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## Predicting biopsychosocial outcomes for heroin users in primary care treatment:

a prospective longitudinal cohort study

### Abstract

#### Background

Opiate substitution treatment for heroin users reduces mortality, illicit drug use, crime, and risk-taking behaviour, and improves physical, mental and social functioning. Few extended studies have been carried out in UK primary care to study factors predicting recovery.

#### Aim

To establish whether primary care opiate substitution treatment is associated with improvements in outcomes over 11 years, in delivering recovery, and to identify predictive factors.

#### Design and setting

A prospective longitudinal cohort study, with repeated measures in the Primary Care Addiction Service, Sheffield, 1999–2011.

#### Method

A total of 123 eligible patients were assessed using the Opiate Treatment Index at entry to treatment and at 1, 5, and 11 years. Clinical records were used to assess factors including employment and discharge status.

#### Results

At 11 years, there was a high rate of drug-free discharge [22.0%] and medically-assisted recovery (30.9%), and low mortality (6.5%). Continuous treatment was associated with being discharged drug free ( $P=0.005$ ). For those still in treatment, there were highly significant reductions in heroin use and injecting, and significantly improved psychosocial functioning. There were strong positive correlations between mental health, physical health, and social functioning. Patients in employment had significantly better psychological and social functioning ( $P=0.017$ ,  $P=0.007$ , respectively).

#### Conclusion

Opiate substitution treatment is associated over 11 years with full recovery, drug-free discharge and medically-assisted recovery. There is a strong association between the psychosocial variables, suggesting that intervention in any one of these areas may have extended benefits, by impacting on related variables and employment. The best predictor of a drug-free discharge was continuous uninterrupted treatment.

#### Keywords

biopsychosocial outcomes; heroin users; opiate substitution therapy; predictive factors; primary care; recovery capital.

### INTRODUCTION

There have been many studies reporting the efficacy of opiate substitution treatment.<sup>1,2</sup> Opiate substitution treatment reduces mortality, illicit drug use, crime,<sup>3</sup> and risk-taking behaviour, and improves patients' mental and physical health and social functioning.<sup>4</sup> However, few of these studies have been carried out over an extended period in a UK primary care setting, where many patients undergoing opiate substitution treatment are treated, and even fewer have studied factors predicting recovery, whether drug-free discharge, or medically-assisted recovery,<sup>4</sup> over the long term in this group.

The 2010 government drugs strategy classifies 'recovery' as leaving treatment drug free,<sup>5</sup> but also recognises an interim situation where the patient is still undergoing opiate substitution treatment but free of illicit drug use: 'medically-assisted recovery'. It also introduces the concept of 'recovery capital': the personal biopsychosocial resources on which a patient can draw during their 'recovery journey'. This could include: stable and supportive relationships (social capital); suitable housing (physical capital), skills, physical and mental health, and employment

(human capital); and constructive values, beliefs, and attitudes (cultural capital). These 'recovery capital' variables are important predictors of recovery.<sup>5</sup>

This study investigates the efficacy of long-term primary-care-based opiate substitution treatment with regard to full recovery, medically-assisted recovery, and a range of psychosocial outcomes for patients, including mental and physical health and social integration. It also identifies positive predictive factors.

### METHOD

This was a longitudinal prospective cohort study, with repeated measures.

This is the 11-year follow-up of a cohort study that began in 1999. One hundred and twenty-three untreated opioid-dependent patients were interviewed using the Opiate Treatment Index (OTI) prior to entering opiate substitution treatment in a primary care setting. Participants were re-interviewed after 1 year of opiate substitution treatment,<sup>6</sup> at 5 years,<sup>7</sup> and again at 11 years in the current study, and clinical records were analysed to identify episodes and the duration of treatment and final service outcomes.

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### How this fits in

There have been many studies reporting the efficacy of opiate substitution treatment in reducing mortality, illicit drug use, crime, and risk-taking behaviour, and improving patients' physical mental and social functioning. This study shows not only the continued effectiveness of primary care opiate substitution treatment after 11 years, but also its effectiveness at delivering full recovery and drug-free discharge. There was a strong association in the study between social functioning and mental and physical health, suggesting that intervention in any one of these areas may have extended benefits by impacting on related variables. Employment appears to be a strong predictor of favourable outcomes. The best predictor of a drug-free discharge was continuous uninterrupted treatment.

