug offences, and 78 per cent for property offences (Hall et al. 1993).

There is no doubt that heroin use and crime are associated but there is disagreement about why they are associated (e.g. Dobinson 1989; Chaiken and Chaiken 1990; Hammersley et al. 1989). The interpretation most often favoured in public discussion is that heroin users commit property crimes to finance their heroin use. There are two alternative explanations. One is that property criminals are more likely to become dependent heroin users. The other is that crime and drug use have common causes, such as, multiple social disadvantage, or a criminal subculture that encourages heroin use and crime (Clayton & Tuchfield 1982; Hammersley et al. 1989; McBride & McCoy 1982).

There is some support for each of these alternative explanations. At least half of treated heroin users are involved in property offences before they first use heroin (Dobinson & Ward 1984, 1987; Hall et al. 1993) This is especially so among male heroin users; women are more likely to be recruited to heroin use by a heroin-using male sexual partner so their criminal activities are more likely to follow their heroin use (Hser et al. 1987; Hall et al. 1993).

Longitudinal studies in the US also indicate that certain personal attributes and life experiences make young people more likely to use heroin and to engage in crime (Elliott et al. 1985; Jessor & Jessor 1977). For example, adolescents who have a history of poor school performance, who begin to use alcohol and tobacco in their early teens, and who have a juvenile criminal history, are those who are most likely to associate with other socially deviant and delinquent peers, and to use heroin in their late teens (Elliott et al. 1985; Jessor & Jessor 1977; Kandel 1993).

Nonetheless, dependent heroin use affects the frequency with which heroin users engage in criminal acts. McGlothlin et al. (1978) studied the criminal and drug use careers of 590 heroin addicts in California and Ball et al. (1983) studied 343 heroin users in Baltimore. Both

groups found a much higher rate of self-reported crime when heroin was used daily than when users were abstinent in the community. In Ball et al.'s study when users were abstinent there was a 75 per cent drop in the number of days that they engaged in crime. McGlothlin et al. showed the same pattern in the frequency of recorded arrests, indicating that the relationship between self-reported heroin use and crime was not the result of response biases. Similar results have been reported among heroin-using property offenders and methadone maintenance patients in Australia (Dobinson & Ward 1984, 1987).

THE COMMUNITY IMPACT OF HEROIN-RELATED CRIME

Only a small proportion of adults ever become dependent on heroin but the frequency with which they engage in crime and the range of their criminal activity has a major impact on the communities within which they live. Studies of the criminal behaviour of heroin users in New York City indicate that their major criminal activity was low level drug dealing (Johnson et al. 1985). Heroin users in this study committed an average of 665 crimes related to drug distribution in a year, activities for which they were often paid in drugs. Drug dealing also provided them with an incentive to initiate friends and acquaintances into heroin use, thereby encouraging the spread of heroin use among their social networks and the communities in which they lived.

Johnson et al. (1985) found that property crimes of robbery, burglary, shoplifting and other forms of theft provided a substantial part of the cash income used for drug purchases. The frequency with which these offences were committed produced very large numbers of property crimes. Johnson et al. estimated that 100 daily heroin users in New York City in 1980 committed an average of 20,900 property offences in a year. Each of these 100 users imposed an estimated economic cost of \$22,840 per annum on victims of property crimes, such as householders who were robbed, or the owners of stores from which goods were shoplifted for resale.

The property crime committed by dependent heroin users affects not only

those whose homes are robbed, but also those whose household insurance premiums are increased to meet the claims of others who have been robbed. It also affects those who have to pay higher prices for goods purchased in stores with high rates of shoplifting. High rates of property crimes also reduce the quality of community life more generally by increasing fear of crime, by increasing the costs of home security, and by reducing the amenity of community living.

METHADONE MAINTENANCE TREATMENT (MMT) AS A CRIME CONTROL STRATEGY

Methadone Maintenance Treatment (MMT) involves the substitution of methadone, a long-acting, orally administered, opioid drug for the shorter-acting heroin that is typically injected (Dole & Nyswander 1965, 1967). Methadone provides a legal and controlled supply of an orally administered opioid drug which only has to be taken once a day because its long duration of action eliminates opiate withdrawal symptoms for 24 to 36 hours. When given in high or 'blockade' doses, it also blocks the euphoric effects of injected heroin, thereby providing an opportunity for the individual to improve his or her social functioning by taking advantage of the psychotherapeutic and rehabilitative services that are an integral part of many MMT programs.

There is good evidence that MMT reduces heroin use among dependent heroin users (Gerstein & Harwood 1990; Hubbard et al. 1989; Mattick & Hall 1993). Given this, and that heroin use is a contributory cause of crime among dependent heroin users, a policy worth considering is expanding MMT as one way of reducing heroin-related crime. Other forms of drug treatment also reduce heroin use and crime (Gerstein & Harwood 1990) but MMT is the focus of this bulletin because it has a number of advantages over alternative approaches. It is a more popular form of treatment than its competitors (Marsh et al. 1990) in that it attracts more users into, and retains more of them in treatment (Ward et al. 1992). It has the strongest research evidence for its effectiveness (Mattick & Hall 1993) and it is also more cheaply and easily provided to large numbers of dependent heroin users than other types

of drug treatment (Gerstein & Harwood 1990; Hubbard et al. 1989).

THE IMPACT OF MMT ON CRIME

MEASURING CRIME RATES

Studies of the impact of MMT on criminal behaviour have typically used one or both of two methods to measure crime rates: self-reported criminal behaviour, and official records of arrests and convictions for property and drug offences. Self-reported crime is reported over a period such as a year, either as the number of specific offences the person reported engaging in, or as the number of days in which they engaged in any criminal offence ('crime days'). Both measures are often retrospectively assessed over the previous year and sometimes over decades (e.g. Anglin et al. 1993).

