

The effect of time spent in treatment and dropout status on rates of convictions, cautions and imprisonment over 5 years in a primary care-led methadone maintenance service

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ABSTRACT

Background Methadone maintenance treatment (MMT) in primary care settings is used increasingly as a standard method of delivering treatment for heroin users. It has been shown to reduce criminal activity and incarceration over periods of periods of 12 months or less; however, little is known about the effect of this treatment over longer durations. **Aims** To examine the association between treatment status and rates of convictions and cautions (judicial disposals) over a 5-year period in a cohort of heroin users treated in a general practitioner (GP)-led MMT service. **Design** Cohort study. **Setting** The primary care clinic for drug dependence, Sheffield, 1999–2005. **Participants** The cohort comprised 108 consecutive patients who were eligible and entered treatment. Ninety were followed-up for the full 5 years. **Intervention** The intervention consisted of MMT provided by GPs in a primary care clinic setting. **Measurements** Criminal conviction and caution rates and time spent in prison, derived from Police National Computer (PNC) criminal records. **Findings** The overall reduction in the number of convictions and cautions expected for patients entering MMT in similar primary care settings is 10% for each 6 months retained in treatment. Patients in continuous treatment had the greatest reduction in judicial disposal rates, similar to those who were discharged for positive reasons (e.g. drug free). Patients who had more than one treatment episode over the observation period did no better than those who dropped out of treatment. **Conclusions** MMT delivered in a primary care clinic setting is effective in reducing convictions and cautions and incarceration over an extended period. Continuous treatment is associated with the greatest reductions.

Keywords Crime, heroin, methadone, methadone maintenance treatment, MMT, primary care.

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INTRODUCTION

Individuals dependent upon heroin require substantial levels of income in order to sustain their drug use. Mean weekly expenditure on drugs by this group is estimated to be in the region of £300 in the United Kingdom and, over the course of a year, an average heroin user spends more than £10 000 supporting their drug use [1]. Research from a number of countries indicates that most heroin users supplement the cost of purchase of their drugs

through illegal income-generating activities such as acquisitive crime and drug dealing [2,3], and that this criminal activity has been shown to be highest during periods of heavy dependence [4].

Methadone, when delivered as a maintenance treatment in appropriate doses, has been shown repeatedly to be effective in improving a range of treatment outcomes, including reductions in criminal activity [5–9], and is highly cost-effective [10]. Positive outcomes such as these have contributed to the UK government's drive—outlined

in its 10-year strategy for drug treatment in 1998 [11]—to bring methadone maintenance treatment (MMT) to a greatly increased number of individuals. Much of this increase has been achieved by development of primary care-based services for drug users [11,12]. Research reports published during this expansion of services describe impressive reductions in rates of convictions of heroin users retained in general practitioner-provided MMT for periods of up to 12 months [1,13,14]; however, there is little available research on patients with extended lengths of stay in treatment. Such patients are now common in many UK primary care settings.

The present study aims to examine the association between treatment status and rates of convictions and cautions (judicial disposals) over a 5-year period in a cohort of heroin users treated in a primary care service in Sheffield, UK. Data come from criminal records held on the police national computer system (PNC). This research follows on from a pilot study [15] and a study of 1-year outcomes from the same service [13].

METHODS

Setting and participants

Participants were recruited from the Primary Care Clinic for Drug Dependence (PCCDD) in Sheffield. This is an intermediate-level special-interest general practitioner (GP)-led service for heroin users set up in 1999 with protocols based upon the 'Orange Book' UK national guidelines [16] and supported by a small team of nurses and drugs workers. MMT was prescribed with doses titrated to meet the needs of individual patients in order to prevent withdrawal symptoms associated with reduction or discontinuation of heroin use. This service is described in more detail elsewhere [15]. A sample of 116 consecutive referrals for MMT was selected between April 1999 and September 2000 with the intention of obtaining a cohort size of approximately 100. Ethics approval was granted in 1998 and 2005 by the North Sheffield Research Ethics Committee.

To be eligible for inclusion, participants were required to be: over 18 years of age; dependent upon heroin; have no existing comorbid psychiatric diagnosis; no serious physical illness; not pregnant, have no contraindications to methadone; and not currently to be in receipt of a prescription for methadone. Heroin dependence was established by a nurse specialist assessment, and was confirmed by history, clinical examination and urinalysis. Participants were approached after their initial assessment by a nurse specialist and prior to their first consultation. All 116 patients approached agreed to participate and provided informed consent; however, eight individuals failed to enter treatment, leaving a cohort of 108. The

extent of illicit drug use at entry to the study was assessed using the drug-use subsection of the Opiate Treatment Index [17]. This was administered by a trained research assistant prior to the start of treatment.