The study was conducted in the Primary Care Addiction Service in Sheffield, UK (PCASS). This is an intermediate-level primary-care-based service led by GPs with a special interest in substance misuse, which has been fully described elsewhere,<sup>6-8</sup> and was established in 1999.<sup>8</sup>

### Clinical interventions

The full range of primary care interventions for opiate users was used, based on the UK national guidelines 1999 and 2007,<sup>9,10</sup> and National Institute for Health and Care Excellence (NICE) guidance.<sup>11</sup> All patients in this study started on opiate substitution treatment as their initial intervention.

### Participants

Using a pilot study of patients using methadone in a Sheffield general practice setting,<sup>12</sup> it was estimated that at least 50 patients would be required to demonstrate a treatment effect, and a dropout rate of up to 40%–50% by 1 year was anticipated.<sup>1,13</sup>

The first 128 consecutive eligible patients referred in to the new service in 1999 were approached to enter this study. No financial incentive was provided, and no one who was approached to participate declined.

The criteria to be eligible to join the study between April 1999 and April 2000 were:

- opiate dependent;
- aged 17–65 years;
- no major psychiatric comorbidity (psychoses, bipolar/unipolar mood disorders);
- not currently in drug treatment;
- not pregnant; and
- no contraindications to opiate substitution treatment.

Opiate dependence was established by a nurse specialist during the patient's initial assessment, and confirmed by their drug-using history, clinical examination, and urinalysis.

The final baseline cohort consisted of 123 patients. To be eligible for re-interview for the 11-year follow-up, participants were required still to be in treatment in primary care services. Thirty-three patients were eligible to be re-interviewed, of whom none declined to participate in the follow-up study.

All 123 patients in the original cohort were still eligible for review and analysis of their clinical records.

### Data collection and time scales

This study was the third follow-up phase to a study that started in 1999, with recruitment occurring from April 1999 to April 2000, led by the same senior researcher. All the previous research and data were made available for this phase of the study.

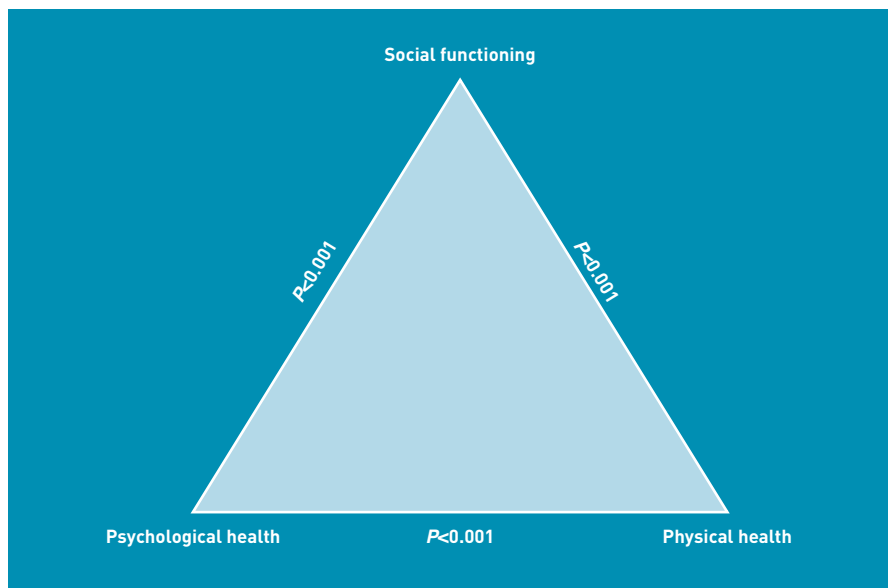
Patients that were still in treatment at PCASS or in shared care were identified. Interviews were carried out between September 2011 and March 2012, alongside scheduled clinical appointments.

### Measurements and instruments used

The OTI was the primary instrument used. This is a comprehensive, multidimensional structured interview, which incorporates six separate outcome domains: drug use, blood-borne virus risk-taking behaviour (injecting and sexual practices), social functioning, criminal behaviour, health status, and psychological adjustments, as measured by the General Health Questionnaire with 28 questions (GHQ-28).<sup>14</sup> The scoring system for the GHQ-28 questionnaire states that any patient scoring  $\geq 5$  on any of the four sections can be classed as a clinical 'case'.

**Table 1. Demographics at baseline, *n* = 123**

Demographic	Baseline value
Age, years	28.19
Males, <i>n</i> (%)	98 (79.7)
Age of first use, years	20.03
Time from first use to treatment, years	8.12
Prior incarceration, <i>n</i> (%)	56 (45.5)
Using heroin, <i>n</i> (%)	117 (95.1)
Injecting, <i>n</i> (%)	94 (76.4)
Unemployed, <i>n</i> (%)	106 (86.2)



**Figure 1. Relationship between Opiate Treatment Index psychosocial variables.**

The OTI is a generic assessment tool with a disease-specific component. It was originally validated in an Australian clinic setting in 1992 by Darke *et al*,<sup>15</sup> and was subsequently modified for use in the UK and validated by Adelekan *et al* in 1996.<sup>16</sup> In all of the scales, the higher the obtained score, the greater the degree of dysfunction.

