

Treating drug misuse problems: evidence of effectiveness



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Glossary

Adrenergic	A drug or chemical with a similar effect to adrenaline.
Agonist	A drug that binds to a receptor cell, triggering a response. The opposite of an antagonist.
Antagonist	A drug that binds to a receptor cell and inhibits the normal physiological reaction of a receptor cell. The opposite of an agonist.
Arrhythmias	Condition in which the muscle contractions of the heart are irregular, faster or slower than normal.
Backloading	Transferring a portion of a drug solution from one syringe into another.
Dysphoria	An emotional state characterised by anxiety, depression or unease.
Hepatic fibrosis	Formation of excessive fibrous tissue in the liver.
Hepatotoxic	Toxic or destructive to the liver.
Meta analysis	A method of analysis which combines the results of a number of surveys to investigate the underlying processes.
Naltrexone	An opioid receptor antagonist, used primarily in the management of alcohol and opioid dependence.
Opioid	A group of synthetic drugs with similar effects to opiates. Examples are methadone and buprenorphine.
Pharmacotherapy	Treatment of a disease with drugs.
Psychopathology	Manifestation of behaviours that may be indicative of mental illness or psychological impairment.
Psychopharmacology	Study of the effects of any psychoactive drug that acts upon the mind by affecting brain chemistry.
Seroconversion	Formation of antibodies in blood serum as a result of infection or immunisation.
Seropositive	Showing a positive reaction to a test on blood serum, for a disease; exhibiting seroconversion.
Viraemia	The presence of a virus in the bloodstream.

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Introduction

Evidence of effectiveness

Drug misuse treatments can be effective in reducing drug use and other problem behaviours. This is shown by studies conducted over the past three decades. These studies have compared treatment to no treatment (or minimal treatment), and pre-treatment to post-treatment problem behaviours. Studies showing the effectiveness of drug misuse treatments have been conducted with clients with different types of drug problems, different treatment interventions, and in different treatment settings (e.g. Hubbard *et al*, 1989, 1997; Ward *et al*, 1998; Institute of Medicine, 1990; Simpson *et al*, 1999; Sorensen and Copeland, 2000; Gossop *et al*, 2003; Hser *et al*, 2005).

A comprehensive and detailed review concluded that drug misuse treatment is effective in terms of reduced substance use; improvements in personal health and social functioning; and reduced public health and safety risks (McLellan 1997).

The commitment to evidence-based treatment is a commendable aspiration and has obvious benefits. It should, however, be recognised that although there are areas of treatment where evidence is available to guide decisions about treatment provision, in other areas the available research evidence is insufficiently strong for this. And in yet other (often important) areas of treatment, research evidence is lacking. In the absence of research evidence, decisions about the provision of treatment must be made according to criteria other than those of empirical research.

A meta analysis of 78 studies of drug treatment investigated outcomes among clients who received drug treatment with outcomes among clients who received either minimal treatment or no treatment (Prendergast *et al*, 2002). The effects of treatment for drug use and crime outcomes were positive, significant, and clinically meaningful. The authors concluded that drug misuse treatment has been shown to be effective in reducing drug use and crime, and that it may be more appropriate to stop asking whether treatment for drug abuse is effective, and instead to ask how treatment can be improved, and how it can be tailored to the needs of different clients.

A principal aim of drug treatment research is to provide evidence to improve the effectiveness of treatments for problem drug users. Relevant evidence that can be used to improve treatment and patient outcomes requires more than studies of efficacy for specific procedures. The therapeutic process consists of more than just a clinical intervention. Evidence is also required about the nature and severity of client problems, about the processes which occur during treatment, about the role of staff competence and skills, and about the organisation and provision of services.

Levels of treatment

Drug treatments can be conceptualised in terms of interventions, programmes and modalities. Interventions consist of specific change techniques, some of which directly address drug use, such as drug testing, drug counselling, and relapse prevention training, while others are directed at other problems, such as social skills training, family therapy or primary medical care. Some interventions have been extensively studied for their effectiveness, whereas others have received only limited attention.

In practice, most programmes deliver a combination of interventions. Programmes may also be classified in terms of treatment modalities. Treatment modalities are categories of treatment classified according to important characteristics of individual treatment programmes (e.g. methadone maintenance, therapeutic communities). A further distinction should be made between the content of treatment (through specific interventions) and treatment services. In addition to treatment interventions, treatment services consist of the totality of treatment input, which includes facilities, staffing, accessibility, budget, client eligibility criteria, other operational policies and procedures.

Drug users present to treatment with complex mixtures of substance use and other problems, and treatment interventions should be appropriately responsive to the needs of individual drug misusers. The range and severity of these problems present challenges for services which have responsibility for their management and treatment. The nature, severity and complexity of their problems are likely to affect the ways in which treatment is provided.

Many attempts have been made, with limited success, to predict post-treatment outcomes in terms of patient variables at the start of treatment. However, there are some variables that have been found to be associated with poor post-treatment outcome, including: more frequent pre-treatment use of drugs, greater severity of dependence, psychiatric problems, a diagnosis of antisocial personality, and lack of family and social supports (McLellan *et al*, 1983; Rounsaville *et al*, 1986; Alterman and Cacciola 1991; Alterman *et al*, 1993; Havassy, Wasserman, and Hall, 1995).

The main outcomes according to which the effectiveness of treatment is usually measured are: substance use behaviour (including substance type, frequency and quantity of use), health (psychological and physical health problems) and social functioning (employment, accommodation, crime).

Multiple substance use

Most problem drug users report multiple drug use, and multiple problem areas. The severity of drug problems, including type of drug(s) used, duration of use, and route of administration, can all have an impact upon the options for change.

Heroin is the most frequently reported main-problem drug among drug users in UK treatment services, though cocaine, amphetamines and benzodiazepines are also widely used (Strang *et al*, 1994; Gossop *et al*, 1998). The use of crack cocaine and associated problems are increasingly found in drug treatment populations (Gossop *et al*, 2002).

Polydrug use may include problematic patterns of drinking. More than one third of the National Treatment Outcome Research Study (NTORS¹) clients who were drinking at intake to treatment reported problematic drinking (Gossop *et al*, 2000). In the US, between 20-50 per cent of drug users in treatment are problematic drinkers (Belenko, 1979; Hunt *et al*, 1986; Joseph and Appel, 1985; Hubbard *et al*, 1989; Lehman and Simpson, 1990).