Measures

Data on convictions and cautions for acquisitive offences (e.g. shoplifting, burglary, fraud) and drugs offences (e.g. dealing or possession) recorded on the Police National Computer (PNC) were provided by South Yorkshire Police. The outcome measures used in this study were the rate of convictions and cautions in the 5 years post-MMT entry, along with the number and length of custodial sentences received during the this period. The number of convictions and cautions received in the 12-month period immediately prior to treatment entry served as a proxy measure for pre-treatment criminality in regression analyses.

Treatment status over the duration of the follow-up period was assessed from computerized clinical records. These were used to determine the amount of time each individual spent in treatment and reasons for discharge from the service, where this occurred. Members of the cohort followed-up at 5 years were classified into one of four categories, depending on their retention status at 5 years: group I were in treatment at 5 years and received continuous treatment at the PCCDD throughout this period; group II were in treatment at 5 years but had more than one treatment episode at the PCCDD during this time; group III had been discharged for negative reasons, either because they dropped out of treatment or had their treatment withdrawn; and group IV had been discharged for positive reasons, either drug free, back to their GP or transferred to another agency.

Statistical analyses

The effect of length of time spent in MMT and other predictor variables on judicial disposal rates for acquisitive and drug-related offences over the 5-year follow-up period was assessed using a negative binomial regression model (NBRM). Negative binomial regression can be considered an extension of Poisson regression for situations in which the conditional mean is greater than the variance. This situation, referred to as 'overdispersion', or extra-Poisson variation, arises most commonly when there is unobserved heterogeneity among subjects and can lead to biased estimates of standard errors and potential overstating of explanatory variables. The NBRM has the same mean structure as the Poisson regression model (hence the same basic interpretation), but includes an additional random component which reflects the uncertainty about the true rates at which events occur for

individual cases. The NBRM is from the family of generalized linear models (GLMs) with a systematic component described by:

$$\mu_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 \dots \beta_k x_k$$

It uses the link function: $g(\mu) = \log(\mu)$ and has a random component specified by the negative binomial distribution:

$$P(y_i) = \frac{\Gamma(y_i + 1/k)}{\Gamma(y_i + 1)\Gamma(1/k)} \left(\frac{1}{1 + k\mu_i}\right)^{1/k} \left(1 - \frac{1}{1 + k\mu_i}\right)^{y_i}$$

where Γ is the gamma function and k is the dispersion parameter.

Effect sizes are reported as the $\exp(\beta_k)$, known as the incident rate ratio (IRR), and can be interpreted as a multiplicative effect on judicial disposal rates per unit change in the explanatory variable (x_k). IRRs statistically different ($P < 0.05$) from 1 in single variable analyses were then adjusted for other significant explanatory variables. Differences in the four retention status groups at 5 years on the number of judicial disposals received during this time were assessed in an unadjusted negative binomial model using paired contrasts. All statistical analyses were conducted using STATA release 8.0.

RESULTS

Follow-up status at 5 years

Treatment and follow-up status of the cohort during the 5-year study period is illustrated in Fig. 1. The mean length of methadone treatment at the PCCDD for each of these groups and the cohort as a whole is shown in Table 1.

Participant characteristics

The mean age of the final cohort ($n = 90$) was 29.0 years [standard deviation (SD) = 5.6 years], which comprised 72 males (80%) and 18 females (20%). The majority described themselves as being single (64%) and unemployed (86%). Mean age at first heroin use was 20 years (SD = 4.6 years) and the group had been using heroin for a median of 8.3 years (minimum = 15 months, maximum = 29.2 years). At entry to treatment, mean daily heroin use was 3.3 episodes (SD = 2.1). Use of other illicit drugs was common; in addition to heroin use, 30% of the group used crack cocaine and 44% used illicitly obtained benzodiazepines in the month prior to the start of treatment. These variables were distributed similarly between each of the four groups and no statistically significant differences were detected.

Baseline criminality: convictions and cautions in the 12-month period prior to treatment entry

Fifty-seven per cent of the cohort received one or more convictions or cautions of any type during the 12-month period prior to the start of treatment. Fifty-one per cent of patients received one or more convictions or cautions for either an acquisitive offence or a drug-related offence. Similar disposal rates were observed for each of the four treatment groups at baseline and there were no statistically significant differences in either the percentage of cases with at least one conviction/caution or the number of such disposals (Table 2).