Each method of measuring crime has its strengths and weaknesses. Official records are affected by variations in police effort. They also seriously underestimate crime rates because the rate of detection of the more common property and drug offences is so low. Comparisons of self-reported and records of convictions suggest that less than one per cent of property offences (such as burglary and theft) are detected by police (Ball et al. 1983).

Self-reported criminal offences provide better indicators of the rate of the majority of criminal offences that go undetected (Ball et al. 1983; McGlothlin et al. 1978). Studies reveal that when credible assurances of anonymity and confidentiality are provided, self-reported arrests and convictions are reasonably consistent with official records (Darke et al. 1992) and reasonably consistent with each other when repeated over time (Anglin et al. 1993). Even so, they are subject to deliberate under- or over-reporting of offences, and to the errors that occur when individuals retrospectively report on the frequency with which they engage in common but variable forms of behaviour (Johnson et al. 1985).

RANDOMISED CONTROLLED TRIALS

The gold standard for evaluating the effectiveness of any treatment is a

reproducible demonstration in a randomised controlled trial that the treatment produces a superior outcome to no treatment or minimal treatment. The simplest type of randomised controlled trial is one in which people with a condition (e.g. opioid dependence) are randomly assigned to receive either the active treatment (e.g. methadone maintenance) or a comparison treatment (e.g. detoxification).

The evaluation of treatment effectiveness requires a comparison treatment so that one can discover what would have happened if the patient had received a different treatment, including no treatment at all. The aim of randomisation is to ensure that the subjects who are allocated to the treatment and the comparison conditions do not differ in any systematic way. Only when the two groups have been assigned in this way can one be confident that a difference in treatment outcome reflects the effects of the treatment rather than the pre-existing characteristics of the subjects who received the different treatments.

Dole et al. (1969) conducted the first randomised controlled trial (RCT) of MMT in New York. Their subjects were imprisoned, recidivist opioid addicts who had at least four years history of opiate use. Thirty-four men who became eligible for release over a four month period were invited to participate in the trial, 32 of whom accepted the offer. Sixteen were randomly assigned to methadone maintenance (with 12 entering treatment), and 16 were randomly assigned to a no treatment waiting list. Methadone maintenance was commenced before leaving prison and continued after release.

Both groups were followed up for 12 months after their release and only one subject in each group was lost to follow-up. There were dramatic differences in favour of methadone maintenance when outcome was assessed by rates of imprisonment and return to daily heroin use. Of the 12 persons who entered methadone maintenance, half were employed or in school, and three had been imprisoned, whereas all 16 of those in the control condition had returned to gaol. Similarly, whereas all 16 of the control condition had returned to daily heroin use, none of the persons in methadone had done so, even though 10 out of 12 had used heroin since their

release, and three continued to use intermittently.

A few additional randomised controlled trials have involved small numbers of patients, followed up for short periods (e.g. Newman & Whitehill 1979; Gunne & Grönbladh 1981). All such studies have nonetheless produced positive results. A more confident judgment of the efficacy of methadone depends upon the corroborative results of observational studies in which statistical forms of control have assessed the plausibility of the major alternative explanations of apparent effectiveness which are dealt with by randomisation in controlled trials.

OBSERVATIONAL STUDIES

The most convincing observational studies are controlled studies in which persons who select MMT are followed prospectively, and their heroin use, crime and other outcomes compared with those of persons who selected other forms of treatment (e.g. therapeutic communities and drug-free counselling). The major problem is that one cannot be sure in the absence of random assignment that the persons receiving different forms of treatment were comparable prior to treatment. It is accordingly difficult to rule out the possibility that apparent differences in treatment outcome are due to differences in the types of patients who received them.

The strategy of quasi-experimentation (Cook & Campbell 1979) provides a way of making causal inferences from observational studies. This involves three processes. First, plausible rival hypotheses are generated which may explain any differences between treatments in outcome. Of these the most plausible is that the treatments differ in the number of patients who are 'good or bad treatment bets'. Second, patients are measured on variables which may reflect a better or worse outcome, such as prior history of drug use, degree of criminal involvement, and severity of drug dependence. Third, statistical methods are used to see whether the differences in treatment outcome persist when account is taken of pre-existing patient differences. If the differences in outcome persist after statistical adjustment, confidence in a treatment effect is increased.

Bale and colleagues

Bale and his colleagues (1980) conducted a study in which subjects selected their own treatment. The outcomes of patients selecting MMT were compared at 12 months post-treatment with those selecting detoxification (i.e. supervised withdrawal from heroin). The two MMT programs produced larger reductions in opioid drug use during the past month, and the number of convictions recorded during the past year, than detoxification. Moreover, the differences in outcome between methadone maintenance and detoxification persisted after adjustment for 10 patient characteristics which had been shown to predict outcome.

Anglin and associates

Anglin and his colleagues conducted a series of studies in California to evaluate the impact of MMT on heroin use and crime in patients in a number of MMT clinics (Anglin & McGlothlin 1984). In each study, retrospective data were collected over a decade or more using a time line in which the interviewer went over a detailed chart marked with the subject's criminal and treatment history. Comparisons of overlapping periods reported at different interviews indicated that there was reasonable consistency in rates of reported drug use and crime (Anglin et al. 1993).

The authors studied a group of opioid-dependent men who were committed to compulsory inpatient treatment as an alternative to imprisonment during 1962–64 as part of the California Civil Addict Program (CAP) (Anglin & McGlothlin 1984). Of the 439 subjects in this study, 118 later entered methadone maintenance treatment in the early 1970s. Entry into methadone maintenance brought about a marked reduction in heroin use which lasted throughout the three year follow-up period. A similar pattern of results was found for criminal activity. The reductions in heroin use and crime among those in MMT were greater than those among heroin users who did not enter MMT.