Alcohol misuse

Alcohol problems are often underrated and neglected in the treatment of drug addiction. Alcohol is among the most frequently reported “secondary” substance problem among drug addicts, and alcohol abuse is often reported by drug misusers after treatment for drug addiction problems (De Leon, 1989; Lehman and Simpson, 1990; Gossop *et al*, 2000). Some forms of drug misuse, e.g. cocaine, are often closely associated with heavy drinking (Gossop, Manning and Ridge, 2006).

Heavy drinking may aggravate other drug problems, and adversely affect treatment outcomes (Kreek, 1981; McLellan, 1983; Joe *et al*, 1991; McKay *et al*, 1999). Heavy drinking is especially risky for the many drug injectors who carry the hepatitis C virus. Drug users with multiple substance use problems may require special treatment planning (Strain, Brooner and Bigelow, 1991).

Drinking outcomes after treatment for drug addiction are often poor with many drinkers making little or no change in their pre-treatment drinking (Gossop *et al*, 2000). In this respect, the NTORS results are consistent with those from the major US treatment outcome studies (Simpson and Lloyd, 1981; Lehman and Simpson, 1990; Hubbard *et al*, 1989). Drug users who were alcohol-dependent and those who were non-dependent drinkers have been found to differ both in their response to treatment and in their treatment outcomes (Chatham *et al*, 1997). It has been suggested that drinking problems have been given insufficient attention in the treatment of illicit drug misusers, and that efforts should be made to develop and strengthen the assessment and treatment of drinking problems among drug misusers (Gossop *et al*, 2000).

Social problems

Drug misusers often present to treatment with social behaviour problems. Such problems may include homelessness, histories of physical and sexual abuse, unemployment, poor educational attainment and poverty. Among the most conspicuous of the social behaviour problems is involvement in crime. High rates of criminal behaviour are common among drug-dependent patients. The most common types of crime often involve some form of theft linked to the need to obtain drugs. One of the most frequent offences is shoplifting (Stewart *et al*, 2000). High rates of criminal behaviour are reflected in similarly high rates of contact with the criminal justice system. This criminality and the associated demands upon the criminal justice system represent a considerable burden for society.

Substantial reductions in the most common forms of income-generating crime such as shoplifting, other forms of theft, burglary and robbery have been found during and subsequent to drug misuse treatment (Hubbard *et al*, 1989, 1997; Ball and Ross 1991; Marsch 1998; Simpson *et al*, 2002).

In NTORS, there were substantial reductions in the numbers of crimes at one-year follow-up, and these reductions were maintained through to four to five years (Gossop *et al*, 2003). Reductions were found both for acquisitive crimes and for drug-selling crimes. Reductions in crime were found both for self-reported offending behaviour and in terms of reduced criminal convictions (Gossop *et al*, 2005).

Psychological health problems

Psychological and psychiatric disorders often occur in conjunction with drug misuse problems. Anxiety and depressed mood are more prevalent among drug users in treatment than in the general population (Kessler *et al*, 1994; Farrell *et al*, 1998). In some studies, around half of opioid- or cocaine-dependent drug users in treatment report a lifetime depressive episode, while a third may have depressed mood at intake to addiction treatment (Kleinman *et al*, 1990a). In a national study of treatment admissions in the United States, depending on the treatment modality, between a quarter and a half of the sample reported depressive and suicidal thinking (Hubbard *et al*, 1989).

High psychiatric symptom levels have been found at intake to treatment among drug misusers admitted to treatment programmes across England, with about one in five having previously received treatment for a psychiatric health problem other than substance use (Marsden *et al*, 2000).

1 The National Treatment Outcome Research Study (NTORS) was commissioned by a Government Task Force and was funded by the Department of Health to investigate the outcomes over a five-year period of more than a thousand people treated for drug-dependence problems in 54 treatment agencies across England. NTORS provides considerable evidence relating to the effectiveness of national treatment programmes and is cited throughout this review.

Blood-borne infections

Shared use of injecting equipment can lead to the transmission of HIV and other blood borne infections. In addition to the direct sharing of needles and syringes, injectors are at risk through indirect forms of sharing, such as “backloading”, as well as exposure to contaminated cookers, filters and rinse water (Gossop *et al*, 1994).

The problems associated with HIV infection among injecting drug users are well known. Hepatitis B (HBV) and Hepatitis C (HCV) infections are more prevalent amongst injecting drug users. Among opiate addicts in London, 86 per cent were found to be HCV seropositive and 55% were HBV seropositive (Best *et al*, 1999). In a study of opiate addicts attending a methadone treatment service, prevalence rates for markers of prior infection with HCV were found to be 80 per cent, and 50 per cent for HBV (Noble 2000). There was a strong association between number of years of injection drug use and hepatitis infection rates.

Mortality

Heavy drinking is a risk factor for mortality among HCV infected drug users because of its adverse effects upon the physical health of the user. For individuals chronically infected with HCV, even low levels of alcohol consumption are associated with increased risk of viraemia and hepatic fibrosis (Pessione *et al*, 1998).

Deaths among drug users have many causes, including accidents, suicide, violence, AIDS, various drug-related illnesses and other illnesses (Rivara *et al*, 1997; Rossow and Lauritzen, 1999; Hulse *et al*, 1999). Despite the greater awareness of HIV and AIDS as potential causes of death among drug users, drug overdose continues to be one of the most frequent causes of death in this group (Ghodse, 1978; Powis *et al*, 1999; Strang *et al*, 1999; Frischer *et al*, 1993). The mortality rate among the NTORS cohort was 1.2 per cent per year (Gossop *et al*, 2001). The majority of deaths (68 per cent) were associated with overdoses. Increases in overdose deaths have been reported among drug users in several countries in recent years (Neeleman and Farrell, 1997; Hall, 1999).

Although overdoses are commonly attributed to the use of opiates, they are more likely to involve the combined use of opiates and alcohol or other sedatives (Darke and Zador, 1996).