Effect of time spent in treatment

Estimated regression coefficients (IRRs) and 95% confidence intervals (CIs) for explanatory variables are given in Table 3. Other than pre-treatment entry criminality and time spent in treatment, no other predictors reached statistical significance at the 5% level. The IRR estimate for time in treatment indicates that, after adjusting for criminality prior to MMT entry, the number of convictions and cautions received was reduced by 1.7% (95% CI = 2.8–0.6%) for every month spent in MMT.

Differences between treatment outcome groups in number of convictions and cautions in the 5 years following MMT

Statistically significant differences were observed between the four groups in respect of the number of judicial disposals over the 5-year period following entry to MMT (Fig. 2). Patients in continuous treatment were convicted or cautioned for fewer crimes than for each of the three comparison groups other than those who were discharged for positive reasons. Pairwise contrasts show, additionally, that successful discharge was associated with reductions in convictions and cautions over non-continuous treatment and treatment dropouts, but not continuous treatment. There was no difference in conviction and caution rates between being discharged for negative reasons and receiving non-continuous treatment over the 5-year period.

Custodial sentences

Thirty-two per cent of the cohort received a custodial sentence during the 5-year follow-up period and nine members of the cohort received sentences totalling more than 2 years. Only two members of the continuous treatment group received custodial sentences during the follow-up period (9.5%) compared to 53% of the non-continuous group, 45% of the treatment dropouts and 21% of discharges. By dividing the sentence term into the four categories shown in Table 4, there was an overall