In addition to the OTI, a basic demographics section was introduced and a records-based search of the patient clinical notes was performed to establish each patient's discharge status, number of treatment episodes/continuity, and employment status. The data collected from the clinical notes were then triangulated with the outcome measures from the primary research.

Finally, the Sheffield coroner's register of drug-related deaths was consulted, to confirm that none of the patients had died in Sheffield from a drug-related death.

### Statistical analyses

Continuous-scale scores from the OTI were analysed using independent groups *t*-tests for comparison of baseline variables between patients who were being followed up and those who were not. Changes in outcomes between baseline and 11-years' follow-up were assessed using paired *t*-tests. For the GHQ-28, the anxiety and depression subscales were assessed using cut-offs for clinical 'caseness' (patients scoring >5), thus producing a dichotomous variable. These data were analysed using McNemar's test. Correlations were analysed by calculating Pearson's correlation coefficient and associated *P*-values. All analyses were conducted using SPSS (version 19).

### RESULTS

Table 1 shows patient characteristics for the cohort at entry to treatment. This is a similar demographic profile to that reported in other studies.<sup>17,18</sup>

Independent *t*-tests were performed using all the baseline OTI variables of those patients interviewed at follow-up against those of patients not interviewed at follow-up. The baseline crime score was the only variable to differ significantly between the two groups, with the re-interviewed group scoring higher, with 2.52 over 2.12.

### Summary of discharge status at 11 years

Table 2 shows that, at 11-year follow-up, there was a high rate of drug-free discharge (22.0%), and medically-assisted recovery (30.9%), and low mortality (6.5%), whereas 14.6% had dropped out of treatment and not returned.

### Outcomes at 11 years

**Drug use.** Table 3 shows the changes in drug use from baseline to follow-up. The tests show significant reductions in heroin and opiate use, tranquilliser use, and tobacco use. There were also significant reductions in levels of polydrug and illicit polydrug misuse. While amphetamine and crack use increased, the levels of use are so low that the results are not statistically significant. Alcohol use increased but this is also not statistically significant. There were no significant increases in drug use in any category.

### Risk behaviour and psychosocial outcomes.

Table 4 shows changes in risk-taking behaviour and psychosocial scores; it shows significant improvements in all areas except sexual behaviour.

**Anxiety and depression outcomes.** Table

**Table 2. Summary of discharge status at 11 years, n = 123**

Discharge status	n	%
Discharge drug free (full recovery)	27	22.0
Primary care (medically-assisted recovery)	31	25.2
Secondary care (medically-assisted recovery)	7	5.7
Planned transfer to another service	16	13.0
Loss of contact	18	14.6
Prison	7	5.7
Death	8	6.5
Never entered treatment	9	7.3
Total	123	100.0

**Table 3. Changes in drug use from baseline to follow-up, n = 33**

Drug category	Baseline mean	Follow-up mean	Mean difference	t-test, Pvalue	95% CI
Heroin	2.97	0.035	2.936	0.000	2.178 to 3.695
Opiates	0.917	0.001	0.918	0.034	0.074 to 1.762
Alcohol	1.138	3.012	-1.421	0.217	-3.72 to 0.878
Cannabis	0.893	0.704	0.247	0.497	-0.486 to 0.979
Amphetamine	0.005	0.022	-0.017	0.465	-0.064 to 0.030
Cocaine	0.344	0.023	0.320	0.317	-0.321 to 0.961
Crack cocaine	0.037	0.157	-0.126	0.190	-0.317 to 0.065
Tranquillisers	1.933	0.096	1.833	0.017	0.356 to 3.309
Tobacco	15.267	12.364	2.984	0.045	0.071 to 5.897
Polydrug	3.996	2.364	1.656	0.000	1.018 to 2.295
Illicit polydrug	2.701	0.940	1.700	0.000	1.144 to 2.256

**Table 4. Changes in risk-taking behaviour and psychosocial scores, n = 33**

OTI subsection	Baseline mean	Follow-up mean	Mean difference	t-test, Pvalue	95% CI
Injecting	8.121	0.242	7.879	<0.001	5.901 to 9.857
Sexual	3.853	4.545	-0.697	0.377	-2.281 to 0.888
Injecting/sexual	11.971	4.788	7.182	<0.001	4.299 to 10.064
Social	21.284	12.312	8.969	<0.001	6.245 to 11.692
Crime	2.932	0.331	2.593	<0.001	1.462 to 3.724
GHQ	15.159	6.474	8.688	<0.001	5.444 to 11.931
General health	20.091	9.485	10.61	<0.001	7.852 to 13.36

GHQ = General Health Questionnaire. OTI = Opiate Treatment Index.