Drug overdoses may be taken either unintentionally or with suicidal intent, and, in this respect, overdoses may be related to psychiatric problems – especially to depressive disorders. About one third of the NTORS clients had thoughts of killing themselves at admission to treatment (Gossop *et al*, 1998). In a study of non-fatal overdoses, 10 per cent of heroin users reported taking a deliberate overdose (Gossop *et al*, 1996). It has been suggested that the distinction between accidental and intentional overdose is a precarious one (Farrell *et al*, 1996).

Pharmacotherapies

Methadone

Methadone treatments are the most widely used type of treatment for opiate addiction throughout the world (Kreek and Vocci, 2002).

Methadone clinics have higher retention rates for opiate-dependent populations than do other treatment modalities for similar clients. Although methadone dosages need to be clinically monitored and individually optimised, clients have better outcomes when stabilised on higher rather than lower doses within the typical ranges currently prescribed. Following discharge from methadone treatment, clients who stayed in treatment longer have better outcomes than clients with shorter treatment courses (Institute of Medicine, 1990).

Methadone maintenance treatment (MMT) has been extensively studied in different countries with different treatment groups, over a period of four decades. It is the most thoroughly evaluated form of treatment for drug dependence. In its summary of the extensive evaluation literature on MMT, the US Institute of Medicine report (1990a) concluded that MMT produces better outcomes on average in terms of illicit drug consumption and other criminal behaviour when compared to the following comparison groups: no treatment, detoxification-only, methadone reduction treatments (MRTs), programme expulsion or programme closure.

With regard to HIV/AIDS, MMT has been found to lead to reduced levels of HIV risk behaviours and to lower HIV seroconversion rates (Gibson *et al*, 1999; Marsch, 1998; Ward *et al*, 1998; Sorensen and Copeland, 2000). Among NTORS clients, injecting, sharing injecting equipment (and having unprotected sex) were all substantially reduced after treatment (Gossop *et al*, 2002).

In a meta analysis of methadone maintenance studies, results showed consistent, statistically significant associations between MMT and reductions in illicit opiate use, HIV risk behaviours and drug and property crimes (Marsch, 1998).

In practice, methadone treatments are extremely diverse. Programmes differ in structures, procedures and practice. Differences include: the number of patients treated, type and qualifications of staff, the amount and type of counselling and medical services provided, methadone doses, policies about urine testing, take-home methadone and many other aspects of treatment (Gossop and Grant, 1991; Ball and Ross (1991; Stewart *et al*, 2000b).

Dose

Clinics vary greatly in the average dose of methadone prescribed. Among patients admitted to NTORS methadone programmes in

1995, the average initial daily dose was 48mg: two thirds received methadone in doses of between 30-60mg; 20 per cent received doses of 60 mg or more, and 13 per cent received doses of 30mg or less (Gossop *et al*, 2001). Similar dosing variations have been reported in the United States (Strain, 1999).

In a randomised double-blind trial of moderate versus high-dose methadone, patients receiving doses of between 80-100mg showed greater reductions in illicit heroin use than the moderate dose group who received doses of between 40-50mg (Strain *et al*, 1999). Both groups showed substantial and significant reductions in illicit drug use compared to pre-treatment levels. There were no differences in treatment retention between the high-dose and moderate-dose groups. Among clients in NTORS, who received MMT, reductions in illicit heroin use were associated with higher methadone doses and retention in treatment (Gossop *et al*, 2001).

Comprehensive reviews of the research literature have investigated the relationship between methadone dose and treatment outcome (Cooper *et al*, 1983; Ward *et al*, 1992, 1998). These reviews concluded that treatment outcomes are improved when doses of 50mg or more are used, when compared to lower doses. They also concluded that there was no evidence to suggest that routine dosing at levels in excess of 100mg per day resulted in any benefit for the majority of patients, though relatively few studies of high dose treatment have been carried out.

Evidence from both randomised controlled trials and from observational studies showed better outcomes for patients in programmes where the majority of patients are maintained in the range of 50-100mg per day (Ward *et al*, 1998). However, it is possible that some patients may be successfully maintained on lower doses, especially if they are more highly motivated to change and more psychologically stable (Schut *et al*, 1973; Williams, 1971). As with other outcome measures, lower rates of HIV infection have been found to be associated with higher methadone doses and longer duration of treatment (Hartel and Schoenbaum, 1998).

Methadone reduction treatment

Methadone reduction treatment (MRT) has been widely used in the UK for many years (Seivewright, 2000). Typically, MRT involves prescribing methadone over relatively long periods of time, with the expectation that the dose will gradually be reduced, and that the patient will eventually be withdrawn from the drug and become abstinent from opiates.

MRT has similarities to programmes in other countries, such as the gradual methadone detoxification programmes (Senay *et al*, 1977), and the 90-day and 180-day detoxification programmes that have been implemented in the US (Iguchi and Stitzer, 1991; Reilly *et al*, 1995; Sees *et al*, 2000). These are sometimes referred to as “maintenance to abstinence” or “methadone to abstinence” programmes.

Several studies appear to show similar outcomes in terms of improvements in substance misuse and other problem behaviours after MMT or MRT (Strang *et al*, 1997; Gossop *et al*, 2000a). However, this may be due to similarities in the treatments received by patients, with the apparent similarity in outcomes being due to many reduction patients actually receiving some de facto form of maintenance. This “drift into maintenance” has been noted by Seivewright (2000).

In a further investigation of the methadone treatments actually received by patients, MRT was frequently found not to be delivered as intended (Gossop *et al*, 2001). Whereas the majority (70 per cent) of the patients allocated to MMT received maintenance doses, only about a third (36 per cent) of the patients allocated to MRT received reducing doses. Many patients who failed to receive MRT as intended appeared to have received some form of maintenance.

Where MRT was delivered as intended, it was associated with poor outcomes. For the patients who received MRT, the more reducing doses they received, the worse their outcomes. In particular, the more rapidly the methadone was reduced, the worse the heroin use outcomes. Studies in other countries have also found worse outcomes for patients receiving abstinence-oriented rather than indefinite maintenance (Capelhorn *et al*, 1994).