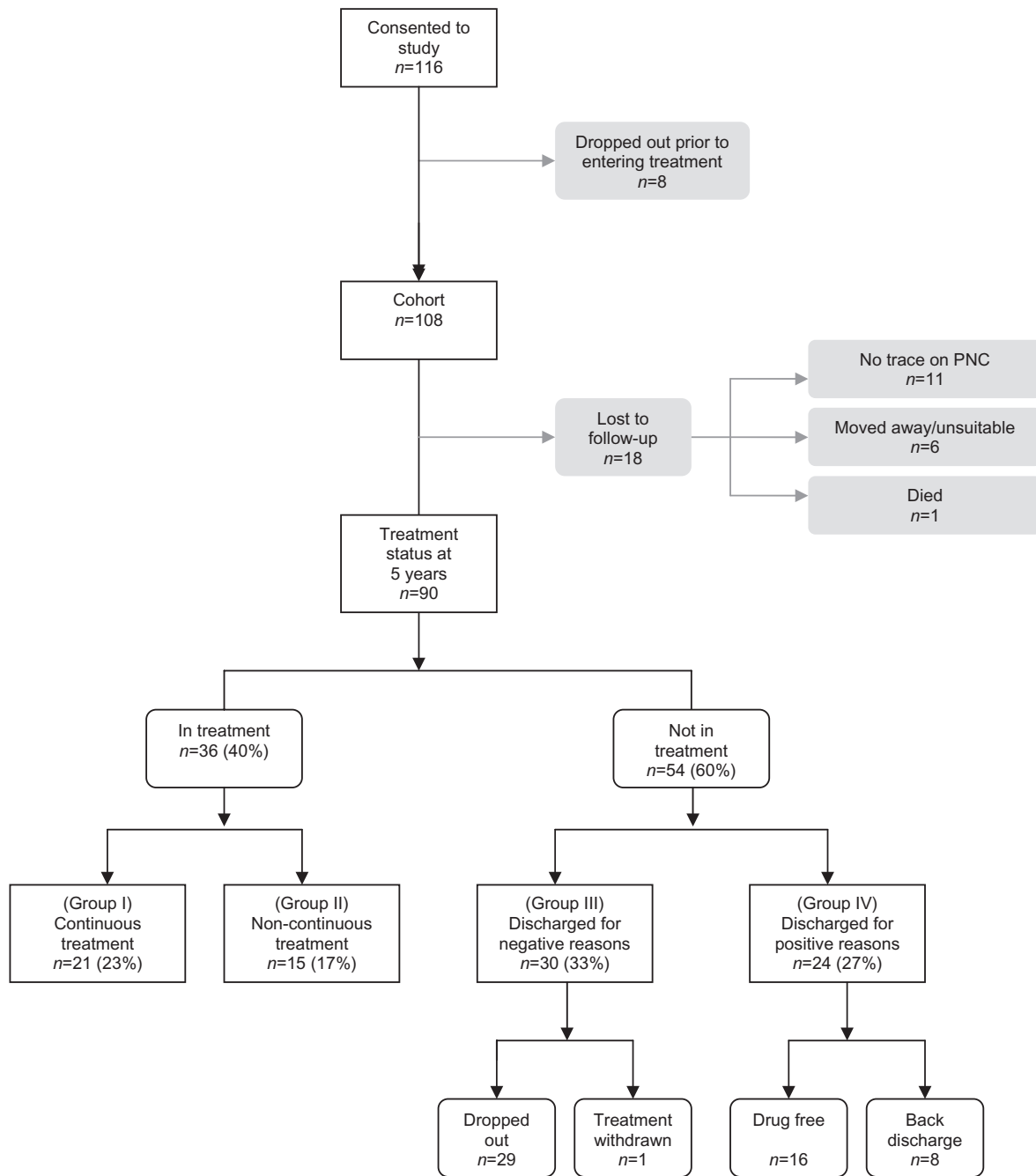


Figure 1 Treatment and follow-up status of consented participants. PNC: Police National Computer

Table 1 Mean length of time in treatment after 5 years for each of the four treatment groups.

Group	Mean	SD	Median	Min	Max
Continuous treatment (n = 21)	60.00	–	60.00	60.00	60.00
Non-continuous treatment (n = 15)	41.40	14.10	44.00	12.00	58.00
Treatment dropouts (n = 30)	21.46	14.93	22.00	1.00	60.00
Discharges (n = 24)	34.75	16.58	33.00	9.00	60.00
All (n = 90)	37.32	19.63	36.50	1.00	60.00

SD: standard deviation.

Table 2 Baseline conviction and caution disposals in the year prior to the start of treatment.

Convictions and cautions for:	Treatment group				All n = 90	Test of H_0
	Continuous	Non-continuous	Treatment dropouts	Discharges		
Any offence	55.0%	66.7%	53.3%	58.3%	56.7%	$\chi^2_3 = 0.785$ $P = 0.853$
Any Aq or Dr offence	52.4%	53.3%	46.7%	54.2%	51.1%	$\chi^2_3 = 0.785$ $P = 0.853$
Mean number (SD) of convictions/cautions for any offence	1.10 (1.26)	1.13 (1.19)	1.30 (1.60)	0.83 (0.82)	1.10 (1.27)	$F_{3,86} = 0.594$ $P = 0.621$
Mean number (SD) of convictions/cautions for Aq/Dr offences	1.00 (1.14)	0.87 (1.06)	0.83 (1.08)	0.63 (0.65)	0.82 (0.99)	$F_{3,86} = 0.547$ $P = 0.652$

H_0 (the null hypothesis)–group I = group II = group III = group IV. Aq: acquisitive offence; Dr: drug-related offence.

Table 3 Negative binomial regression results.

	IRR	95% CI for IRR		Hypothesis test of IRR = 1	
		Lower	Upper	Z	P-value
Age	0.984	0.939	1.03	0.485	0.486
Sex (female)	0.805	0.423	1.534	0.434	0.510
Time spent in prison during 5 years post-MMT entry	1.020	0.997	1.042	2.95	0.086
Marital status (single)	1.122	0.661	1.904	0.180	0.671
Number of years of regular heroin use	1.013	0.977	1.050	0.505	0.477
Any previous treatment (self-report)	0.742	0.444	1.241	0.291	0.256
Previous MMT episode (self-report)	1.500	0.786	2.863	1.514	0.219
Pre-MMT criminality	1.345	1.093	1.655	7.83	0.005
Months in MMT	0.983	0.969	0.996	6.31	0.012
Adjusted ^a	0.983	0.970	0.997	5.82	0.016

CI: confidence interval; IRR: incident rate ratio; MMT: methadone maintenance treatment. ^aModel: mean number of convictions and cautions = $\beta_0 + (\beta_1 \times \text{pre-MMT criminality}) + (\beta_2 \times \text{months in MMT})$.