5 displays the rates of psychopathology among the 33 patients at baseline and at subsequent follow-up.

This table shows significant reductions in the rates of psychiatric comorbidity among the 33 patients retained in treatment, most notably in the anxiety and depression subsections.

#### Predictors of outcomes

*Outcome and treatment episodes.* Many patients exit and re-enter treatment, often multiple times. The study analysed

**Table 5. Prevalence of anxiety and depression cases**

GHQ-28 subsection	Baseline, n(%)	Follow-up, n(%)
B – Anxiety	19 (57.6)	5 (15.2)
D – Depression	15 (45.5)	3 (9.1)
Total cases	34	8

the effect of remaining in treatment continuously against the effect of multiple dropouts and re-entries. It was found that continuous treatment is associated with being discharged drug free ( $P = 0.005$ ) and multiple treatment episodes were associated with remaining in treatment long term ( $P = 0.026$ ).

*Continuous treatment was associated with a drug-free discharge.* A single treatment episode was associated with drug-free discharge, and multiple treatment episodes ( $\geq 2$ ) were associated with remaining in treatment long term ( $P = 0.026$ ).

*Employment, social, and psychological outcomes.* The biopsychosocial outcomes (general health, social, GHQ) were compared for employed and unemployed patients at baseline and follow-up. At baseline, opiate substitution treatment patients in employment, as measured by the OTI, had significantly better social functioning scores than those who were unemployed ( $P = 0.001$ ). At follow-up, there was a significant difference between the social functioning ( $P = 0.007$ ) and the GHQ score ( $P = 0.017$ ) of the employed and unemployed group. The employed group also displayed better scores for all three variables at both time points.

*Correlations and associations between psychosocial and health scores.* The correlations at 11 years between the scores for the three psychosocial variables were measured as follows:

- social functioning to GHQ
- social functioning to general health
- GHQ to general health.

There are positive correlations between all three variables, and using Pearson's correlation coefficients, all three associations were once again found to be significant, with  $P$ -values of 0.016, <0.001, and <0.001 respectively.

## DISCUSSION

### Summary

This study shows the continued effectiveness of primary care opiate substitution treatment in reducing mortality and harm to opiate users after a period of 11 years, and at delivering full recovery and drug-free discharge, as well as medically-assisted recovery.

There was a strong association in the study between social functioning and

mental and physical health, suggesting that intervention in any one of these areas may have extended benefits by impacting on related variables. Clinical depression in particular is common in this group, and treatment may positively impact on other areas to produce better outcomes.

Employment also appears to be a strong predictor of favourable outcomes. The best predictor of a drug-free discharge was continuous uninterrupted treatment.

### Strengths and limitations

This was a prospective, longitudinal, cohort study. It is a naturalistic study over 11 years, using 123 participants undergoing clinical treatment outside a research setting, and is the most extended study of its kind in a UK primary care setting. It used a well-validated research instrument, the OTI, which had previously been shown to have excellent psychometric properties. It is one of very few studies specifically investigating how recovery capital may influence recovery outcomes. The 'social functioning' section of the OTI addresses many, but not all, of the important facets of 'recovery capital'; notably, cultural capital and physical capital are not included within this domain. The study team was necessarily limited by the domains of the validated instruments available at the outset of this study, of which the OTI was the best established and validated in terms of measurement of biopsychosocial outcomes. Over the 11 years of the cohort study, there was variable recording of urine test data within the clinical records, so it was not possible to triangulate self-reported drug-use data, as measured by the OTI instrument.

This study originally had a cohort of 123 patients, and it was estimated that 50 patients would be required to show a treatment effect. Only 27 (21.9%) were lost to follow-up, through dropping out of treatment, or never entering treatment. However, it was not possible to follow-up patients that had moved away from Sheffield. The term 'medically-assisted recovery' is a consensus statement derived from a government strategy document and widely used elsewhere in the literature.<sup>5</sup> However, a broader definition is commonly used by specialists within the field, which recognises that service users may engage and disengage with opiate substitution treatment over a long period of time, and may continue some illicit drug use and still experience a continued improvement in health and social functioning.

Like other studies of this kind, it is not possible to use a randomised design or to

have a control group of untreated patients.