When methadone patients were randomised to MMT or to 180-day MRT, MMT produced significantly greater reductions in illicit opioid use (Masson *et al*, 2004). This finding has been supported by a broad review of the literature, which concluded that methadone maintenance leads to better outcomes in terms of illicit drug consumption and criminal behaviour when compared to methadone reduction treatments (US Institute of Medicine report, 1990a).

Supervised consumption

In the UK, there is a widespread practice of issuing prescriptions for methadone to be consumed without supervision. In many other countries maintenance drugs are usually (or always) consumed under direct supervision, and the option of take-home methadone is regarded as a privilege which is granted to those patients who have demonstrated their ability to avoid the use of illegal drugs, and achieve other improved outcomes. Evidence from studies in the US and other countries should, therefore, be interpreted with this in mind (i.e. that they are of methadone treatment under conditions of supervised consumption).

One consequence of issuing methadone to be taken without supervision is that there is an established illicit market involving the diversion and sale of methadone. Estimates of the proportion of drug users in methadone treatment who sell their prescribed drugs range from 5-34 per cent (Fountain *et al*, 2000). Almost

half of the drug users approaching the NTORS methadone programmes reported having used non-prescribed methadone in the 90 days prior to admission to treatment (Gossop *et al*, 1998).

Fewer GPs than clinics tend to prescribe methadone to be dispensed on a daily basis (Gossop *et al*, 1999). GPs were also less likely to use supervised dispensing procedures, either on site, or under the supervision of a retail pharmacist. GPs and clinics have also been found to differ in the forms of methadone prescribed to patients. Almost all patients in the clinics received oral liquid methadone. Among those being treated by GPs, about one in six received methadone in tablet form.

Supervised dispensing of methadone has also been found to vary markedly across the UK (Strang and Sheridan, 1998). This variation seems unsatisfactory.

There is broad agreement that the supervised consumption of methadone reduces diversion of the drug onto the illicit market (Roberts and Hunter, 2004). However, there is little direct evidence to show this effect. In a survey of drug user groups, there was an understanding that supervised consumption was an important component of safe, effective and responsible methadone prescribing, and users were generally willing to accept it (Stone and Fletcher, 2003).

Injectable methadone

The prescribing of injectable forms of methadone to opiate addicts dates back to the earliest years of the British drug clinic system. This practice is virtually unknown outside the UK.

During the mid 1970s, injectable methadone was the most frequently prescribed form of methadone within British addiction clinics (Mitcheson, 1994). A 1995 survey (Strang and Sheridan, 1998) found that 10 per cent of all methadone prescriptions to addicts were for injectable methadone (Strang *et al*, 1996).

One study found that over one-third of opiate addicts, when given the choice, preferred injectable methadone to injectable diamorphine (Metrebian *et al*, 1998).

A study of opiate addicts who received prescriptions for injectable opiates (either injectable heroin or injectable methadone) found that although patients were satisfactorily retained in treatment, there was little evidence of changes in injecting behaviour, with some patients continuing to use risky injecting practices (Battersby *et al*, 1992). In addition, the stability of the lives of 20 per cent of the sample deteriorated, though more than a third of the sample were rated as having made positive life changes during the study period. The results were inconclusive with regard to either benefit or harm as a result of this intervention.

In an open clinical study, long-term opiate-dependent patients who had failed to benefit from standard treatment (usually oral methadone) were prescribed injectable methadone (Sell *et al*, 2001). Lower levels of injecting- and sexual-risk behaviour were reported during treatment. A troubling observation from this study was that many patients injected their prescribed drug into a femoral vein (groin injecting), and did not rotate injecting sites.

A randomised clinical trial that compared the treatment response of opiate-dependent outpatients to supervised oral versus supervised injectable methadone maintenance treatment found that both groups showed significant reductions in drug taking and other problem behaviours at follow-up (Strang *et al*, 2000). Patients who received injectable methadone maintenance reported higher levels of treatment satisfaction than the oral maintenance patients. The costs of providing injectable methadone were estimated to be about five times greater than those for oral methadone.

Heroin

Few British opiate addicts currently receive a prescription for injectable heroin. Most doctors holding a licence to prescribe heroin regard this as being appropriate only for a minority of cases (Sell *et al*, 1997).

Early UK studies of heroin prescribing (Hartnoll *et al*, 1980; Gossop *et al*, 1982; Battersby *et al*, 1992; Metrebian *et al*, 1998) showed no clear or consistent benefits. For example, in a comparison of oral methadone and injectable heroin prescribing, the results showed no clear overall superiority of either approach (Hartnoll *et al*, 1980).

In a recent Swiss trial, patients were stabilised on (typically) doses of between 500-600mg heroin daily. Oral methadone was also prescribed if the user was not able to, or did not wish to, attend the clinic to take their heroin. Injections of heroin were administered under supervision, and could not be taken home. In addition to injectable heroin, the treatment intervention package involved the provision of counselling and other forms of psychosocial care. Patient recruitment, treatment retention and treatment compliance were better among the patients receiving injectable heroin than for those on oral methadone (Uchtenhagen *et al*, 1999).

Reductions in the use of illicit heroin and cocaine were found among those receiving prescribed heroin, though reductions in the use of other illicit drugs were less marked. The use of non-prescribed benzodiazepines decreased only slowly, and alcohol and cannabis consumption hardly declined at all. There were reductions in criminal activity. In some cases, improvement occurred very soon after the beginning of treatment. In other cases, improvements were not seen until after several months of treatment.

A more recent trial in the Netherlands (van den Brink *et al*, 2002) evaluated the effects of a 12-month maintenance treatment with oral methadone and co-prescribed heroin, compared to a standard maintenance treatment with oral methadone alone. The study population consisted of chronic, treatment-resistant heroin addicts in methadone programmes. Patients prescribed heroin showed improvements in physical health, mental status and social functioning. Improvements often occurred early in treatment. Surprisingly, retention rates after 12 months were higher among the methadone-only group (86 per cent) than among those receiving heroin (70 per cent).

Buprenorphine

Buprenorphine is a mixed agonist-antagonist. It is readily absorbed through oral membranes if given sublingually. A potential advantage of buprenorphine is that it can be taken once every two or three days with little loss of pharmacological effectiveness.