A second study took advantage of the closure of the only MMT program in Bakersfield, California. The nearest clinic was 70 miles away in Tulare. McGlothlin and Anglin (1981) compared the outcomes in the Bakersfield patients with

those of a group from the Tulare program who were not involuntarily discharged from treatment, two years after the closure of the Bakersfield clinic. The Tulare group spent 73 per cent of non-incarcerated time during the follow-up period in methadone maintenance compared with eight per cent for the Bakersfield group.

After the Bakersfield program closed, 60 per cent of the men and 56 per cent of the women became heroin-dependent again, as indicated by morphine-positive urines. The Bakersfield group also had about twice the percentage of individuals arrested during the follow-up period. The other outcomes for the Bakersfield group were poor: 73 per cent were arrested, 61 per cent were imprisoned for more than 30 days, and two died from drug overdoses.

The Drug Abuse Reporting Program

The Drug Abuse Reporting Program collected outcome data five to seven years after drug treatment at 52 drug treatment agencies in the USA and Puerto Rico during 1969 to 1973 (Simpson & Sells 1982). The treatment modalities represented were MMT, residential therapeutic communities, outpatient drug-free treatment, and short-term detoxification programs. Included was a group of people who applied for, but never began treatment. A total of 4,627 subjects were interviewed about their drug use and crime for each month between the end of treatment and the time of the interview.

Patients in methadone maintenance had better outcomes than those who went through detoxification programs or had no treatment at all (Simpson & Sells 1982). This finding was apparent in the year after treatment, and was still evident, although the differences had diminished, at the five-year follow-up (Bracy & Simpson 1982–83). The length of time spent in treatment predicted improved treatment outcome for those who were enrolled in MMT for at least one year.

The Treatment Outcome Prospective Study

The Treatment Outcome Prospective Study (TOPS) (Hubbard et al. 1989) was a prospective study of over 11,000 illicit drug users who applied for treatment in MMT, residential therapeutic communities,

and outpatient drug-free treatment. All applicants in 1979, 1980 and 1981 were interviewed about their drug use and criminality, and were then followed up at three months, one year, two years and at three to five years after treatment. Illicit drug use and criminal activity were assessed by self-reports which were validated. Statistical methods were used to control for potential confounding variables.

All three treatment modalities were associated with a reduction in illicit drug use but MMT had the best retention rates: after three months, 65 per cent of methadone patients remained in treatment, whereas less than 40 per cent of the outpatient drug-free clients and 44 per cent of the residents in therapeutic communities remained in treatment more than three months. At the end of six months 50 per cent of patients were still in methadone maintenance treatment.

Patients in methadone maintenance substantially reduced their heroin use while in treatment, with less than 10 per cent regularly using heroin (weekly or daily) after three months. Criminal activity was also reduced. A third of patients in MMT reported committing a predatory crime in the year before treatment. This dropped to 10 per cent during the first month of treatment. Significant reductions in self-reported predatory crime were only observed while patients remained in methadone maintenance.

PRE-POST STUDIES OF TREATMENT EFFECTIVENESS

Pre-post observational studies are those in which persons entering MMT are followed over time to assess changes in their drug use and crime. In the absence of any comparison treatment condition, the contribution of MMT to changes in behaviour is assessed by examining the relationship between length of time in treatment and patient outcome. Such studies are weaker than controlled observational studies because it is difficult to rule out the alternative explanation that the patients who were the least dependent on opioids, and the most motivated to discontinue their drug use, were the most likely to remain in treatment.

The quasi-experimental strategy can provide a limited test of this alternative explanation. First, the hypothesis that

patients with a good outcome were more likely to be those retained in treatment can be tested by comparing the characteristics of those who do and do not remain in treatment. Second, if there are differences between those who stay and those who leave, statistical methods can be used to discover whether the relationship between treatment duration and patient outcome persists when differences in patient characteristics are taken into account.

Gearing and Schweitzer

Gearing and Schweitzer (1974) provided an independent evaluation of the outcome of 17,500 patients admitted to Dole and Nyswander's long-term methadone maintenance program between January 1964 and December 1971. The demographic characteristics of patients entering the program changed over the period of study but retention in treatment was high (namely, 90% after one year, 80% after two years and 75% after three years). Retention in treatment was associated with improved social productivity, reduced crime and a reduced mortality rate. The rates of arrest decreased with time in treatment, namely, 7 per cent in the first year, 5 per cent in the second year, 3 per cent in the third year, and 3 per cent in the fourth year. Gearing and Schweitzer's results are noteworthy in showing very high rates of retention in treatment, and that positive outcomes were sustained over four cohorts of 17,500 patients who were admitted to their program over a period of eight years.

Ball and colleagues

Ball and Ross (1991) evaluated six MMT programs, two in each of Baltimore, Philadelphia and New York, over a three-year period between 1985 and 1987. During 1985–86, 633 male patients were interviewed, and 506 were interviewed a year later about their drug use history, their last period of injecting drug use, and their past and current criminal activity. At follow-up 388 remained in treatment and 107 had left treatment at some time during the intervening year.

Prior to entering MMT the sample had a total of 4,723 arrests, a mean of nine arrests for the 86 per cent of the sample who had been arrested. Sixty-six per cent of the group had spent some time in gaol

and 36 per cent had been imprisoned for two years or more. The sample admitted to 293,308 offences a year prior to MMT entry, with each offender committing an average of 601 crimes per year (range 1 to 3,588) on an average of 238 days a year.