### Comparison with existing literature

Twenty-seven (22%) of the patients who entered the clinic in 1999 went on to achieve a drug-free discharge, 31 (25.2%) were still in treatment in medically-assisted recovery in primary care, and seven (5.7%) in secondary care. This represents a total of 65 (52.9%) patients achieving either a drug-free discharge or being retained in medically-assisted recovery. Only 21.9% of patients permanently dropped out (loss of contact and/or death and/or prison) of treatment, which is low compared to some other studies that report dropout rates as high as 40%.<sup>1,13,19</sup> This suggests that long-term opiate substitution treatment in a primary care setting is effective at delivering low mortality, medically-assisted recovery, and drug-free discharge over an extended follow-up period.

The main predictive factor of a drug-free discharge is continuous treatment, whereas multiple exits and re-entries to treatment are more likely to lead to the patient remaining in treatment long term.<sup>20</sup> Failing to retain patients in treatment effectively is likely to lead to poor outcomes and more patients in extremely long-term treatment. This should be considered by commissioners of opiate substitution treatment services, since the introduction of 'any willing provider' on relatively short-term contracts (UK Health and Social Care Act 2012) may adversely impact on outcomes, owing to discontinuity of multidisciplinary service provision.<sup>21</sup>

At 11 years of medically-assisted recovery, there were highly significant reductions in heroin, opiate, tranquilliser, and tobacco use among the follow-up patients. There were also reductions in polydrug and illicit polydrug use. There was an increase in alcohol use, which is documented in other studies.<sup>22,23</sup> The significant reduction ( $P=0.017$ ) in concomitant use of tranquillisers is important, as concomitant benzodiazepine use with heroin is implicated in a significant proportion of deaths from drug misuse.<sup>24</sup> Overall, there were no significant increases in any drug category, and reductions of over 98% in heroin and opiate use.

There was significant improvement in all areas of psychosocial and health outcomes, except sexual risk behaviour. Previous studies have suggested that effective methadone maintenance treatment paves the way for subsequent improvements in physical and psychological comorbidities,<sup>25</sup> and the reductions of over 50% in GHQ and general health scores reflect this within

### Funding

The original study was funded by a research training fellowship granted to Dr Keen by Trent Regional Health Authority in 1998. The 11-year update was carried out as part of a BMedSci attachment and funded by a grant from the Academic Unit of Primary Health Care, University of Sheffield.

### Ethical approval

Ethics approval was granted for this study on 14 August 1998, by the North Sheffield Research Ethics Committee, (SS98/168) with a first amendment granted on 10 April 2001 for the 1-year follow-up. A second amendment was granted in August 2011 for the current follow-up, by the South Yorkshire Research Ethics Committee.

### Provenance

Freely submitted; externally peer reviewed.

### Competing interests

Dr Keen holds the post of clinical director at the Primary Care Addiction Service Sheffield (PCASS) and is the instigator of the original study. However, at no time did she or any other clinician at PCASS become involved in any interviewing of the cohort or have any direct input into statistical analysis. The other authors have declared no competing interests.

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the present study, with *P*-values all less than 0.001. In terms of medically-assisted recovery, the 97% reduction in injecting risk scores is extremely important,<sup>26</sup> and shows the effect of treatment on drug use and injecting habits. At baseline, 31 out of 33 patients were using heroin, with 28 out of 33 injecting, compared with 5 out of 33 using heroin and 1 out of 33 injecting at follow-up.

There were very high levels of depression and anxiety at entry, with 45.5% of patients fulfilling diagnostic case criteria for depression. These comorbidities are known to have a negative effect on patients' functioning and perceived quality of life.<sup>27-29</sup> The results at follow-up show significant reductions in the prevalence of these disorders, and this highlights the association between opiate substitution treatment and reductions in psychological distress.

There was a very strong correlation between the three psychosocial outcomes (social, GHQ, general health) both at baseline and at follow-up.

These variables serve as indicators in other key areas, and high scores across the

psychosocial variables are indicative of a high-risk patient. If a patient is experiencing distress or dysfunction in any of these areas, it is highly likely that they will also have higher scores in the other two.

The results also show that there is a strong association between employment and psychosocial functioning scores, such that employed people were more likely to have better physical health, and significantly better mental health and social functioning than unemployed people.

#### **Implications for research and practice**

To achieve a drug-free discharge and full recovery, patients should be retained in uninterrupted treatment where possible.

Psychosocial interventions should seek to improve patients' mental, physical, and social functioning, including employment, in order to maximise their recovery capital.

Services should measure psychological functioning, as depression in particular is common and treatment may positively impact on other areas to produce better outcomes. This warrants further research.



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