High dosage sublingual buprenorphine was approved in France in 1996 as a maintenance treatment where it is prescribed mainly in primary care services (Barrau *et al*, 2001; Thirion *et al*, 2002). One recent estimate suggested that the number of patients receiving buprenorphine maintenance in primary care settings may have increased to around 80,000 at the end of 2000 (Vignau *et al*, 2001). The majority of these patients received the drug on a long-term maintenance basis (Fhima *et al*, 2001).

Buprenorphine has been found to be at least as effective as methadone as a maintenance agent in terms of reducing illicit opioid use and retaining patients in treatment (Mattick *et al*, 1998; Johnson *et al*, 2000). Buprenorphine is safer than methadone in terms of the risk of overdose since it produces relatively limited respiratory depression, and is well tolerated by non-dependent users. Cardiac arrhythmias have been reported both for methadone and LAAM (a methadone alternative), but not for buprenorphine (Krantz and Mehler, 2004).

The mixed agonist-antagonist action of buprenorphine may also lead to less severe withdrawal than heroin or methadone (Kosten *et al*, 1992). Buprenorphine has been used both on its own and in combination with other drugs in the management of opiate withdrawal symptoms. In an open-label trial, opiate-dependent patients who were allocated to receive buprenorphine detoxification reported less severe withdrawal symptoms and were more likely to complete detoxification than others who received lofexidine (White *et al*, 2001).

Naltrexone and naloxone

Naltrexone is a long-acting opioid antagonist (which may be administered orally, or as an implant) and that prevents opiate agonists (such as heroin) producing euphoria and other opiate effects (Martin *et al*, 1973; O'Brien *et al*, 1975). Naltrexone can be

used to speed up withdrawal treatments. It also has a potentially important role in helping to prevent relapse (Mello *et al*, 1981).

In principle, naltrexone pharmacotherapy provides an almost ideal treatment for opiate addiction. Naltrexone selectively competes for opioid receptors, prevents reinforcement from opioids, and prevents a return to physical dependence. Naltrexone is orally active, potent, and can be administered on a three times a week schedule. Because it does not produce a "high", it has little abuse potential and raises few problems of diversion (Kleber *et al*, 1985).

It generally has few side effects at a recommended dose (of 50mg per day), though some detoxified heroin addicts report unpleasant withdrawal-like effects such as dysphoria, loss of energy, depression and gastrointestinal symptoms (Crowley *et al*, 1985; Hollister *et al*, 1981).

Despite its promise, naltrexone has not lived up to its early expectations and has had little impact on the day-to-day clinical management of heroin addiction. Since naltrexone is an expensive drug its cost may be an obstacle where financial resources are limited. Perhaps more importantly, the majority of drug-dependent patients are reluctant or resistant to taking naltrexone. Among treatment-seeking opiate addicts, few tend to be willing to accept naltrexone (Greenstein *et al*, 1984).

There is also a problem of high drop-out rates from naltrexone treatment (Greenstein *et al*, 1981; National Research Council Committee on Clinical Evaluation of Narcotic Antagonists 1978). In a recent Australian study, 30 per cent of a sample of opiate users were willing to accept naltrexone treatment: of these fewer than one third remained in treatment for a 12-week programme (Tucker *et al*, 2004).

Compliance rates may be improved when naltrexone ingestion is linked to a contingency management schedule (Grabowski *et al*, 1979; Rounsaville, 1995).

Naltrexone has been found to work well with highly motivated opiate-dependent patients, and with those with good social integration and social resources (O'Brien, 1994; Tennant *et al*, 1984; Washton *et al*, 1984; Ling and Wesson, 1984).

Concern has been expressed about naltrexone's possible hepatotoxicity (Maggio *et al*, 1985; Pfohl *et al*, 1986). There is a need for caution when naltrexone is used in the treatment of addiction, since many addicts have liver disease associated with viral hepatitis infections. If naltrexone is given to addicts with minor abnormalities in liver function, baseline laboratory tests should include a full battery of liver function tests and regular retesting (O'Brien and Cornish, 1999). Naltrexone-related transaminase elevations (a biochemical indicator of impaired liver function) have not usually been observed at lower doses and with drug addicted patients (Marrazzi *et al*, 1997).

The prescription of naltrexone is unlikely to be effective as a stand-alone treatment and is recommended as part of a broader treatment programme (Resnick *et al*, 1979; O'Brien and Cornish, 1999; Rounsaville, 1995).

Antagonist drugs such as naloxone can be made available to opiate misusers as a public health measure to reduce the risks of fatality after opioid overdose. Drug misusers have expressed favourable attitudes towards the distribution of naloxone, and the majority of those who had witnessed an overdose fatality would have been willing to administer naloxone if it had been available (Strang *et al*, 1999). This study estimated that at least two-thirds of witnessed overdose fatalities could have been prevented by administration of home-based supplies of naloxone, and recommended the implementation of a trial of naloxone distribution. Descriptive reports of two pilot projects involving take-home naloxone suggest that naloxone is used appropriately in cases of overdose and can save lives (Dettmer *et al*, 2001).

Prescribing stimulants

Amphetamine prescribing has been tried at several specialist centres with some monitoring of practices and outcomes (Fleming and Roberts, 1994; Myles, 1997). Amphetamine prescribing also sometimes occurs in general practice. It has been estimated that as many as 900-1,000 patients in the UK were receiving some form of amphetamine maintenance treatment (Strang and Sheridan 1997), which makes stimulant prescribing approximately three times more prevalent than heroin prescribing.

The prescription of stimulants for maintenance purposes is a contentious procedure about which little is known. Early attempts to treat stimulant misusers with prescribed ampoules of methamphetamine were regarded as "mostly ineffectual" and a "therapeutic failure" (Mitcheson *et al*, 1976; Gardner and Connell, 1972).

It has been suggested that prescribing should be time-limited and restricted to primary amphetamine users with heavy and problematic use (Flemming, 1998). In the past prescribing has involved dispensing dexamphetamine as an oral elixir several days a week.

When a treatment group who received dexamphetamine was compared with a control group, amphetamine prescribing appeared to increase treatment contact and retention (McBride *et al*, 1997). The treatment group used less illicit drugs and showed reductions in injecting activity during treatment.