After entry to MMT, the total number of self-reported offences declined to 50,103 crimes per year, while the mean number of crime days per year decreased from 238 to 69. The number of crime days continued to decline with the number of years spent in treatment. The estimated reduction in the number of crimes committed was 192,000 offences per year. The study may have over-estimated the impact of MMT in that it compared self-reported crime during the last period of addiction with that during treatment. Nonetheless, the magnitude of the reduction in crime is consistent with that observed in comparisons of crime rates in periods of daily heroin use and abstinence in the community. It is also unlikely to be due to regression to the mean because it was so large and it was sustained as long as the user remained in treatment.

A COMPARISON OF RANDOMISED AND OBSERVATIONAL STUDIES

The observational studies generally support the randomised controlled trials in showing that MMT reduces heroin use and criminal activity but the average retention rates and rates of heroin use in MMT in the observational studies were not as impressive as those reported from the randomised controlled trials. There are a number of possible explanations for this.

First, the randomised controlled trials have probably provided an optimistic estimate of treatment effectiveness. In order to produce clear results, such studies usually exclude some of the more difficult patients and they often have a greater degree of control over the quality of the treatment than usually occurs under the exigencies of clinical practice.

Secondly, many current MMT programs in the USA have departed from the original model of Dole and Nyswander in directions that are likely to reduce average effectiveness, namely, by reducing average methadone dose and by placing pressure on patients to become abstinent from all opioids,

including methadone (D'Aunno & Vaughn 1992).

Thirdly, there have been important changes in patterns of illicit drug use between the time when MMT was introduced and when the more recent observational studies were conducted. Cocaine use in particular has become widespread among methadone patients. Since methadone neither blocks the effects of cocaine nor averts withdrawal symptoms, it has had minimal impact on the use of this and other non-opioid illicit drugs (Hubbard et al. 1989).

THE RELEVANCE OF US RESEARCH TO AUSTRALIA

There has been limited Australian research on the impact of MMT on drug use and crime. In its absence, it has been assumed that the results of American research are applicable in Australia. On the whole, this is probably a reasonable assumption for reductions in heroin use and HIV. It may require some qualification in the impact of MMT on crime.

The goals and policies of Australian methadone programs (Burgess et al. 1990; Baillie et al. 1991) are similar to those in American MMT programs (e.g. D'Aunno & Vaughn 1992; General Accounting Office 1990). The Dole and Nyswander model of MMT was substantially modified during the popularisation of methadone treatment during the 1970s (Gerstein & Harwood 1990; Burgess et al. 1990), with the goal in many programs shifting from long-term maintenance towards the achievement of abstinence from all opioid drugs within a few years (D'Aunno & Vaughn 1992; Gerstein & Harwood 1990). MMT expanded greatly in Australia during the middle 1980s (Ward et al. 1992). With the advent of the HIV epidemic and the National Campaign Against Drug Abuse goal of harm minimisation, the prevention of HIV transmission among injecting drug users was given a higher priority than the traditional goal of eliminating illicit drug use.

American and Australian methadone patients have long histories of opioid dependence (e.g. Dobinson & Ward 1987; Hall et al. 1993; Reynolds & Magro 1976) but they differ in ethnic composition. American programs contain large proportions of African and Hispanic Americans whereas there is no large

ethnic group among Australian opioid users. The importance of this difference in ethnicity is diminished by the effectiveness of MMT in controlled clinical trials in Bangkok, Hong Kong, New York, and Stockholm. Similar relationships have also been observed between program characteristics (e.g. dose and duration of treatment) and outcome in America (Ball & Ross 1991) and Australia (e.g. Bell et al. 1995; Caplehorn & Bell 1991). MMT patients in both the USA and Australia have extensive histories of criminal involvement and experiences of incarceration, with the majority of Australian MMT patients having criminal convictions and engaging in a wide range of offences to fund their drug use (Dobinson & Ward 1987; Hall et al. 1993).

There are differences in the cost of illicit drugs and in the availability of social welfare between Australia and the USA which need to be considered when using US studies to estimate the impact of MMT on crime in Australia. Until recently, street prices of heroin in Australian cities have been considerably higher than those in New York (Australian Bureau of Criminal Intelligence 1995; Johnson et al. 1985). This might be expected to encourage more Australian heroin users to engage in crime to finance their heroin use. Operating in the opposite direction is the greater degree of social welfare and health services available to Australian than American heroin users. This might reduce the need of Australian heroin users to engage in crime to provide for food and shelter, as happens among New York addicts who are more often homeless and have limited social welfare income (Johnson et al. 1985).

Despite these differences, the limited Australian evidence on the impact of MMT on crime is consistent with American research. Bell et al. (1992) for example, conducted a prospective cohort study in which they examined the impact of MMT on rates of conviction for drug and property offences. They found that the rate of property convictions dropped by approximately a third for each year that dependent heroin users spent in MMT. Moreover, this relationship persisted after statistical adjustments were made for differences in the characteristics between those who remained in MMT and those who did not.

More recently, Bell et al. (1995) partially replicated the Ball and Ross (1991) study

by following a cohort of 300 patients in three Sydney private MMT programs over a year. Self-reported crime days in the last 30 days of active addiction were compared with the number in the last 30 days on MMT. The percentage reporting drug selling declined from 40 per cent to 12 per cent and the percentage engaging in property crimes declined from 35 per cent to 9 per cent. The number of days in the last 30 on which they reported engaging in each type of offence declined from 21 to 11 for drug selling and from 18 to 9 for other crime. The percentage engaging in any income-generating crime in the previous 30 days declined from 59 per cent to 20 per cent (Bell et al. 1995). Analyses of changes in rates of convictions for property and drug offences from before treatment to after treatment confirmed the self-reported reductions, with rates of property offences declining from 0.75 per annum to 0.22, while those for drug offences declined from 0.30 to 0.06.

