NTORS

After Five Years

The National Treatment Outcome Research Study

Changes in substance use, health and criminal behaviour during the five years after intake

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1 Introduction

Drug misuse and drug dependence are major problems for individuals and for society. They lead to serious unhappiness and illnesses for individuals, and necessitate vast expenditure from society to respond to the associated health and crime problems. Finding effective responses to such problems is a priority.

One of the enduring myths about the addictions is that treatments for these disorders are ineffective. This myth persists despite a vast and increasing body of evidence to the contrary. The NTORS project was established to gather information in this country about the treatment outcomes of a large sample of drug misusers who had been treated within the existing national system of treatment services.

This report presents a concise, non-technical summary of the implementation of the study and focuses on the headline findings at 5-years. The interested reader is referred to earlier summaries of the project and also to technical papers from the study (see Appendix 1). Further reports for research journals are being prepared and will be described at the project's website (http://www.ntors.org.uk).

2 Background to NTORS

The specific origins of NTORS lie in the request of the Minister of Health (in 1994) for a reappraisal of the effectiveness of the national (UK) drug misuse treatment services. The extreme rapidity with which NTORS was established, and the ways in which it has operated, have been described elsewhere. The research project itself began operation in January 1995 and the clients were recruited between February 27th and July 31st, 1995.

The NTORS findings have been made available in a series of bulletins and reports published by the Department of Health. Findings from NTORS provided the foundation for the Task Force's report to the British Government in May 1996; they have been used by the Department of Health to formulate guidance to treatment purchasers; and they have also contributed to the Government's *Ten Year Strategy for Tackling Drug Misuse*. At the request of the US National Institute of Health, a report on outcomes for clients receiving methadone treatment in primary care settings was prepared. This was presented to the NIH Consensus Conference on Medical Treatment of Addiction, Bethesda, USA, in November 1997.

An important feature of NTORS is its concern with existing treatment programmes delivered under day-to-day operating conditions. Among the research priorities are: to assess the type and severity of problems presented by clients at intake to treatment, to measure outcomes over 5 years after treatment entry, to identify and measure key treatment processes, and to assess their impact on outcomes.

To a considerable extent NTORS reflects the methods and intentions of earlier American studies such as DARP and TOPS, and more recent projects such as DATOS. Not surprisingly, the American research groups have also showed increasing interest in treatment processes and their impact. The similarity between the findings from NTORS and those from the American projects has been noted in a special issue of *Psychology of Addictive Behaviors* (1997) which was devoted to DATOS and NTORS. Findings from the British and American studies are also presented in a special issue of *Drug and Alcohol Dependence* (1999).

3 Research design

NTORS is a prospective, longitudinal, cohort study. It monitors the progress of clients recruited into one of four treatment modalities which were delivered in either residential or community treatment settings. The residential modalities were: specialist inpatient treatment, and rehabilitation programmes. The community treatments were methadone maintenance, and methadone reduction programmes.

The research design is based on an established tradition of programme evaluation and longitudinal outcome research. The study is naturalistic and causal inference is achieved through measurement of key variables and comparison of treatment samples on the basis of pre- and post-treatment outcome measures.

Treatment outcome for drug misusers can be evaluated either narrowly, by a focus upon illicit drug use behaviours, or from a broader social, "rehabilitative" perspective. NTORS assesses changes in three major areas. These are:

- Reductions in problematic drug (and alcohol) use
- Improvements in personal and social functioning
- Reduction in public health and public safety threats.

In this report, the NTORS outcomes are presented in terms of changes in:

- substance use (for illicit heroin, non-prescribed methadone, non-prescribed benzodiazepines, crack cocaine, powder cocaine, amphetamines, and alcohol),
- injection risk behaviours (injecting and sharing injecting equipment),
- psychological health, suicidal ideation, and mortality,
- criminal behaviour.

Clients in NTORS were asked to recall the frequency of these problem behaviours during a 90-day recall period before intake to treatment and prior to subsequent follow-ups. We regard this recall period as appropriate, since longer recall may result in poor reliability for some behaviours and a shorter period may provide an overly narrow view of change in a longitudinal study of this type.

Where there is no penalty for accurate reporting, self-reported use of drugs and alcohol can provide reliable and accurate measures of these behaviours. The validity of patient's self-reports have been studied and confirmed repeatedly in many studies but there continues to be pressure to collect urine, blood or hair samples to confirm self-reported drug use. This was done within NTORS (see Appendix 3).

The study uses time-anchored follow-ups after treatment intake. During the first year, data was collected at intake, at 1 month, 6 months, and one year from intake. Subsequent follow-up interviews were carried out at 2 years and 4–5 years after intake. Intake interviews were conducted by specially trained treatment staff at the agencies. All follow-up interviews were carried out by independent interviewers from the Office for National Statistics (ONS).

Within any prospective, longitudinal study which is designed to identify treatment outcomes, different follow-up points may be chosen for different purposes. In general, there is no single, optimal follow-up point, and multiple assessments are preferable.

The NTORS design uses multiple assessments throughout the 5 year period after treatment intake. The use of shorter-term follow-up points is consistent with the procedures adopted by others who have pointed to issues such as treatment drop-out, the tendency for relapse after

treatment to occur relatively quickly, and the tendency for the effects of a single treatment episode to become contaminated by the effects of subsequent treatments and other factors occurring in the social environment. This report summarises the outcomes within the first year by presenting data from the 1 year follow-up. These results are consistent with those found at the earlier follow-up points.

The main findings of this report are those showing the outcome responses of the clients over the full study period, and including data from the 2-year and 4–5 year follow-up points.

The average times taken to follow up clients at each contact point are: 1 year follow-up at 1.2 years; 2 year follow-up at 2.2 years; and 4–5 year follow-up at 4.4 years.

4 The sample

The original NTORS cohort, and the full sample, comprised the 1075 clients recruited to treatment during 1995. This constituted the study group throughout the first year of the project.

The eligible sample for 2 and 4–5 year follow-up was constructed using a sampling frame of 894 clients (83% of the intake sample) for whom definite locator information was confirmed by contact during the first year after intake (ie at 6 month and 1 year follow-up). From this, a random stratified sample of 650 clients was selected (by SPSS random selection procedures) to include approximately the same percentages of clients as at intake within the four treatment modalities. These included: inpatients, n=85 (13%); rehabilitation, n=170 (26%); methadone reduction, n=118 (18%); and methadone maintenance, n=277 (43%).

The eligible sample was of sufficient size to give good accuracy in statistical analysis, and was acceptable within the project design since the longer-term follow-up interviews were designed to provide information about the stability or lack of stability of changes observed after treatment. The use of a smaller sample was determined by the reduced financial resources available for longer-term follow-up.

Four hundred and ninety six of the eligible sample were interviewed at the final 4–5 year follow-up. This represents a follow up rate of 76%. It is important to note that following individuals who have participated in drug misuse treatment is far from easy. Our follow-up rates meet acceptable to good thresholds from a scientific viewpoint but, we believe, are impressive since prior involvement with clients was restricted to administrative contact necessary to arrange the time and location of follow-up interviews.

Within this sample, results are presented for data collected at each previous follow-up point. The number of clients followed up by index treatment modality were: inpatients, n=61 (72%); rehabilitation, n=117 (69%); methadone maintenance, n=225(81%); methadone reduction, n=93 (79%). The follow-up rates achieved within the project were acceptable, and permit reasonable confidence in the results.

5 The agencies

Fifty four participating agencies took part in NTORS. These provided treatment in both *residential* and *community* settings, and they were purposely selected as providing programmes that were representative of the main treatment modalities used within the UK. Agencies were identified and selected on the basis of a 1994 Department of

TABLE 1 **Regional distribution of treatment programmes**

Region	Inpatient	Residential rehabilitation	Methadone maintenance	Methadone reduction
North Thames	–	1	2	3
South Thames	1	2	4	1
South & West	1	6	1	1
Anglia & Oxford	1	1	–	1
West Midlands	2	1	–	2
Trent	1	2	2	–
Northern & Yorks.	–	–	4	1
North West	2	2	3	6
Total	**8**	**15**	**16**	**15**

Health survey and from lists of national drug treatment services.