In Australia, low, oral doses of dexamphetamine have been prescribed with few reported adverse effects (Shearer *et al*, 2001). This treatment has led to satisfactory treatment retention and compliance in the amphetamine group, with patients being more likely to attend counselling sessions and to attend more sessions than the control group.

Psychological treatments

A range of treatments have been developed based upon the assumptions, theories and research traditions of psychology, and especially of social learning theory. These are variously referred to as cognitive-behavioural treatments or psychosocial treatments.

Motivational Interviewing

Motivational Interviewing (MI) was originally used with problem drinkers (Miller 1983), but it has also been applied to the treatment of illicit drug misuse.

Many treatments for drug addiction presume a prior commitment to change on the part of the drug user. MI assumes that the drug user in treatment is ambivalent about their drug taking behaviour, and MI sees itself as "an approach designed to help clients build commitment and reach a decision to change" (Miller and Rollnick, 1991).

MI is seen primarily as a counselling *style* rather than a treatment procedure (Rollnick, 2001). It is believed to be a useful tool in many stages of treatment, particularly where drug users are still in the early stages of committing themselves to treatment or to changing their behaviour. It has been found to be more beneficial for patients with lower initial motivation for treatment than for patients with higher initial motivation (Rohsenow *et al*, 2004).

Promising results have been obtained in the treatment of different patient groups. In a comparison of a standard assessment to an enhanced assessment plus Motivational Interviewing session, drug users who received MI were more likely to attend subsequent treatment sessions (Carroll *et al*, 2001). When opiate addicts attending a methadone clinic were allocated to either a motivational interview or a control group, the motivational group showed more commitment to treatment goals and more compliance with treatment requirements. They also reported fewer opiate related problems and fewer relapses (Saunders *et al*, 1995).

Cocaine-dependent outpatients with depression were more likely to remain in treatment, complete the programme and have fewer post-treatment psychiatric problems after MI treatment than a "treatment as usual" programme (Daley *et al*, 1998). Amphetamine misusers randomly assigned to MI plus skills training were more likely to become abstinent or to show greater reductions in drug use than those assigned to a control (self-help booklet) group (Baker *et al*, 2001). Adults seeking treatment for cannabis problems showed greater reductions in drug use and drug-related problems after MI than in a delayed-treatment control condition (Stephens *et al*, 2000). In a study of drug misusers who received court orders to undergo treatment, those who received MI were more likely to attend treatment sessions and to complete the programme (Lincourt *et al*, 2002).

Not all studies have reported positive results. In a study of drug misusers seeking treatment, a brief manual-guided motivational interviewing intervention failed to show any effect when added to standard treatments (Miller *et al*, 2003).

A systematic review of 29 randomised trials of MI interventions applied to four behavioural domains (substance misuse, HIV risk behaviours, smoking, and diet and exercise) found improvements in at least one of these areas, in 60 per cent of these studies (Dunn *et al*, 2001). When MI was used with substance misusers, nearly three-quarters of the studies (11/15) showed significantly improved outcomes. A meta analysis of controlled trials also found that interventions using adaptations of MI were superior to no-treatment and placebo comparison groups in terms of reduced substance misuse problems, but not for reductions in HIV risk behaviours (Burke *et al*, 2003).

In a recent and comprehensive meta analysis of 72 clinical trials spanning a range of problems, Hettema *et al* (2005) found that MI interventions had frequently improved outcomes, both when provided as stand-alone treatments and when added to other treatments. However, they also noted that MI did not consistently lead to improved outcomes, and that the effectiveness of MI was highly variable across treatment providers, populations, target problems and settings. As with other treatments, the “effective components” of MI are not well understood. Interestingly, the number of MI-specific treatment components was not related to treatment-effect size. Also, MI interventions were found to be less effective when manual-guided.

Cue exposure

Cue exposure methods that are based on a classical conditioning model of learning have been advocated as a potentially effective means of treating addictive behaviours (Heather and Bradley, 1990; Drummond *et al*, 1995; Conklin and Tiffany, 2002).

Drug use and relapse are often strongly influenced by social and environmental stimuli which have been conditioned to different aspects of their drug-taking behaviours. These conditioned stimuli will elicit conditioned responses, which in turn are likely to lead to drug seeking and drug taking, and which may be experienced by the user as “craving”. Use of illicit drugs during treatment is often related to exposure to drug-related cues and to associated urges to use drugs (Unnithan *et al*, 1992).

Typically, cue exposure treatments involve repeated unreinforced exposure to drug-related stimuli in an attempt to extinguish conditioned responses to such cues. This technique has been utilised in treatments for users of opiates, cocaine, alcohol and nicotine. Treatment may involve exposure to the same drug-related cues that drug misusers would encounter in real life, such as needles and syringes, and the drugs themselves

(Childress *et al* 1984; Childress *et al*, 1986; McLellan *et al*, 1986). Exposure may also involve using symbolic or cognitive cues (imagining being offered drugs, or looking at photographs or videotapes of drug taking) in the absence of drug ingestion.

Cocaine addicts have been found to show significant decreases in subjective and physiological reactivity to cocaine related stimuli following systematic non-reinforced exposure to drug cues (O’Brien *et al*, 1990). In studies of drug users who were dependent upon cocaine, significant responses to cocaine-related cues were found after 28 days’ cue exposure treatment (Childress *et al*, 1988). In work with methadone-maintained opiate addicts, tolerance of subjective craving has been shown among those who received cue exposure treatments, with improved clinical outcomes at follow-up. (Childress *et al*, 1984 and 1988).

Such effects do not always transfer readily to a clinical setting. In a randomised clinical trial of cue exposure treatments for heroin addicts, cue exposure, provided in six sessions over a period of three weeks, produced no more improvement in outcomes than a standard treatment-as-usual condition (Dawe *et al*, 1993). The cue exposure group and the standard treatment group showed substantial but similar levels of reductions in cue reactivity after treatment.

Drug-related cues do not reliably lead to conditioned responses. Subjective and physiological reactivity to drug-related cues has been found to vary both within and across studies (Modesto-Lowe and Kranzler, 1999). About one third of a sample of cocaine-dependent patients were found to show no craving response to drug-related cues, and a further 16 per cent of those who did respond to such cues showed no increase in their levels of craving (Avants *et al*, 1995).