AN OVERALL APPRAISAL

The overall impact of MMT on crime can be evaluated by the degree to which the evidence satisfies a modified set of criteria for causal inference (Hill 1965). Although no single criterion is necessary, the more that are satisfied, the greater our confidence that a causal relationship exists between MMT and a reduction in crime.

Strength of association: The relationship between MMT and a reduction in criminal behaviour is, on average, a reasonably strong one. The rate of both self-reported crime and convictions approximately halves with each year that a patient remains in treatment.

Consistency: A relationship between methadone treatment and reduced drug use and criminal behaviour has been consistently observed in controlled trials, quasi-experimental studies, comparative studies, and pre-post-studies in the USA, Sweden, Hong Kong and Australia. This relationship is most consistent in MMT programs that use methadone doses above 60 mg and which have maintenance as their treatment goal. It has been consistently found for both self-reported and officially recorded crime.

Specificity: The effects of MMT are most evident on those outcomes it has been designed to change: opioid use and

criminal behaviour motivated by the need to finance illicit opioid use.

A dose-response relationship: First, there is a relationship between the dose of methadone received and treatment retention and reduction in drug use and crime. Both within individual programs and between programs, the higher the dose of methadone, the longer the retention in treatment and the greater the reduction in drug use and criminal behaviour. Secondly, there is a relationship between treatment duration and benefit: the longer patients remain in treatment, the better the outcome. This relationship does not appear to be explained by a higher retention rate among patients who have a good prognosis.

Plausibility: The rationale for the effectiveness of methadone maintenance is plausible. Opioid dependence is characterised by a preoccupation with procuring illicit opioid drugs which persists to the detriment of the user's health and well-being. The provision of methadone, in doses which avert withdrawal and reduce the positive effects of illicit opioid use, reduces opioid use and the necessity for users to engage in drug dealing and property crimes to procure opioid drugs.

Coherence: The evidence on the effects of methadone maintenance is coherent with what is known about the natural history of opioid drug use: by the time patients present for treatment they have a long history of opioid use so it takes time for methadone maintenance to achieve its benefits; opioid dependence is a chronic condition with a high rate of relapse, so the effects of methadone maintenance treatment appear to last only while people remain in treatment.

Experiment. Although there is limited experimental evidence of the effectiveness of methadone maintenance, it is consistently positive. There are only three controlled trials of comprehensive methadone maintenance over periods of a year or more (Dole et al. 1969; Newman & Whitehill 1979; Gunne & Grönbladh 1981), all involving small numbers of patients and conducted in three very different cultural settings. All found that MMT produced substantial reductions in opioid drug use and crime.

Thus, when the available evidence is taken as a whole there are good reasons

for believing that **on average** MMT reduces injecting heroin use and criminality. The phrase 'on average' implies a number of caveats.

First, MMT substantially reduces but does not eliminate crime committed by opioid-dependent persons. About half of those who enter MMT leave within 12 months and a substantial proportion of those who stay in treatment continue to use heroin and engage in criminal behaviour, although at much lower rates than before they entered treatment.

Second, there is considerable variability in the effectiveness of different MMT programs in reducing drug use and criminal acts. The factors responsible for this probably include the clientele of the programs, the dose of methadone given, the treatment philosophy, the duration of treatment, the quality of the therapeutic relationships, and the intensiveness of ancillary services (Ball & Ross 1991).

Third, the most effective MMT programs are those which resemble the model introduced by Dole and Nyswander in providing higher doses of methadone as part of a comprehensive treatment program with maintenance rather than abstinence as a treatment goal (Ward et al. 1992).

Fourth, the benefits of methadone maintenance only continue as long as patients remain in treatment. Patients who discontinue treatment seem to relapse to opioid use at a high rate. Any expectation that MMT will increase abstinence post-treatment is misplaced, although long-term MMT does not appear to reduce the chances of achieving abstinence (Maddux & Desmond 1992).

THE MARKET FOR MMT IN AUSTRALIA

Could the amount of heroin-related drug and property crime in the Australian community be reduced by increasing the number of heroin users who are enrolled in MMT? An answer to this question requires a description of the current supply of MMT in Australia, an analysis of the factors that influence the demand and uptake of MMT, and a discussion of the costs and benefits of various ways of increasing the numbers of heroin users enrolled in MMT.

THE SUPPLY OF MMT IN AUSTRALIA

As at June 1994, there were 14,996 persons enrolled in MMT in Australia. Just over half of these (55%) were enrolled in New South Wales, with the remainder distributed across the other States and Territories as follows: Victoria 19 per cent, Queensland 13 per cent, South Australia 6 per cent, Western Australia 4 per cent, Australian Capital Territory 2 per cent, and Tasmania 0.6 per cent (Commonwealth Department of Human Services and Health 1995).

The number of persons enrolled in MMT has increased steadily over the past decade from 4,446 in June 1987 to 14,996 in June 1994 (and an estimated 18,000 by June 1995). The participation rate per 100,000 of the population aged 15 to 44 has increased from 59 in June 1987 to 182 in June 1994 (Commonwealth Department of Human Services and Health 1995). In New South Wales, the numbers enrolled in MMT have increased from 3,195 in June 1987 to 9,479 in June 1995, and the participation rates from 73 to 199 per 100,000 of adults aged over 15 years (New South Wales Drug and Alcohol Directorate 1996).

Within New South Wales, the regions with the largest numbers of patients enrolled and the highest participation rates have been in the Sydney metropolitan area. As at June 1995, Eastern Sydney had 1,838 MMT clients (a participation rate of 681 per 100,000), Western Sydney had 1,480 clients (308 per 100,000), Central Sydney had 974 clients (356 per 100,000) and South Western Sydney had 1088 clients (206 per 100,000). MMT clients have been predominantly male (62%) for most of the past decade but their average age has increased by about six months per year between June 1987 and June 1994 (from 31 to 35 years for males and from 29 to 33 for females) (New South Wales Drug and Alcohol Directorate 1996).