Agencies were recruited from all parts of the country. The geographical distribution of the agencies is shown in terms of administrative health regions in Table 1. Drug problems are not spread evenly across England. Some parts of the country have much greater problems than others in relation to the misuse of drugs. The London area and the north-west of England, for example, have higher levels of drug use than the rest of the UK. About one third of all drug notifications to the Home Office were made by London-based doctors and about one third of all drug arrests are made in the Metropolitan Police area. High rates are also recorded from the areas around Manchester and Liverpool.

A large proportion of the methadone prescribing clinics participating in the study were based in the North West and in the South East of England. This is representative of the national distribution of such services. Similarly, many of the rehabilitation services were based in the South West of England, and this is reflected in the sampling from this part of the country.

6 The clients and their problems

The NTORS clients were predominantly men (74%). Their average age was 29 years (range 16 – 58 years). Ninety one percent identified their ethnic group as white-UK. Just over a quarter (28%) described themselves as married or living with a partner. About one third (30%) were in a relationship but not cohabiting, and the largest group (42%) were single. Just under half (47%) were responsible for children aged 18 or under. Of those clients who were in a relationship, 45% reported that their partner was currently using drugs. Drug use among friends was even more prevalent: 80% had friends who were drug users.

Clients reported extensive, chronic and serious substance misuse problems. The most common drug problem was long-term opiate (usually heroin) dependence, often in conjunction with polydrug and/or alcohol problems. More than three quarters (81%) were using two or more of the main types of illicit target drugs in the three months prior to intake. More than half were using psychostimulants (mostly crack cocaine).

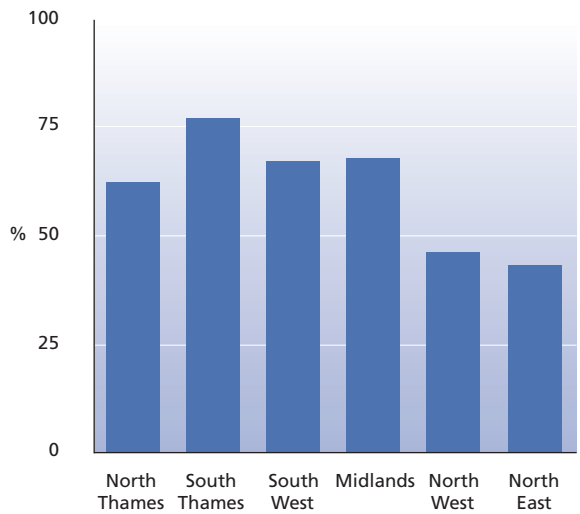
The average duration of heroin use was 9 years and a quarter had used heroin for 13 years or more. Three quarters were using heroin on a regular basis (weekly or more

often). The mean daily dose for the heroin users was about two thirds of a gram. Almost a quarter of the heroin users (22%) were using daily amounts of 1 gram or more.

Almost two thirds of the cohort (62%) were injecting drugs prior to intake. The drug which was most frequently used by injection was heroin (53%). Twenty eight percent were injecting stimulants (cocaine, 17%, amphetamines, 17%). Despite concerns about the injection of benzodiazepines, very few clients (4%) were injecting these drugs prior to intake. Similar injecting rates were found among clients admitted to residential and community setting treatments.

There were marked regional variations in the routes of drug administration. For heroin, the cohort was approximately evenly divided between heroin injectors and those who smoked heroin (chasing the dragon). Heroin injecting was most prevalent among clients living in the South Thames region, and least prevalent among those from the north of England (see Figure 1). Conversely, chasing the dragon was about twice as prevalent in the north of England as in the midlands and the south.

FIGURE 1 **Regional variations in heroin injecting**



Although the NTORS clients were recruited on the basis of their drug problems, many of the cohort reported problematic patterns of drinking prior to starting treatment. As we shall describe, many were drinking at worryingly high levels.

Psychological health problems were common, especially those related to anxiety and depressive mood. More than a quarter of the cohort (29%) reported having thoughts of suicide in the three months before treatment. Ten percent had received inpatient hospital psychiatric treatment (for a problem other than drug dependence) in the 2 years before intake, and 14% had received community psychiatric treatment.

High rates of criminal behaviour were reported prior to admission. 70,728 separate crimes were reported during the three months prior to intake. Sixty one percent of the cohort reported committing at least one offence. Acquisitive crime was one of the most commonly reported types of offence, and more than a third of the clients having committed at least one shoplifting offence in the previous 90 days. Drug selling offences were also common.

Almost three quarters of the cohort had been arrested in the previous two years on a total of 4,466 occasions. Although many such arrests were for drug offences, arrests for shoplifting offences were also common, accounting for 42% of all arrests.

7 Client differences between treatment settings and modalities

There were important case-mix differences between the characteristics and problems of the clients who sought treatment in the residential and in the community programmes. In general, the clients in the residential programmes had more serious problems than those in the outpatient programmes.

The contrast was most marked between the residential rehabilitation and methadone reduction clients. The clients in the rehabilitation units included the more chronic, long-term users with the most severe problems. Rehabilitation clients presented with the longest heroin careers, they were more likely to be regular users of stimulants (especially cocaine), and were more likely to have shared injecting equipment. There were also more heavy drinkers among the clients entering the rehabilitation programmes. Rehabilitation clients were more likely to have been actively involved in crime and they had been arrested more often than the other clients.

Clients in the methadone reduction programmes tended to be younger; they had used heroin for the shortest time; they were more likely to confine their drug use to heroin and less likely to have broad patterns of polydrug or alcohol use; and they were less likely to share injecting equipment.

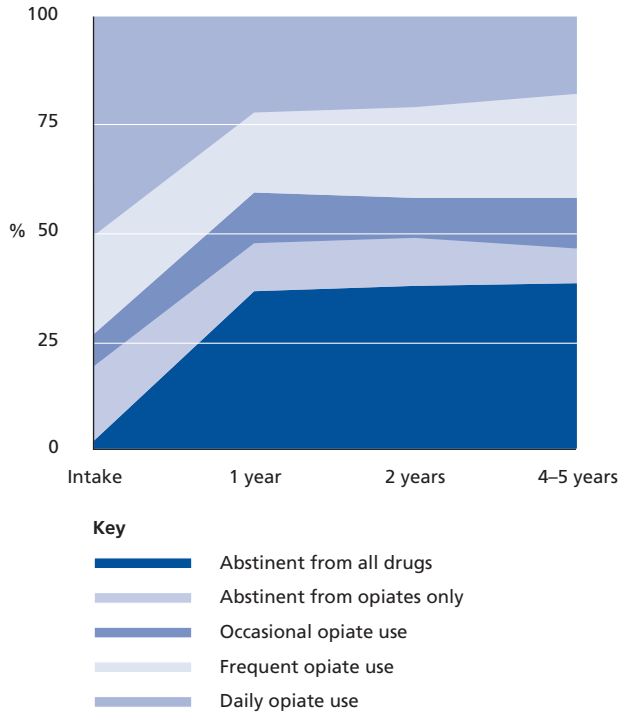
Such differences are important to the understanding and interpretation of our results. They could be expected to affect the way treatment is delivered and the way clients respond to treatment. Treatment outcome will be affected by client characteristics, and specifically by the nature and severity of the client's pre-admission problems.