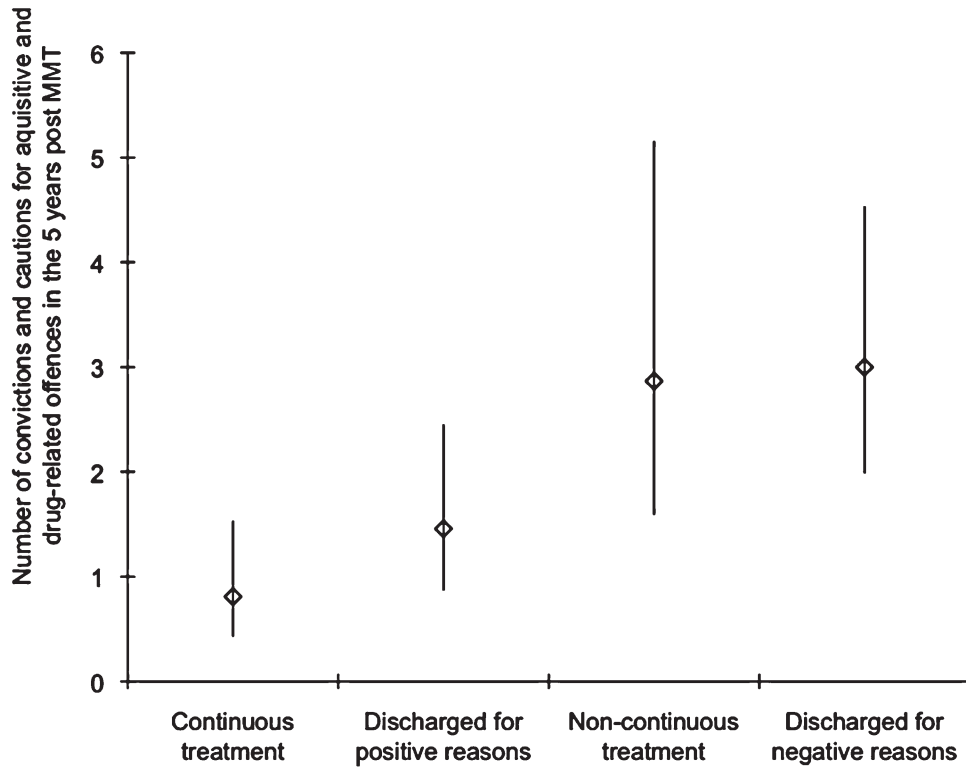
significant difference between groups in the proportion of patients who received custodial sentences ($\chi^2_9 = 19.79$, $P = 0.019$).

DISCUSSION

Findings from the UK's National Treatment Outcome Research Study (NTORS) suggest that reductions in conviction rates can be expected over periods of up to 5 years when drug users are engaged in treatment [2]. However, the heterogeneous drug-using and treatment cohort in the NTORS study and the use of the Offenders Index as a data source, which does not include information about cautions (equivalent to an uncontested conviction and the most common disposal for drug offences) [18], limits the extent to which these findings can be applied to heroin users treated with MMT in primary care. Issues such as the effect of repeated treatment episodes, which

have been associated with less than optimal treatment outcomes on non-crime variables [19], have also not been addressed previously.

The findings from the present study suggest that heroin users treated with MMT in a primary care setting can maintain a reduction in their involvement in acquisitive or drug-related crime for periods of up to 5 years. It is clear, as others have shown, that retention in treatment is crucial [20]; however, there does not appear to be a simple relationship between time spent in treatment and a reduction in judicial disposals. Those who remain in continuous MMT in this setting received significantly fewer convictions or cautions than those who receive non-continuous treatment. Hutchinson *et al.* (2000) previously reported a similar finding to this in a comparable primary care setting over a 12-month period [1], but what is striking about the present finding is that the average time spent in MMT for who received non-



Key: IRR (+/- 95% CI)
 1=0.56 (0.24 – 1.27)
 2=0.28 (0.12 – 0.67)
 3=0.27 (0.13 – 0.58)
 4=0.50 (0.23 – 1.11)
 5=0.49 (0.25 – 0.94)
 6=0.96 (0.47 – 1.96)

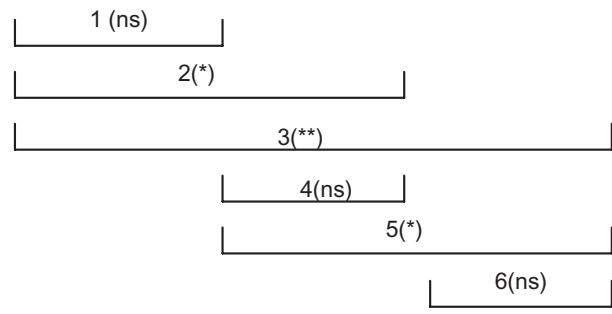


Figure 2 Number of convictions and cautions for acquisitive and drug-related offences during the 5 years following entry to methadone maintenance treatment (MMT). Error bars represent negative binomial 95% confidence intervals (CI); IRR: incident rate ratio. Pairwise contrasts are summarized as: ***P* < 0.01; **P* < 0.05; NS: not significant at the 5% level

Table 4 Custodial sentences received during the 5 years post-treatment.