Cue reactivity may not be predictive of future substance use behaviours. In a study of cue exposure with heroin addicts, no relationship was found between measures of craving taken prior to and after cue exposure treatment, and post-treatment drug use outcomes (Powell *et al*, 1993).

The literature remains inconsistent regarding the extent to which cues elicit craving responses, and the relationship of cue reactivity to subsequent substance use. In a meta analysis of 18 cue exposure studies, there was little evidence to support the effectiveness of cue exposure for the treatment of drug dependence (Conklin and Tiffany, 2002).

Contingency management

Contingency management provides a system of incentives and disincentives that are designed to make continued drug use less attractive and abstinence more attractive, with consequences made contingent upon behaviour (Stitzer *et al*, 1989; Robles *et al*, 1999).

Different types of reinforcers may be used in contingency management programmes to promote a desirable change in behaviour. In addiction treatment, these have often included changes in take-home methadone privileges (Iguchi *et al*, 1996), the offer of money or vouchers with a monetary value (Hall *et al*, 1979), and increases or decreases in methadone dosage (Stitzer *et al*, 1986). In a study of patients' preferences, take-home doses and increases in methadone dose were rated as the most preferred reinforcers (Chutuape *et al*, 1998). Monetary incentives have also been used to improve treatment outcome behaviours among drug-dependent patients (Silverman *et al*, 1996).

Contingency management has been found to be useful for extinguishing negative or undesirable behaviours such as continued polydrug taking, or failure to comply with basic treatment standards, as well as a means of encouraging positive behaviours, such as engagement with treatment services or good time keeping.

Some contingency management programmes have used positive reinforcement alone. Others have used mixed positive and negative reinforcement schemes. A comparison of positive or negative reinforcement found that both were equally efficacious in reducing drug use, although the use of positive incentives was found to retain drug users in treatment for longer periods (Iguchi *et al*, 1988).

Research has shown that contingency management techniques can be effective in reducing continued drug misuse among methadone patients (Strain *et al*, 1999), including their use of cocaine (Kidorf and Stitzer, 1993; Silverman *et al*, 1996), and benzodiazepines (Stitzer *et al*, 1982). Many contingency management interventions have been conducted with patients in methadone treatment programmes since methadone dose, dosing frequency, or the take-home option, lend themselves readily for use as reinforcers.

Incentives have been found to be effective in leading to increased attendance at counselling sessions. Methadone maintenance patients attended more counselling sessions when take-home methadone doses were contingent upon attendance than when they were offered non contingently (Stitzer *et al*, 1977) or when none were offered (Kidorf *et al*, 1994). A short-term contingency management programme led to increased full-day treatment attendance and abstinence from cocaine use among pregnant women in methadone programmes (Jones *et al*, 2001).

Vouchers have been found to be effective in reinforcing abstinence from cocaine among primary cocaine dependent outpatients (Higgins *et al*, 1994). Patients were randomly assigned to a behavioural programme, with or without an added abstinence reinforcement component contingent upon drug free urines. Patients in the voucher treatment group achieved more

consecutive weeks of cocaine abstinence than the no voucher group, and more of them remained in treatment. In a study in which cocaine abusing methadone patients were randomly assigned to receive voucher reinforcement contingent on cocaine abstinence or to a control group, patients receiving contingent vouchers stayed abstinent from cocaine for longer than patients in the control group (Silverman *et al*, 1996).

Contingency management has been found to be a useful treatment for "non-responsive" patients. Even with otherwise unmotivated patients, a substantial number can be helped to give up drugs when the reward value is sufficiently increased. For example, combining a high magnitude reinforcer (vouchers with a value of \$100) and a low response requirement (two days of abstinence) yielded cocaine abstinence initiation in approximately 80 per cent of the patients (Robles *et al*, 2000).

A meta analysis of 30 studies concluded that the most effective reinforcers for behaviour change in contingency management with drug users often involved increases in methadone dose and methadone take-home privileges (Griffith *et al*, 2000). Also, the length of time before the delivery of reinforcement was an important factor. Immediate and mixed (both immediate and delayed) intervals were found to lead to a greater treatment response than when rewards were delayed.

Contingency management interventions were most effective when they were directed towards changing the use of a single illicit drug, than when they were targeted towards reducing multiple drug use. Another factor related to the effectiveness of contingency management was the level of monitoring of the targeted behaviour. Where interventions were based upon illicit drug use, as monitored by the results of urine screening, the collection of three specimens per week was more effective than when fewer weekly urine specimens were collected.

Many studies failed to report whether other social support services were provided or made accessible, or the extent to which they were provided, if available. An important issue that requires further investigation is how contingency management might most effectively be incorporated with other psychosocial or pharmacological treatments.

Relapse prevention

Relapse is an important problem for all of the addictive disorders (Hunt *et al*, 1971; Marlatt and Gordon, 1985; Gossop *et al*, 1989a). In a study of opiate-dependent outpatients in a methadone detoxification programme, lapses to illicit opiate use were extremely common (Unnithan *et al*, 1992). Almost half (40 per cent) had lapsed to illicit opiate use within the first two weeks of starting the withdrawal programme and after only a small dose reduction had been achieved.

Relapse prevention (RP) combines behavioural skills training, cognitive interventions, and lifestyle change procedures (Marlatt

and Gordon, 1985). Its primary goal is to teach drug users who are trying to change their drug taking behaviour how to identify, anticipate and cope with the pressures and problems that may lead towards a relapse (Marlatt, 1985).

Three factors commonly found to be associated with relapse are cognitions, negative mood states and external (including interpersonal) events (Cummings *et al*, 1980; Bradley *et al*, 1989; Unnithan *et al*, 1992). Antecedents to lapse may also include subjective experiences of “urge” (sudden impulse to engage in an act) and “craving” (subjective desire to experience effects of a given act) (Heather and Stallard, 1989). The majority of lapses among heroin addicts occur in the company of drug takers, or in a social context related to drug taking (Gossop *et al*, 1989).

Drug misusers who managed to avoid a full relapse to heroin use after treatment have been found to make increased use of cognitive, avoidance and distraction coping strategies (Gossop *et al*, 2002). A further predictor of good outcome is the number of protective factors in the person’s environment; i.e. people, activities or social structures which were identified by the individual as being helpful to them in their efforts to stay off drugs (Gossop *et al*, 1990).