OUTCOMES

8 Abstinence and patterns of illicit drug use

For clients in both the residential settings and in the community setting programmes, there were marked improvements in drug use after treatment. The drug use outcomes over the course of the study are shown in Figures 2 and 3. Both among the residential clients and those in the methadone

FIGURE 2 **Drug use outcomes – residential**



programmes, improvements were already evident at 1 year, and these gains were largely maintained at 2 and 4–5 year follow-up. Reductions were found both in the percentages of clients who were using drugs, and in terms of the frequency of illicit drug use.

Abstinence is one of the most rigorous outcome criteria for drug misuse treatment, and this was the explicit treatment goal for the residential setting (rehabilitation and in-patient DDU) programmes. More than a third (38%) of the residential clients were abstinent from all six illicit target drugs at 4–5 years. The percentage of residential clients who were abstinent from illicit opiates (the main problem drugs at intake) increased from 19% at intake to 47% after 5 years. For the methadone clients, more than a third (35%) were abstinent from illicit opiates at 4–5 years compared to 6% at intake.

FIGURE 3 **Drug use outcomes – community**

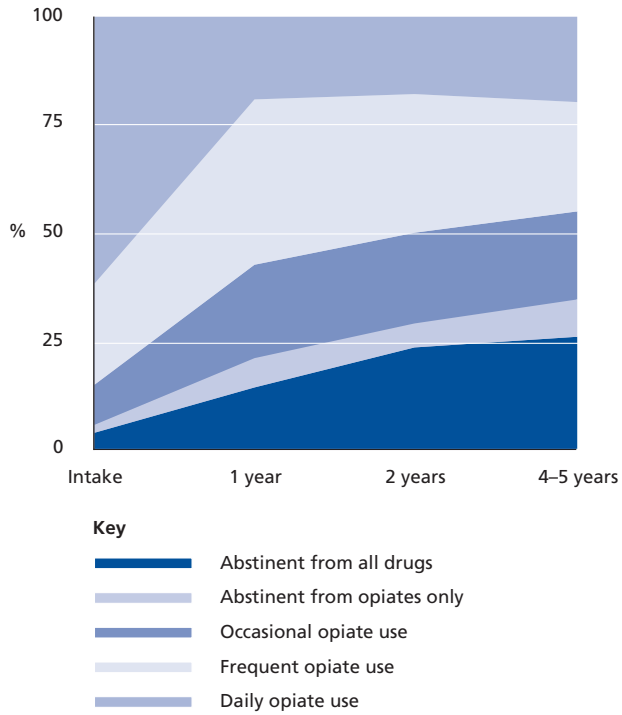
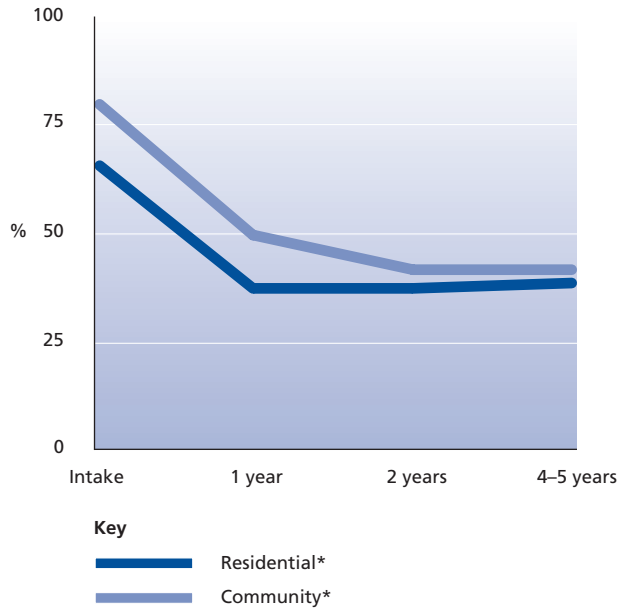


FIGURE 4 **Regular heroin use[1]**



Daily use of opiates among the residential clients had fallen from 51% before treatment to 18% at 4–5 years. Daily opiate use was widely reported by the community clients before intake to treatment (62%), but after 4–5 years, daily opiate use had fallen by more than two thirds, to 20%.

9 Regular use of illicit drugs

A range of quantitative measures of illicit drug use were taken within the project. Regular (weekly or more frequent) use provides one measure of problematic drug use and this is reported in the present report. Measures of regular use were taken for all six illicit drugs. Changes in the regular (weekly or more frequent) use of these drugs are shown in Figures 4 to 9.

The most common drug problem at intake was dependence upon opiates. At intake to treatment 66% of the clients recruited to residential treatment programmes were regularly using heroin. This dropped to 38% after one-year and this decrease was maintained to the 4–5 year follow-up where the percentage of clients regularly using heroin was 39%. A similar pattern of outcome was found for regular use of non-prescribed methadone. At intake to treatment, 27% of the residential clients were regularly using non-prescribed methadone. This fell by more than half to 10% at one year,12% at two years, and to the lowest level of 8% at 4–5 years (less than a third of the number using non-prescribed methadone at intake to treatment).

The results for the methadone clients show a similar pattern. At intake, 80% of the methadone clients were regularly using heroin. After one year this fell to 50% and decreased further to 42% at both 2 years and 4–5 year follow-up. Regular use of non-prescribed methadone was reported by 31% of these clients at intake. This dropped by nearly two-thirds to 11% at one year

1 Asterisks shown in this and in subsequent Figures, indicate statistically significant reductions in problem behaviours for clients treated in that treatment setting.

FIGURE 5 **Regular non-prescribed methadone use**

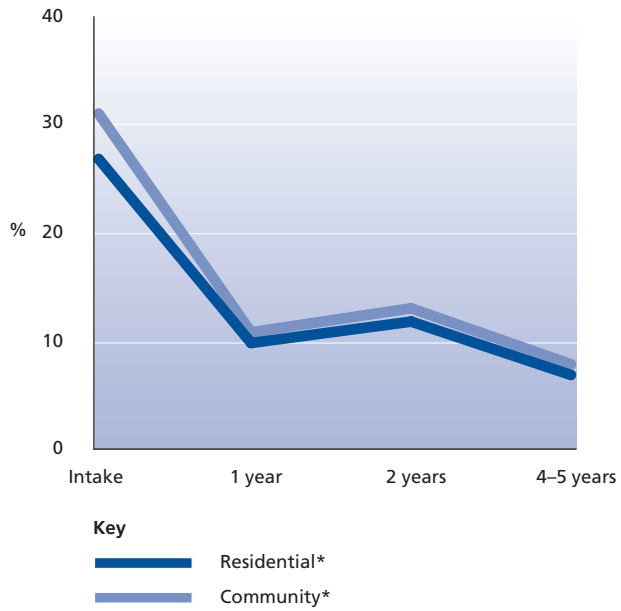
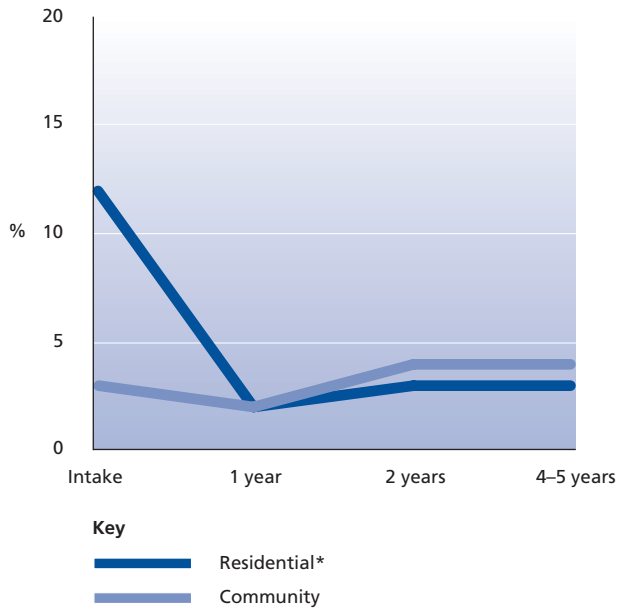


FIGURE 7 **Regular cocaine powder use**



follow-up, rose slightly to 13% at two years and then decreased to its lowest percentage of 7% at 4–5 year follow-up (less than a quarter of the original number of regular users).