	Treatment group				All
	Continuous	Non-continuous	Treatment dropouts	Discharges	
Did not receive a custodial sentence	19 (90.5%)	7 (46.7%)	17 (56.7%)	19 (79.2%)	62 (68.9%)
Terms totalling between 1 day and 6 months	2 (9.5%)	5 (33.3%)	3 (10%)	2 (8.3%)	12 (13.3%)
Terms totalling between 7 and 24 months	0	2 (13.3%)	3 (10%)	2 (8.3%)	7 (7.8%)
Terms totalling ≥25 months	0	1 (6.7%)	7 (23.3%)	1 (4.2%)	9 (10%)

continuous treatment was close to 70% of that of those who stayed in treatment throughout the study. Furthermore, while differences in disposal rates might have been expected between those discharged for negative reasons

and those in non-continuous treatment, this was not the case, suggesting that non-continuous MMT delivered in this setting may have little benefit in terms of reducing criminality. Because non-continuous treatment shows no

advantage over dropping out of treatment completely, our findings also suggest that MMT in primary care will be more effective in reducing criminality if patients can be retained in treatment at first attempt. This makes it especially important to optimize treatment as early as possible in order to enhance retention in treatment and to avoid attempts at detoxification, which may rest on the assumption that it is preferable to reach a methadone-free state as quickly as possible. The observation that patients who were discharged drug-free or stable did not fare significantly better than those in continuous treatment suggests that some patients within this group went on to relapse and re-offend. In addition, therefore, to trying to retain patients in treatment at first attempt, consideration, both clinically and in terms of further research, should be given to defining the most effective minimum period for MMT before tapering or transferring to other services.

Despite the fact that continuous MMT produces optimal outcome, the results of the regression analyses suggest that the average patient entering MMT in a similar setting would be expected to have a reduction in convictions and cautions of approximately 10% over 5 years for every 6 months spent in treatment. This is independent of the patient's criminality at the time of entering treatment. This has obvious cost-benefit implications that are beyond the scope of this paper; however, other authors have shown that the effectiveness of MMT is influenced by not only the way treatment is delivered but also the clinical context [7,9]. Currently there are few data available for MMT treatment delivered in primary care over extended periods. This is an important area for further investigation, which is particularly relevant in a political climate where long-term MMT for drug misuse is coming under increasing scrutiny.

Study limitations

The study groups used to assess the effect of different types treatment access were defined arbitrarily and were not adjusted statistically for multiple comparisons, as these methods tend to be overly conservative [21]. Replication using similar categories is needed to confirm the group differences observed. As an observational design was employed, it is important to consider other explanations for the findings presented here. One or more unmeasured confounding variables could, for example, explain the observed relationship between time in MMT and reduction in crime. The most obvious candidate would be related to a tendency to offend—were those who spent extended periods in treatment somehow less 'criminal'? Similarly, could the differences between groups be a reflection of differences in motivation or maturation out of crime? Although it would be unreasonable to dismiss

completely either of these explanations, the fact that the groups were similar on all measured variables at entry to treatment, including demographic characteristics, drug use history and convictions and cautions in the preceding 12 months, suggests that they are unlikely to fully explain the study findings.

A third issue is that there is no detailed information for those who were discharged for positive reasons following their MMT. Our data suggest that if they did relapse there would have been a good chance, over the 5-year follow-up period, that they would return to MMT and form part of the second analysis group (non-continuous treatment). Similarly, it is unknown whether those who were not in continuous treatment were receiving MMT from another service. However, the observation that those who were not in continuous treatment or who dropped out of treatment had such high levels of criminality compared to those in the other groups suggests that this was not a major factor.

SUMMARY AND CONCLUSIONS

In summary, we have shown that MMT delivered in a primary care clinic setting is associated with reductions in convictions and cautions and incarceration in heroin addicts treated over a period of at least 5 years. Continuous treatment was associated with the greatest reductions and it is important that patients are retained in treatment at first attempt. Furthermore, treatment should be continued for an adequate period for it to be effective in reducing levels of criminality. The length of time that this constitutes is a matter for further research.

Declaration of interest

Dr Keen was a clinical director at the Primary Care Clinic for Drug Dependence in Sheffield at the time of the study. All other authors have no interests to declare.

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