In the past seven years, the largest increase in the supply of MMT places has come from the expansion of MMT provided in the private sector, rather than from an expansion of publicly funded MMT programs (Commonwealth Department of Health and Human Services 1995). That is, there has been a larger increase in persons receiving MMT from private medical practitioners than

from publicly-funded MMT programs. Nationally, the number of clients enrolled in public programs increased from 2,701 in June 1987 to 6,541 in June 1994 while over the same period the numbers enrolled in private MMT programs increased from 1,745 to 8,449. The participation rates have increased over the same period from 36 to 79 per 100,000 for public programs and from 23 to 102 per 100,000 in private MMT programs (Commonwealth Department of Human Services and Health 1995). One of the largest increases in private sector MMT places has been in New South Wales where the percentage of MMT places provided in private programs increased from 49 per cent in June 1987 to 68 per cent in June 1995 (New South Wales Drug and Alcohol Directorate 1996).

Private MMT programs are run by general practitioners and psychiatrists who are licensed by the State governments to dispense methadone to opioid-dependent persons. The direct medical costs of these programs are paid by the Commonwealth government through Medicare by bulk-billing for medical services and urinalyses. Patients also pay a dispensing fee which averages \$40 to \$50 a week.

Private MMT programs generally do not provide any formal counselling for clients but prescribers regularly see their clients (3 times a month on average) for which they receive a consultation fee that is bulk-billed to Medicare. Private programs typically give a higher average methadone dose (64 mgs compared with 59 mgs in public programs) and until recently they had more liberal policies towards giving out take-away methadone doses than the public clinics (giving out an average of 16 per month as against less than 3 per month in public clinics) (Bell et al. 1995).

The most recent data indicate that it costs approximately \$2,662 per annum to provide MMT in Australia in public programs (\$2,623 per annum in New South Wales). The direct costs of private MMT programs to government are considerably less: \$552 per annum for programs run by general practitioners and \$1,728 for those run by psychiatrists. These estimates do not include the direct costs paid by clients (\$2,340 per annum at \$45 per week over 52 weeks). When the clients' contribution is added, the

average costs of MMT provided in private programs (\$2,892 for general practitioners and \$4,068 for psychiatrists) are higher than MMT provided in public programs. In 1993/94 it was estimated that the States and Commonwealth governments contributed \$15.2m and \$15.3m respectively to the costs of providing public and private MMT in Australia (Commonwealth Department of Health and Human Services 1995).

THE DEMAND FOR MMT

The most recent estimate is that there were approximately 59,000 dependent heroin users in Australia in 1991 (Hall 1995). Even if there has been no major increase since then, it would be unwise to assume that the potential demand for methadone treatment is equal to 41,000, that is, the discrepancy between the estimated number of regular heroin users in the population (59,000) and the number who are currently enrolled in methadone maintenance treatment (18,000).

First, the size of the heroin-using population may have increased recently (Hall 1995). Second, not all dependent heroin users are interested in drug treatment in general, or in MMT treatment in particular. A substantial minority become abstinent without seeking professional assistance (Biernacki 1986; Johnson 1978), and a substantial proportion of those who enrol in drug treatment, including MMT, drop out. Studies of street heroin users have also identified heroin users who actively avoid involvement in MMT (Beschner & Walters, 1985; Johnson et al. 1985).

Factors influencing demand for MMT

The demand for MMT treatment will be affected by the balance of the benefits and costs of the heroin-using lifestyle. Among the costs that push dependent heroin users into treatment has been the advent of HIV/AIDS among injecting drug users a decade ago. The threat of life-threatening and chronic infectious diseases has been accentuated by the recent recognition of the high incidence and prevalence of hepatitis C infection among Australian injecting drug users (Crofts et al. 1993). Other costs of heroin use that push dependent users into treatment may include the impact of law enforcement strategies on the street price of heroin (Weatherburn & Lind 1995).

Very little research has been conducted on the reasons why dependent heroin users decide to stop their heroin use. Joe et al. (1990) report data on reasons given by 372 daily heroin users. The most commonly cited reasons were feeling 'tired of the hustle' involved in maintaining daily heroin use (83%) and the feeling that the individual had 'hit bottom' and needed to make a dramatic change in his/her life (82%). The next most common reasons were having experienced a major personal or special life event, such as entering a new relationship or having children (66%), fearing being gaoled (57%) and having family responsibilities (56%). Specific aspects of heroin-using life style included: the high cost (40%) and the poor quality of heroin (36%), being tired of having no money (34%), fearing a drug overdose (31%) and fear of being sent to gaol (30%). A sample of 247 Sydney methadone clients interviewed by Weatherburn and Lind (1995) gave similar reasons for stopping their heroin use: 97 per cent were 'tired of the lifestyle', 67 per cent thought that heroin was 'too expensive', and 30 per cent had been in trouble with the police.

Less is known about what factors influence whether or not treatment is sought and, if so, what type of treatment is selected. The attractiveness of different forms of treatment to users is an obvious factor. In the USA, MMT attracts the largest proportion of dependent heroin users (Marsh et al. 1990). If this finding is applicable to Australia, then the increased availability of MMT over the past decade has probably contributed to an increased use of MMT. Evidence from both Australia (Bell et al. 1994) and the US (Woody et al. 1975) also suggests that reducing the barriers to MMT entry by providing rapid assessment and intake increases its attractiveness to heroin users and its success in retaining them in treatment.