At intake, the use of stimulants, and of benzodiazepines, was reported by over half of the cohort. The outcomes for benzodiazepines were broadly comparable to those for opiates. Among clients in residential treatment settings, the proportion regularly using non-prescribed benzodiazepines fell from 44% at intake to 13% at 4–5 years. Among the methadone clients, regular non-prescribed

FIGURE 6 **Regular non-prescribed benzodiazepine use**

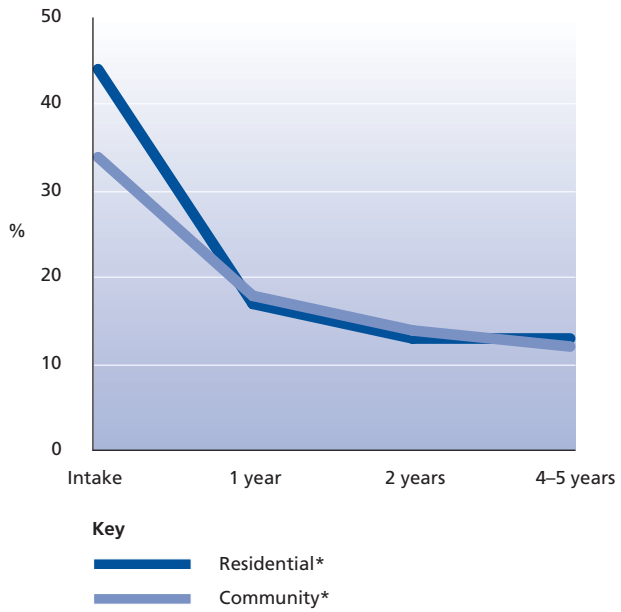


FIGURE 8 **Regular crack cocaine use**

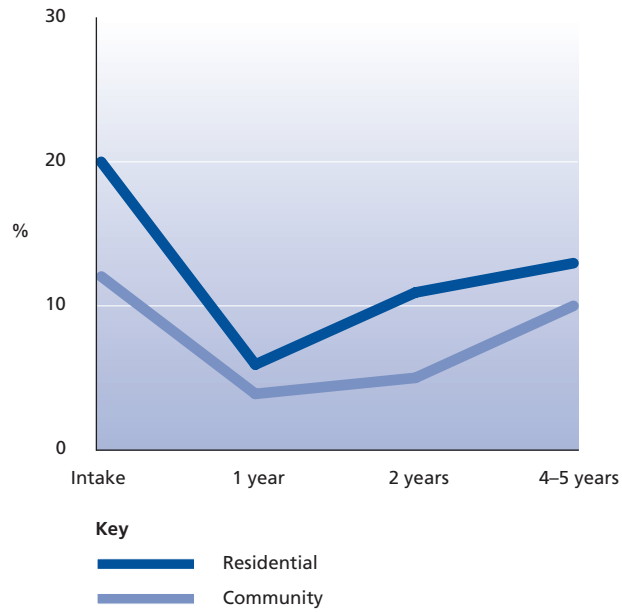


FIGURE 9 **Regular amphetamine use**

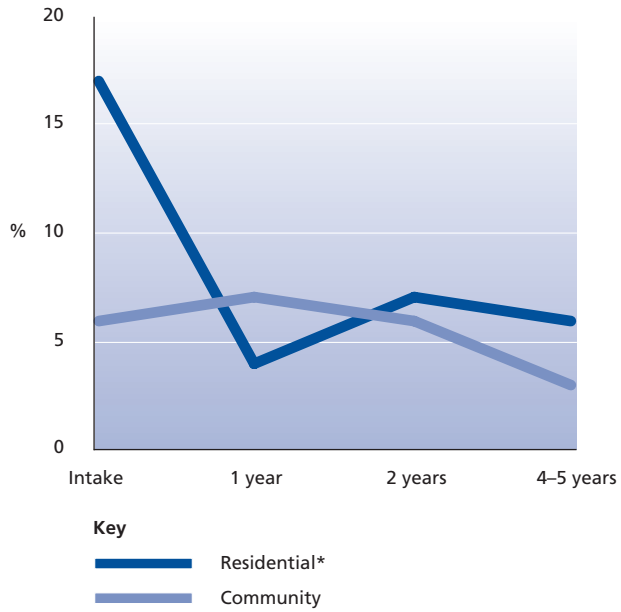
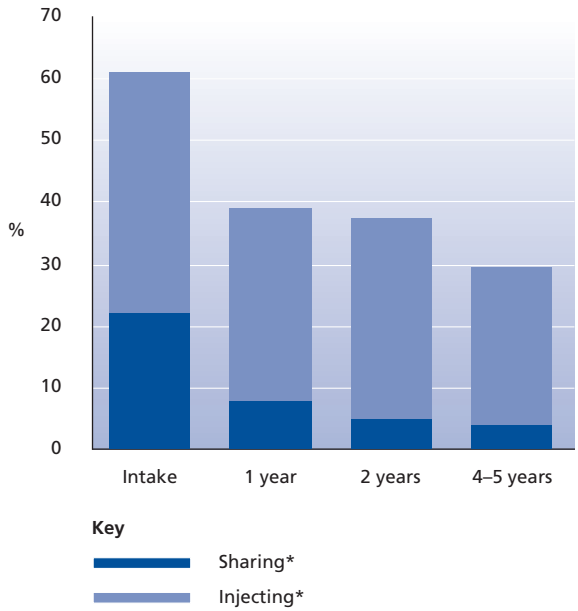


FIGURE 10 **Injecting and sharing – residential**



benzodiazepine use fell throughout the course of the study, from 34% at intake to treatment to 12% at 4–5 years.

There were differences in outcome between the three stimulant drugs. Among the residential clients, regular use of cocaine powder was reduced from 12% to 3%. Regular use of both cocaine powder and amphetamines was low among the methadone clients at intake – reported by 3% and 6% respectively; regular use of these drugs remained low at subsequent follow-up points.

Crack cocaine was regularly used at intake by 20% of the residential clients and 12% of the methadone clients. In both groups, regular use of crack fell at one year (6%, residential, and 5%, methadone), but then increased again. Among the residential clients it had increased to 13% at 4–5years, and to 10% among the methadone clients.

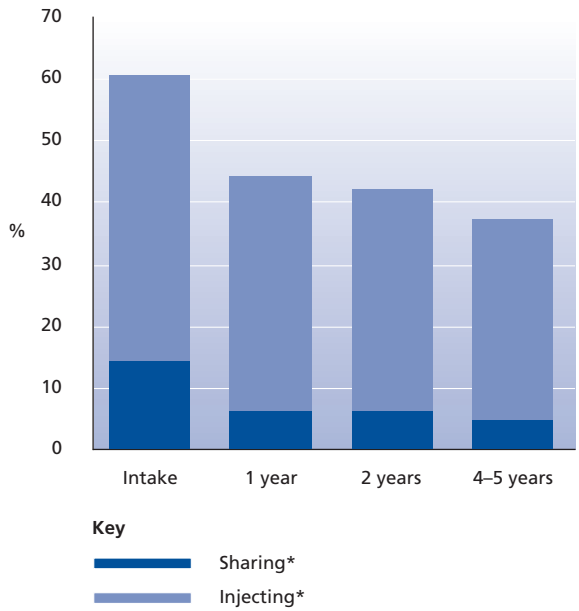
10 Injecting behaviour

HIV prevention and harm reduction measures have been identified as a priority in UK national drug policy since the mid 1980s. The important role of drug treatment programmes in tackling HIV infection was also recognised at an early stage of the HIV epidemic, and most drug treatment services have incorporated interventions targeted at the injecting risk and sex risk behaviours of their clients.

The majority of NTORS clients had used drugs intravenously prior to treatment. Almost a quarter of the drug injectors (15% of the cohort) reported sharing injecting equipment in the 3 months before entering their NTORS treatment episode.

The results are positive and encouraging. Rates of injecting and sharing equipment were all substantially reduced one year after treatment entry and remained low throughout the five year follow-up period. The rate of injecting fell from 60% at intake to 37% at 4–5years. The rate of sharing fell from 14% to 5%.

FIGURE 11 **Injecting and sharing – community**



These reductions were found among drug users admitted to both the methadone treatment and the residential treatment programmes. Among the clients from the residential programmes (where rates of injecting and sharing were high), injecting at 4–5 years had fallen to half of the rate at intake, and sharing was substantially lower.

There were also reductions in the proportion of injectors sharing among the residential clients; this fell from 36% at intake to 12% at 4–5 years. Among the methadone clients it fell from 24% to 14%.

11 Alcohol

Clients were recruited to NTORS on the basis of their drug misuse problems. However, alcohol was an important if sometimes neglected component within their overall pattern of multiple substance use, and many clients reported problematic drinking patterns prior to treatment.

Heavy drinking among drug misusers deserves to be taken seriously. Alcohol use by drug misusers may aggravate other problems. Dually (drug and alcohol) dependent clients often have higher rates of criminal involvement and more health problems than drug misusers without drinking problems. Drinking problems may also lead to the involuntary discharge of patients from drug misuse treatment programmes.

More than one third of the drug misusers who were drinking at intake reported problematic or highly problematic patterns of alcohol consumption. A minority (8%) of clients reported daily, or almost daily drinking of extremely large quantities of alcohol (on average, equivalent to about one and a half bottles of spirits). These drinkers would be regarded by almost any observer as having a highly problematic pattern of drinking which required treatment.

Reductions in frequency and quantity of drinking were found among some of the more problematic drinkers. However, despite these improvements in some individuals, it is disappointing that many of

FIGURE 12 **Frequency of drinking**

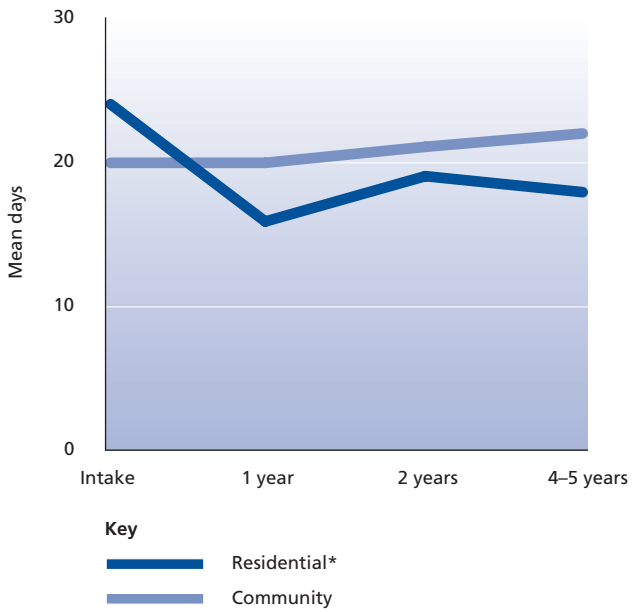
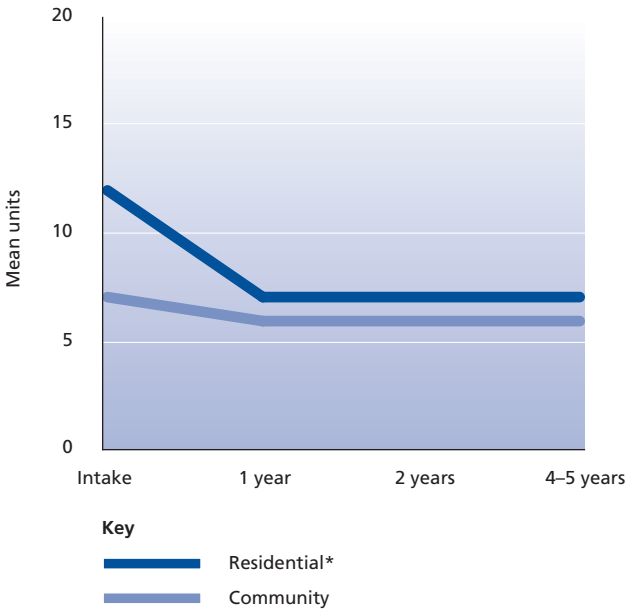


FIGURE 13 **Quantity of drinking**



the drinkers in both residential and community treatment settings made little change to their pattern of pretreatment drinking behaviour.

Figures 12 and 13 show outcomes for frequency and quantity of drinking. Over a quarter of the clients treated in the residential programmes (29%) were drinking above recommended Royal College of Psychiatrists' weekly limits for sensible drinking. The mean number of units of alcohol consumed by drinkers was 17 units per drinking day. At one year, frequency of drinking had reduced to a mean of 16 days. This had increased slightly to 18 days at 4–5 years. Reductions in the mean daily quantity of alcohol consumed were maintained from 1 year through to 4–5 years.

Even with the improvements that were found among the more problematic drinkers, the average amount of alcohol being consumed at follow-up on a typical drinking day remained high. The percentage of clients drinking above recommended limits was not significantly reduced.

Levels of drinking among the methadone clients were largely unchanged during the course of the study. Frequency of drinking remained at about 20/90 days, and the mean units consumed per drinking day was 7 units at intake and 6 units at all three follow-up points. The proportion of clients drinking above weekly recommended limits was 24% at intake and 25% at 4–5 years.

The continued heavy drinking of so many clients after drug misuse treatment contrasts with the more substantial improvements found in the use of illicit drugs.

12 Psychological health, suicidal ideation and mortality

At intake to treatment, many NTORS clients reported high levels of psychological health problems, and there were correspondingly high rates of contact with non-addiction treatment services. Psychological health scale scores at intake were strongly correlated with the number of physical health symptoms reported. Women reported higher scores across all