Changes in the method of delivering MMT in Australia over the past decade have probably had conflicting effects on demand for MMT. Demand for MMT has probably been increased by more liberal policies towards continuing heroin use while in treatment. The more liberal provision of take-away doses, especially in private MMT programs, has also increased the attractiveness of MMT since the requirement of daily dosing is one of the aspects of MMT most disliked

by MMT clients (Beschner & Walters 1985; Hunt et al. 1986). The adoption of higher methadone doses and a maintenance approach to treatment in many Australian programs have been shown to increase retention in MMT (Caplehorn & Bell 1991; Caplehorn et al. 1993).

On the other hand, the imposition of direct dispensing charges on users in private and some public MMT programs in some States have probably reduced demand and they may have reduced retention. Concerns have also been expressed that the liberal provision of take-away doses in many private programs provides an incentive to sell methadone and a motive for continued criminal activity to cover dispensing costs. There is, however, little evidence to evaluate these concerns about private MMT programs.

INCREASING THE UPTAKE OF OPIOID MAINTENANCE TREATMENT

INCREASING THE PUSH INTO TREATMENT

Not all of the factors that influence demand for MMT can be easily changed. In the case of law enforcement, for example, the ability of police activity to produce short-term fluctuations in the market price and purity of heroin appears to be limited. Law enforcement may nevertheless encourage entry to MMT by maintaining a high street price for the drug (Weatherburn & Lind 1995). Street level law enforcement may increase the inconvenience of being a regular heroin user, thereby encouraging more dependent heroin users to seek MMT. It remains to be seen, however, whether short-term changes produced by street level enforcement have enduring effects on entry to MMT and, if so, whether these benefits are purchased at the price of counterproductive public health effects, such as, increasing unsafe and risky patterns of drug use (Maher 1996).

THE ROLE OF TREATMENT COERCION

A popular proposal for increasing the number of dependent heroin users in treatment is to divert them from the criminal justice system into drug

treatment. This option may be especially appropriate for the most criminally involved dependent heroin users who may avoid treatment (Beschner & Walters 1985; Johnson et al. 1985; Kaplan 1983). The evidence from American studies suggests that coercion does not impair the effectiveness of drug treatment, provided that the threat of return to the criminal justice system remains credible (Anglin 1988; Anglin & Hser 1990; Brecht et al. 1993; Gerstein & Harwood 1990; Hubbard et al. 1988; Simpson & Friend 1988).

Elsewhere (Hall 1996) it has been argued that the most ethically defensible form of legally coerced drug treatment is that in which offenders still have a choice as to whether they accept treatment or imprisonment. If they choose to be treated, they should also have a choice of treatment options, rather than being compelled to enter a particular form of drug treatment.

There are two reasons for avoiding an over-enthusiastic embrace of treatment under coercion as a crime control measure. First, it requires funding of additional treatment places for persons under coercion. The failure to do so will place an undue burden on existing community-based treatment services and deprive those who voluntarily seek treatment from receiving it. Second, there is a need to monitor and evaluate drug treatment under coercion to ensure that scarce treatment resources are not wasted on unsuitable clients, that the programs provide effective and humane treatment, and that they provide a credible alternative to imprisonment rather than being seen by offenders and correctional staff as a 'soft option' to be exploited by those who wish to evade imprisonment (Gerstein & Harwood 1990).

INCREASING THE ATTRACTIVENESS OF OPIOID MAINTENANCE TREATMENT

Our ability to increase the attractiveness of MMT by increasing its availability is limited by the willingness of government (either Federal or State) to fund an ever-increasing number of MMT places. Sooner or later a limit will be imposed on

funds for MMT and this will require more efficient and less expensive ways of delivering opioid maintenance treatment. Some of these alternative methods of delivery may also prove more attractive to dependent heroin users than the current ones.

One alternative is to experiment with general practitioners as prescribers and community pharmacies as dispensers of methadone. The more expensive multidisciplinary public MMT clinics, and the specialist private MMT programs, could be restricted to stabilising new, and dealing with more difficult, clients. These alternative community MMT programs may be more attractive to dependent heroin users than the large, highly visible and controlling specialist clinics. The mainstreaming of MMT within primary and generalist health services may also increase MMT uptake by reducing the stigma of being a MMT patient. It remains to be seen how many general practitioners and pharmacists are prepared to be involved in providing this type of MMT.

Another approach may be to use longer-acting opioid drugs, such as buprenorphine and LAAM, as maintenance agents. Because these drugs have a longer half-life than methadone, the frequency of dosing would be three times a week rather than daily. In addition to reducing costs, it would remove the need for daily dosing and supervision that many MMT clients dislike. Buprenorphine has the additional advantages of a lower risk of overdose, and an easier withdrawal than methadone which has a bad (if not always deserved) reputation among heroin users for its addictiveness, side effects and overdose risk (Beschner & Walters 1985; Hunt et al. 1986; Rosenblum et al. 1991).

We should also consider increasing the number of MMT spaces by providing more systematic assistance to stable MMT patients who want to withdraw from methadone. This should be done without placing pressure on clients to become abstinent. That is, it should be the choice of the client to stop, not the result of imposing an arbitrary time limit on enrolment in MMT. It may be achieved by improving relationships between MMT and drug-free treatment services, or it may require the development of organised aftercare and support services in some MMT programs.

The attractiveness of MMT to heroin users can be most directly achieved by various changes in program policies and philosophies. These include increasing average methadone doses, giving clients greater control over their dose, being more tolerant of intermittent heroin use earlier in treatment, and adopting more liberal policies on take-away doses of methadone. 'Streaming' may also be introduced into some programs. This involves providing, in addition to standard MMT, low threshold programs that have a less onerous assessment process and which make fewer demands upon patients to change drug use or behaviour. Some of these changes have been made in Australian MMT programs in response to HIV/AIDS; they may partly explain the increase in the numbers of heroin users seeking MMT.