FIGURE 14 **Psychological health symptoms**

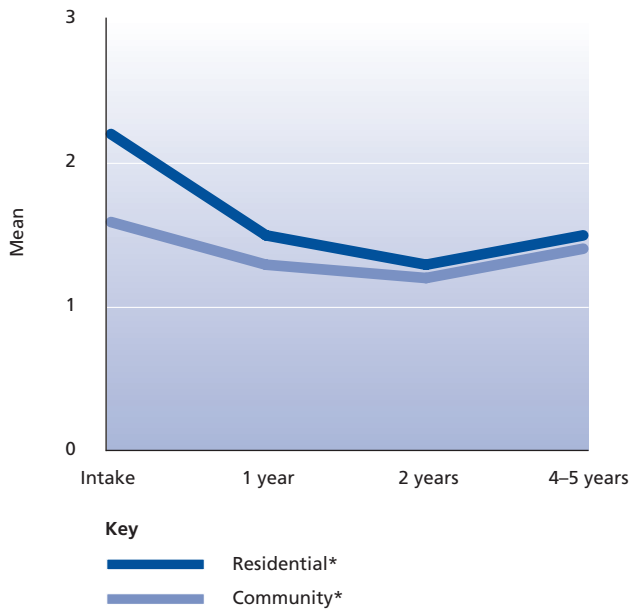


FIGURE 15 **Suicidal ideation**

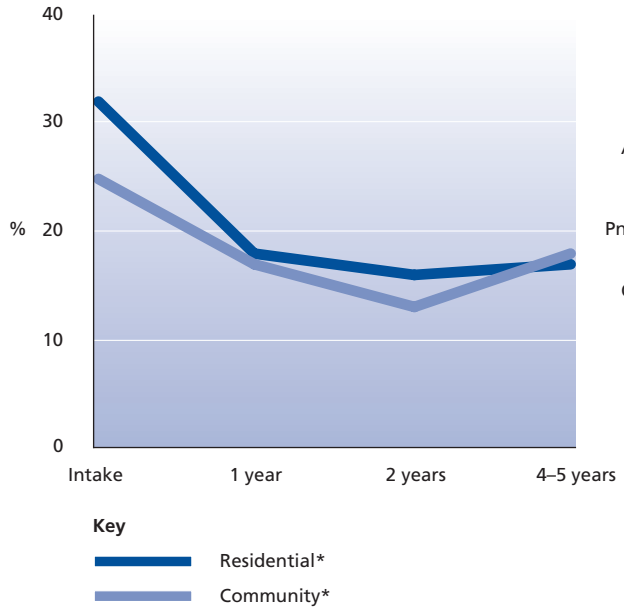
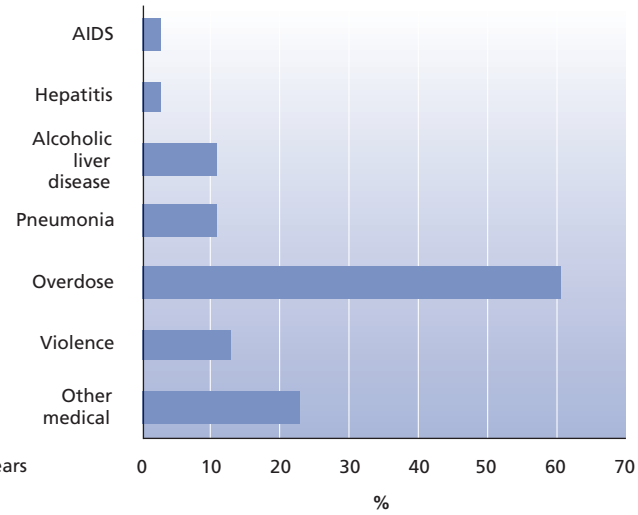


FIGURE 16 **Causes of death as recorded on death certificates**



psychological symptom scales. A relationship was also found between substance use and psychological health, with higher symptoms among opiate users who were also frequent users of benzodiazepines, alcohol, and stimulants.

Although the residential clients reported more severe psychological health problems at intake, clients in both treatment settings showed similar outcome. Symptom scale scores were reduced at 1 year and 2 year follow-ups. At 4–5 years, psychological health problem scores had increased slightly compared to the 1 and 2 year outcomes. These were still lower than the scores at intake. Similar results were found for rates of suicidal thoughts which also reduced over two years but had increased at 4–5 years for clients in both treatment settings.

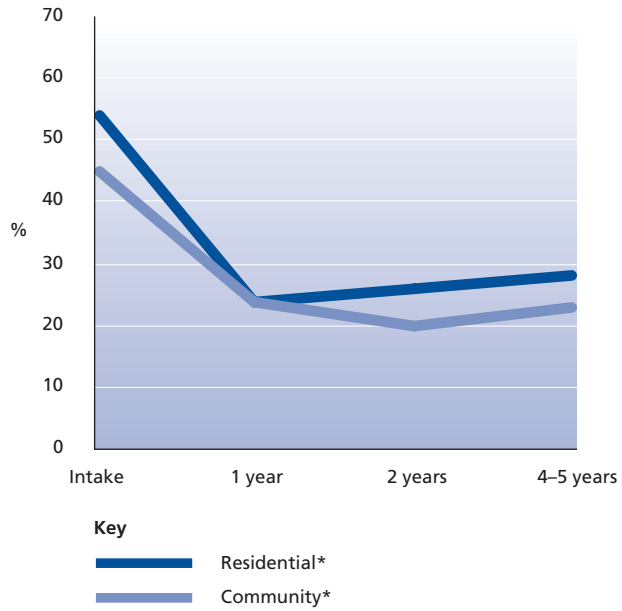
At the time of writing this report, 62 of the 1,075 clients in the NTORS cohort were known to have died. This represents an annual mortality rate of 1.2% and is considerably higher than for the general population. The majority of deaths (61%) were due to drug overdoses. The second most common cause of death was medical illnesses. AIDS was listed as a cause of death for two clients. Violent deaths were relatively common (14% of cases) and included murder, suicide (hanging), and death from multiple injuries.

In most of the overdose deaths, more than one drug was detected. Indeed, a single substance was found after death in only about one in five cases. The most common drug combinations associated with death involved opiates and alcohol, opiates and benzodiazepines, or all three of these drugs. Polydrug use in general, but this sort of mixture of substances in particular, increased the risk of mortality.

13 Crime

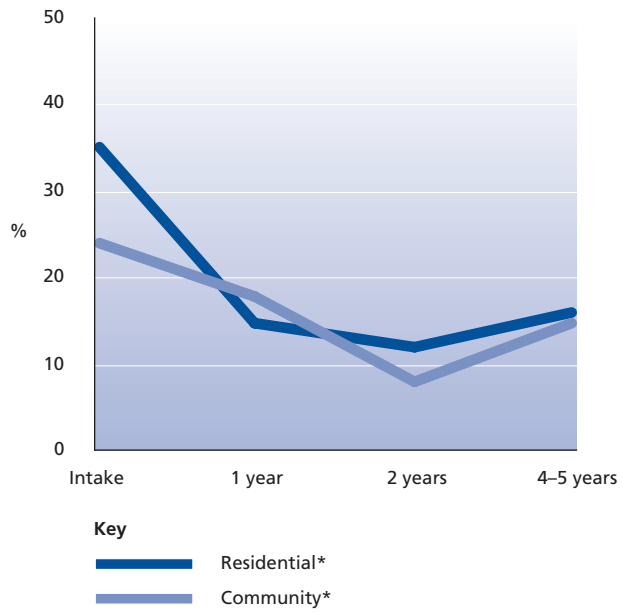
High rates of criminal involvement were reported by the NTORS clients before treatment. Acquisitive crimes were very common and the most reported type of offence was shoplifting. During the course of the study, there were significant reductions in the percentage of clients who

FIGURE 17 **Acquisitive crime**



had committed offences during the three months prior to interview. At one year, rates of acquisitive crime had approximately halved among both the residential and community clients. These improvements were maintained at the 2 year and 4–5 year follow-ups, where rates of criminal involvement ranged from 20% to 28%.

FIGURE 18 **Selling drugs**



Reductions were also found in drug selling offences. About a third of residential clients and a quarter of community clients reported selling drugs prior to starting treatment. These rates were reduced at both one year and two years for clients in both settings. At 4–5 years, there was a slight increase (to 16% for the residential clients and 15% for the community clients) but levels of drug selling were still significantly lower at the final follow-up than at intake.

14 Economic issues[2]

Economic analysis is one method of understanding, and in particular, quantifying the benefits and costs of treatment. A previous analysis of some of the social costs incurred by the cohort included crime costs, health and welfare service use, and the use of drug misuse services. Just for these areas, the total cost for the 1075 users was £12 million in 1994/5 prices. Criminal behaviour costs, especially the victim costs of crime, made up a large proportion of this total. As the study has progressed, more items have been included in the economic assessment and more accurate costings have been undertaken. Recent analysis of criminal justice costs suggests that the earlier costs may have been underestimated. A more accurate total based on the costs of each arrest suggests that expenditure within the criminal justice system alone accounted for almost £5 million in the year before intake.

Crime was greatly reduced after one year, and it was estimated that for every extra £1 spent on drug misuse there is a return of £3 in the cost savings associated with lower levels of victim costs of crime and reduced demands on the criminal justice system. These cost savings are only one part of the benefit from treatment, and also only indicate immediate rather than longer term benefits. Further economic analyses will

2 This section was written with Prof. Christine Godfrey.

TABLE 2 **Costs and consequences of drug treatment**

Item	Examples
Cost of treatment	Specialist drug services
	Other related health and other care agency use related to treatment
	Time and other costs for drug user and family
	Costs to employers
Value of treatment for individuals and families	Improvement in quality and quantity of life of the drug user
	Improvements in quality of life of the family, including accidental overdoses by children
Potential savings in public sector resources	Reduced criminal justice expenditure
	Reduced health and other welfare care costs
Gains to employers	Productivity gains
Wider social benefits of treatment	Reductions in victim costs of crime
	Reduction in communicable diseases
	Social environment benefits

seek to increase the accuracy of the costing methodology and to include estimates for a greater range of the costs and consequences as outlined in Table 2. As may be expected, the ratio of costs to benefits is likely to change. For example, treatment could be expected to reduce the number of premature deaths among drug users. Only a few averted deaths would add substantially to the calculated social cost savings. Unlike many American studies, productivity benefit gains from drug users returning to jobs after treatment were not included in the earlier calculations. Updated figures including more impacts, and calculated across 2 years rather than the initial 12 months, will provide a more detailed analysis of how the consequences change over time.

NTORS allows costs for individuals to be tracked across time and related to treatment input. We are currently using a revised and more complete economic data-set to investigate variations on the costs and outcomes of different individuals and whether there are factors which predict different costs and outcomes. One aim of this work will be to explore how the results from such analysis could be used to explore the potential costs and consequences to different groups of drug users from different policy changes[3].

15 Conclusions

Most of the results from NTORS have been positive. Rates of abstinence from illicit drug use were increased, frequency of drug use was reduced, crime was reduced, and health was improved.

At intake, the clients had a range of serious and chronic drug misuse and other problems. Heroin was the main problem drug, though the majority of clients were multiple drug misusers. After one year, the patients recruited to both the residential programmes and to the methadone treatment programmes showed substantial reductions in their use of heroin and other illicit drugs. These reductions in illicit drug use were generally maintained throughout the 4–5 year follow-up period.

3 A further report on economic implications is being prepared for publication.

Improvements in illicit drug use were found both for frequency of use outcomes and for outcomes based upon abstinence from drugs. Abstinence is the most stringent criterion for treatment outcome. Almost half (47%) of the clients from the residential programmes, and more than a third (35%) of those from the methadone programmes were abstinent from opiates at 4–5 year follow-up.

The results have been interpreted as supporting the "treatment works" message. The NTORS researchers are happy to stand behind this message. Disappointingly, many commentators on the addictions continue to voice pessimistic and nihilistic opinions about the ineffectiveness of treatment.

We are pleased to contribute further evidence to the rapidly growing literature which shows the positive changes that can be achieved after treatment by even the most seriously dependent and chronic drug misusers. The results from NTORS have been generally well received by those working in British treatment programmes. The project has also received the sympathetic and interested attention of policy makers, and it has been able to inform the development of UK treatment policy responses.

The NTORS findings are interesting in their own right as statements of outcome. They are also interesting because of the insights that they offer into the processes which affect outcome. The role played by treatment in helping addicts to give up drugs is complex, and evidence about the impact of treatment is often difficult to interpret. Treatment should be seen, not as an event, but as a process. Although NTORS focuses upon the role of treatment, the responses that occur during, and subsequent to treatment, are influenced by a range of inter-related factors all of which can influence outcome.

Length of time in treatment has been found in many studies to be one of the most consistent predictors of favourable post-treatment outcomes among drug misusers. Our more detailed analyses of the data have shown that time in both the residential treatments, and in methadone maintenance is predictive of superior outcomes.

These results cannot be interpreted as demonstrating that particular times in treatment are *sufficient* for clinical improvement. Time in treatment is a complex measure and may reflect the tendency of the more motivated patients to stay longer and engage more fully with treatment. However, it is still clear clients should be encouraged to stay in treatment for long enough to be exposed to, and to participate in clinical components of sufficient quality and intensity to facilitate change.

The findings about the extremely large amount of crime committed by the NTORS cohort prior to treatment has already been reported, and has been the subject of considerable attention. The vast majority of acquisitive crimes were committed by a small minority of the clients with 10% of the clients committing 76% of the crimes. These high-rate offenders represent a major problem to society in terms of their criminality and to the treatment services.

At intake, the clients who were most heavily involved in crime were the most frequent users of using heroin and cocaine; they also reported more severe dependence on drugs, poorer psychological health, and lower rates of employment. Our results are encouraging in that they show that many of the greatest reductions in criminal activity occurred within this highly active group of offenders. Among the high-rate offenders, crimes were reduced to 13% of intake levels. By any standards, this represents a huge reduction in criminal behaviour.

The reductions in crime cannot be attributed directly to the impact of treatment factors. Much of the crime reduction that occurred was probably facilitated by the reductions in the regular, dependent use of drugs, and particularly of heroin. Heroin use was consistently found to be predictive of involvement in acquisitive crime. Those drug misusers who had stopped regular heroin use were more than 10 times less likely to be involved in crime than those who continued to use heroin regularly.

But we would not wish our results to be used as an excuse for complacency by service providers. Many NTORS results are positive, but some outcomes are not so good. There are troubling indications that earlier improvements in the use of crack have lessened after 4–5 years (though this had still not fallen back to pre-intake levels). Also, the outcomes for drinking are not satisfactory. Too many drug misusers were drinking heavily both at intake and at follow-up, and services should be modified to improve this situation.

Nor should the findings of improvements among many clients obscure the further finding that some clients failed to respond to treatment. About one fifth of the cohort continued to use heroin on a daily basis throughout the follow-up period, and after 5 years, about 40% of the clients both from the residential and methadone programmes were still using heroin at least once a week.

Some clients failed to show improvement on virtually all outcome measures. In a detailed analysis of the methadone clients, we found that almost a quarter of the sample showed a poor response to treatment. In some respects it is encouraging that only a minority of patients showed such poor outcomes. On the other hand the failure of these patients to improve on a range of different outcome measures despite their access to, and often extensive input from drug misuse treatment services, is a matter for concern. The fact that 62 of the NTORS cohort had died within this five year period, most often of drug overdoses, reinforces this concern about the poor treatment response of some clients.

Despite these reservations, the longer-term outcomes for the NTORS clients over this 5 year period demonstrate the substantial reductions in drug use and in other problem behaviours which can be made after treatment by people with serious and long-term drug problems. These changes represent important benefits to the individuals, to their family and friends, and to society as a whole. The services which provided the treatment interventions represent a powerful national asset for society in responding to drug misuse problems. There are undoubtedly areas in which the treatment services should be further strengthened. We hope the NTORS findings will be used to support, and to help improve and strengthen existing treatment services.

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Appendix 1 List of NTORS publications[4]

NTORS The National Treatment Outcome Research Study: Summary of the project, the clients, and preliminary findings: First Bulletin. (1996). Gossop, M., Marsden, J., Stewart, D., Edwards, C., Lehmann, P., Wilson, A., & Segar, G. Department of Health: London.

NTORS The National Treatment Outcome Research Study: Improvements in substance use problems a 6 months follow-up. Second Bulletin (1997). Gossop, M., Marsden, J., Stewart, D., Edwards, C., Lehmann, P., Wilson, A., & Segar, G. Department of Health: London.

The National Treatment Outcome Research Study in the United Kingdom: Six month follow-up outcomes (1997). Gossop, M., Marsden, J., Stewart, D., Edwards, C., Lehmann, P., Wilson, A., & Segar, G. *Psychology of Addictive Behaviors, 11(4):324–337*.

NTORS: The National Treatment Outcome Research Study (UK) (1997). Gossop, M., Marsden, J., Stewart, D., Lehmann, P., Edwards, C., Wilson, A., & Segar, G.. *NIDA Research Monograph Series 178.* National Institute of Health: Rockville.