Even if public funds were inexhaustible, there may be limits on public tolerance of new MMT clinics being opened within residential areas (Senay 1988). There may also be limits on public tolerance of certain program policies. Reductions in the therapeutic demands made on MMT clients to reduce their opioid drug use, for example, risk blurring distinctions between drug substitution for a therapeutic purpose and the provision of socially sanctioned opioids, albeit under medical supervision. The adoption of take-away policies that are too liberal may lead to increased diversion of methadone to finance MMT and heroin use. This may, in turn, lead to increased methadone overdose deaths, including deaths among heroin users who are not enrolled in MMT, and it may facilitate the injection of oral methadone syrup with adverse health consequences for users (Darke et al. 1995). These program changes may also impair the average effectiveness of MMT in reducing heroin use and crime.

SHOULD WE CONSIDER INJECTIBLE HEROIN MAINTENANCE?

One way of attracting more heroin users into drug treatment may be to offer injectible heroin maintenance treatment (HMT). Its principal attraction is that it provides dependent heroin users with their preferred drug, heroin, by their preferred route of administration, injection. There are reports of successful clinical experience using this form of maintenance treatment (e.g. Marks 1987). Heroin maintenance treatment is also

currently undergoing a controlled evaluation in Switzerland (Rihs, 1994; Uchtenhagen et al. 1994), and there is a proposal for a trial of HMT in the ACT (Bammer 1995).

Even if we assume that HMT, like MMT, reduces illicit heroin use and crime among those receiving it, its impact at a population level is likely to be small because it is unlikely to reach as large a proportion of the heroin-using population as MMT has over the past decade (Hall 1995). The major restraint upon the number of clients in HMT is societal concern about providing injectible heroin, even when it is restricted to dependent heroin users who receive it under medical supervision.

But even if there were strong public support for HMT the scale of its provision would be modest because its costs are of the order of two to three times those of providing MMT (Rihs-Middle, 1995, personal communication). Given this cost differential, MMT seems preferable on the grounds of cost-effectiveness to HMT if we assume a rough equivalence between HMT and MMT in their impact on heroin use and crime (Hartnoll et al. 1980).

Expectations of HMT need to be realistic. It may provide an additional option for those dependent users who have failed to respond to other forms of treatment, including MMT. It may also have modest benefits for the larger community if it reduced the criminal activity of a small actively criminal group of dependent users, and if it reduced their risks of contracting or transmitting HIV and other infectious diseases.

ETHICAL ISSUES IN EXPANDING MMT

Any expansion of MMT to reduce drug-related crime must strike a balance between benefiting heroin users and the wider community. An over-reliance upon legal coercion and punitive law enforcement policies to drive dependent heroin users into MMT runs the risk that it will become primarily a form of social control, rather than a therapeutic alternative to imprisonment. If this were to happen, MMT programs would become progressively more punitive and less attractive to users and the staff who work in them. The high rates of patient and staff turnover would impair the effectiveness of MMT in reducing heroin

use and crime. The net effect of these policies would be to put public support for MMT at risk.

Conversely, an over-reliance on providing user-friendly MMT programs could produce an expensive form of State-subsidised opioid distribution which had minimal therapeutic benefits to dependent heroin users. It would also be achieved at considerable social cost: the increased economic costs of providing MMT, the costs of the methadone diversion, and perhaps, an increase in methadone overdose deaths, including deaths among individuals who were not enrolled in MMT programs. These outcomes would also reduce public support for MMT programs.

CONCLUSIONS

Many dependent heroin users in contact with law enforcement and treatment agencies engage in high rates of drug dealing and property crime to finance their drug use. Their criminal activity usually begins before their heroin use but the development of heroin dependence intensifies criminal activity and entrenches users in a criminal lifestyle.

There is consistent evidence that MMT reduces heroin use and crime while heroin-dependent persons receive adequate doses of methadone in programs with a maintenance treatment goal. The evidence comes from a small number of randomised controlled trials, the findings of which are supported by a substantial body of observational studies, primarily from the US. There are good reasons for believing that the impact of MMT on crime observed in American studies also occurs among opioid-dependent persons in Australia who receive MMT.

The number of heroin-dependent persons enrolled in MMT in Australia has increased steadily over the past decade. The factors pushing heroin users into MMT include: the unavailability, high cost and low purity of heroin, possibly the level of police activity directed at user-dealers, and the use of legal coercion to encourage heroin users convicted of drug-related offences to seek treatment.

The factors pulling dependent heroin users into MMT include: the increased availability of drug substitution treatment, its increased attractiveness to heroin

users with reductions in the therapeutic demands made upon them, and more liberal take-away doses.

An approach which may be worth a trial is the use of longer-acting opioid drugs like buprenorphine to reduce the frequency of supervised dosing. Alternative methods of MMT delivery also can be trialed, including GP prescribing and pharmacist dispensing of methadone. Heroin maintenance may be one option that could increase the attractiveness of opioid maintenance treatment for a small group of severely dependent heroin users who have failed at other forms of drug treatment. Its impact on heroin use is likely to be modest because of the high costs of providing it and because community concerns will limit its application to large numbers of dependent heroin users.

Any decision to expand availability of MMT as a crime control measure should begin cautiously and be accompanied by sufficient resources to ensure that MMT is adequately delivered. Care should also be taken to ensure that MMT is provided in a way that balances the potentially conflicting interests of dependent heroin users and the general public. A fair balance needs to be struck between benefiting MMT clients (by improving their health and quality of life, reducing their risk of contracting HIV/AIDS and other infectious diseases and reducing their risk of imprisonment) and benefiting the wider community (by reducing the prevalence of HIV/AIDS, and reducing drug-related crime and correctional costs).

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