NTORS at one year. The National Treatment Outcome Research Study: Changes in substance use, health and criminal behaviors at one year after intake: Third Bulletin. (1998). Gossop, M., Marsden, J., & Stewart, D. Department of Health: London.

NTORS at one year. The National Treatment Outcome Research Study: Changes in substance use, health and criminal behaviors at one year after intake. (1998).

4 This list contains articles which were published or accepted for publication prior to January, 2001. Articles in preparation or being reviewed are not listed.

Gossop, M., Marsden, J., & Stewart, D. Department of Health: London.

Substance use, health and social problems of clients at 54 drug treatment agencies: Intake data from the National Treatment Outcome Research Study (NTORS) (1998). Gossop, M., Marsden, J., Stewart, D., Lehmann, P., Edwards, C., Wilson, A., & Segar, G. *British Journal of Psychiatry, 173: 166–171*.

The economic burden of drug addiction: Social costs incurred by clients at intake to NTORS. (1998). Healey,A., Knapp.M., Astin,J., Gossop, M., Marsden, J., Stewart, D., Lehmann, P., & Godfrey,C. *British Journal of Psychiatry,173*:*160–165.*

The National Treatment Outcome Research Study: Summary of six-month follow-up outcomes for substance abuse behaviours. (1998). Rolfe, A., & Stewart, D. *Drug News, Spring 1998: 36–38.*

The Maudsley Addiction Profile (MAP): A brief instrument for assessing treatment outcome. (1998). Marsden, J., Gossop, M., Stewart, D., Best, D., Farrell, M., Lehmann, P., Edwards, C. & Strang, J. *Addiction, 93(12): 1857–1867.*

NTORS from the inside: the researchers behind NTORS summarise their findings (1999). Gossop, M., Marsden, J., & Stewart, D. *Findings, 2: 17–22.*

Treatment outcome among opiate addicts receiving methadone treatment in drug clinics and general practice settings: Results from the National Treatment Outcome Research Study -NTORS. (1999) Gossop, M., Marsden, J., Stewart, D., Lehmann, P., & Strang, J. *British Journal of General Practice, 49: 31–34.*

NTORS: Two year outcomes. The National Treatment Outcome Research Study: Changes in substance use, health and crime: Fourth Bulletin. (1999). Gossop, M., Marsden, J., Stewart, D., & Rolfe,A. Department of Health: London.

Treatment retention and 1 year outcomes for residential programmes in England. (1999). Gossop, M., Marsden, J., Stewart, D. & Rolfe, A. *Drug and Alcohol Dependence, 57: 89–98.*

Drug selling among drug misusers before intake to treatment and at one year follow-up: results from the National Treatment Outcome Research Study (NTORS) (2000). Gossop, M., Marsden, J., & Stewart, D. *Drug and Alcohol Review, 19:143–151.*

The UK National Treatment Outcome Research Study and its implications. (2000). Gossop, M., Marsden, J., & Stewart, D. *Drug and Alcohol Review, 19:5–7.*

Reductions in acquisitive crime and drug use after treatment of addiction problems: one year follow-up outcomes (2000). Gossop, M., Marsden, J., Stewart, D., & Rolfe, A. *Drug and Alcohol Dependence, 58: 165–172.*

Psychiatric symptoms amongst clients seeking treatment for drug dependence: intake data from the National Treatment Outcome Research Study (2000). Marsden, J., Gossop, M., Stewart, D., Rolfe, A., & Farrell, M. *British Journal of Psychiatry, 176:285–289.*

The National Treatment Outcome Research Study (NTORS): Inception and implementation of a major treatment evaluation study in the UK. (2000). Gossop, M., Marsden, J., Stewart, D., Edwards, C., Wilson, A., & Segar, G. In *Evaluation of Substance Use Disorders, Workbook vol 7.* World Health Organization, Geneva.

Drug misuse and acquisitive crime among clients recruited to the National Treatment Outcome Research Study (NTORS) (2000). Stewart, D., Gossop, M., Marsden, J., & Rolfe, A. *Criminal Behaviour and Mental Health, 10: 13–24.*

Treatment of outcomes of stimulant misusers: one year follow-up results from the National Treatment Outcome Research Study (NTORS) (2000). Gossop, M., Marsden, J., & Stewart, D. *Addictive Behaviors, 25(4): 509–522.*

Patterns of drinking and drinking outcomes among drug misusers: one year follow-up results. (2000). Gossop, M., Marsden, J., Stewart, D., & Rolfe, A.. *Journal of Substance Abuse Treatment, 19: 45–50.*

Patterns of improvement after methadone treatment: one year follow-up results from the National Treatment Outcome Research Study (NTORS) (2000). Gossop, M., Marsden, J., Stewart, D., & Rolfe, A. *Drug and Alcohol Dependence, 60: 275–286.*

Routes of drug administration and multiple drug misuse: regional variations among clients seeking treatment at programmes throughout England (2000). Gossop, M., Marsden, J., Stewart, D., & Treacy, S. *Addiction, 95(8): 1197–1206.*

Variation between and within drug treatment modalities: data from the National Treatment Outcome Research Study (UK) (2000). Stewart, D., Gossop, M., Marsden, J., & Strang, J. *European Addiction Research, 6: 196–114.*

Outcomes after methadone maintenance and methadone reduction treatments: two-year follow up results from the National Treatment Outcome Research Study. (2001) Gossop, M., Marsden, J., Stewart, D., & Treacy, S. *Drug and Alcohol Dependence*, 62: 255-264.

Change and stability of change after treatment of drug misuse: 2 year outcomes from the National Treatment Outcome Research Study (UK). Gossop, M., Marsden, J., Stewart, D., & Treacy, S. *Addictive Behaviors.* (in press).

A prospective study of mortality among drug misusers during a four year period after seeking treatment. Gossop, M., Stewart, D., Treacy, S., & Marsden, J. *Addiction.* (in press)

Reduced injection risk and sexual behaviour after drug misuse treatment: Results from the National Treatment Outcome Research Study (NTORS). Gossop, M., Marsden, J., Stewart, D., & Treacy, S. *AIDS Care*. (in press).

Appendix 2 Research instruments used and developed by the NTORS team

A structured questionnaire of approximately 1-hour was developed to collect information from clients participating in NTORS. The questionnaire included standardised and new measures including drug and alcohol use and related problems, personal/social situation, physical and psychological health symptoms, criminal behaviour and recent treatment and support contacts. The NTORS team provided training in the administration of the interview to treatment agency staff and to the independent field interviewers who carried out the follow-ups.

As part of the project, and based upon the NTORS research interviews, a brief questionnaire was developed. This was designed as a core research instrument and to be a resource for treatment services wishing to undertake outcome studies of people with drug and alcohol problems. It measures problems in four domains: substance use, health risk behaviour, physical and psychological health, and personal/social functioning. For most clients, the interview completion time is approximately 12 minutes. The MAP is a public domain research instrument and may be used free of charge for not-for-profit applications. The MAP questionnaire may be downloaded from the NTORS website.

Appendix 3 Urine Analyses: Self-Reported Drug Use and Concordance rates

Urine screening for illicit drug use was conducted at treatment programmes randomly selected on a one-in-two basis. Urine samples were taken both at treatment intake and at one year follow-up. Assays for opiates, amphetamines and cocaine metabolite were carried out using homogenous enzyme immunoassay procedures (EMIT). Opiate class positive analyses were characterised for morphine, codeine and dihydrocodeine using thin layer chromatography. The results of the urine analyses provide supportive evidence for the validity of the self-reported drug use. Clients were asked about their use of drugs during the previous 48 hours and these data were compared with the results of the urine tests. The rate of concordance between self reported use and urine results for heroin, cocaine, and amphetamines was 92%. Of the samples taken from clients who provided a urine specimen and who reported not using heroin, cocaine or amphetamines, only 2–3% tested positive for these drugs.

More information about NTORS is available at our website

www.ntors.org.uk

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