When three-month and six-month residential RP programmes were compared in a randomised trial, both were found to lead to significantly improved outcomes at follow-up. Results also suggested that continued treatment beyond three months appeared to be beneficial in terms of delaying time to first drug use (McCusker *et al*, 1995).

A comparison of a relapse prevention group with a Twelve-Step recovery support group for cocaine abusers in a 12-week treatment programme (Wells, Peterson, Gaaney, Hawkins, and Catalano, 1994) found participants in both groups reduced their cocaine and cannabis use, with no differential treatment effects on cocaine outcomes or retention.

Outcomes have been compared among cocaine-dependent drug misusers randomly assigned to group-based, or to individually-based RP (Schmitz *et al*, 1997). Significant and sustained improvements were found in addiction severity, craving for cocaine and coping behaviours, with no differences in outcome between the group and individual treatments.

A review of controlled clinical trials concluded that, for a range of different substances of abuse, there is evidence for the effectiveness of relapse prevention over no-treatment control conditions. RP was found to be of comparable effectiveness, but not superior to other active treatments (Carroll 1996).

Several areas have been identified in which relapse prevention may have particular promise. RP may reduce the intensity of relapse episodes if relapse occurs. Also, studies comparing RP to psychotherapy control conditions have found sustained main

effects or delayed emergence of effects for RP, suggesting that sustained or continuing improvement may be associated with the implementation of coping skills learned in RP treatment.

The evidence for patient-treatment matching is inconsistent. Several studies have suggested that RP may be more effective for more impaired substance abusers, including those with more severe levels of substance use, negative affect, and greater deficits in coping skills (Carroll, Nich, and Rounsaville, 1995; Carroll *et al*, 1991).

In a randomised controlled trial that evaluated the effectiveness of psychotherapy (either RP or supportive clinical management) and pharmacotherapy in the treatment of cocaine abusers, after 12 weeks of treatment, all groups showed significant improvement (Carroll *et al*, 1994). Higher severity patients had significantly better outcomes when treated with RP compared with supportive clinical management.

Drug users with depression also showed better treatment retention and cocaine outcomes when treated with RP compared to clinical management (Carroll, Nich, and Rounsaville, 1995). Although all groups sustained the gains they made in treatment, significant continuing improvement across time in continuous cocaine outcomes was seen for patients who had received RP compared with those who received clinical management (Carroll, Rounsaville, Nich, *et al*, 1994).

However, when randomly allocated to either structured RP or a Twelve-Step Facilitation aftercare programme, drug misusers reporting low levels of psychological distress at intake were found to maintain abstinence significantly longer than those with high distress after RP (Brown *et al*, 2002). Better outcomes were achieved when random assignment to aftercare was consistent with participant preference.

Twelve-Step treatments, residential rehabilitation and therapeutic communities

Twelve-Step treatments, residential rehabilitation, and therapeutic communities differ in several respects, but also share many common features. All owe their origins, to a greater or lesser extent, to the influence of Alcoholics Anonymous (AA), and they all share a common focus upon abstinence as the overriding goal of treatment. These treatments see recovery from addiction as requiring a profound structuring of thinking, personality, and lifestyle, and involving more than just giving up drug taking behaviour.

Narcotics Anonymous

Narcotics Anonymous (NA) is a direct descendant of Alcoholics Anonymous. The international expansion of NA led to a reported 26,000 NA groups in 64 countries in 1993 (DuPont and McGovern, 1994). NA may have a larger population of drug abusers involved in its programme than any other drug recovery initiative (Brown *et al*, 2001).

NA/AA and the Twelve-Step programmes are an important part of national addiction treatment provision. More than three-quarters (77 per cent) of the patients who were recruited from a standard hospital-based health service treatment facility were found to have previously attended NA or AA meetings (Best *et al*, 2001). Although about one in five had only ever attended one meeting, many had an extensive involvement (having attended, on average, more than 50 meetings). More than half of these patients had been referred to NA or AA by their GP, a specialist substance misuse service, or some other statutory NHS treatment service.

Despite the popularity of Twelve-Step treatments, and compared to some other addiction treatments, there have been relatively few systematic evaluations of the effectiveness of Twelve-Step treatments in general, and of NA in particular. Many people with drug misuse problems may also attend AA as well as NA because of the nature of their multiple (drug and alcohol) substance misuse problems, and also because of the wider availability of AA meetings and potential sponsors. The outcomes reported for NA may, therefore, also reflect the impact of other Twelve-Step organisations.

Two conceptually different features of Twelve-Step programmes are the mutual support network provided within the fellowship, and the philosophy of the programme. NA offers a peer group that can support efforts to achieve and maintain abstinence. NA provides a peer group that shares the same problems, but which actively supports the learning of new, prosocial behaviours, and is aggressively opposed to all forms of drug taking (Brown *et al*, 2001). This is a powerful asset for anyone seeking to recover from drug addiction (Gossop *et al*, 1990). The role-modelling

function of NA can be further assisted by the support, mentoring and policing offered by the sponsor.

Providing direction and support to other addicts as a sponsor in NA or AA has been found to be strongly associated with substantial improvements in sustained abstinence rates for the sponsors, though sponsorship itself was not found to improve outcomes for the persons being sponsored (Crape *et al*, 2002).

It is widely believed that Twelve-Step treatments are not acceptable to all drug users and that many drug users who are not actively involved with NA or Twelve-Step programmes are reluctant, or even resistant, to this approach. However, many drug misusers in NHS addiction treatment services have been found to hold positive views about NA and AA (Best *et al*, 2001). More than three quarters felt that NA and AA were at least partly suited to their current treatment needs, and only about one in five drug misusers were definitely resistant to the ideas and methods of the fellowship and the possibility of their own involvement with it.

There were marked differences in attitudes towards different Steps. Some Steps received broad levels of acceptance (Step 10), whereas others received much lower levels of agreement (Step 3). There was much more willingness to accept "personal responsibility" steps, than those which related to a "higher power".

Favourable outcomes may be less dependent on attendance at meetings than upon the extent to which those at the meetings embrace the philosophy (Morgenstern *et al*, 1997; Montgomery *et al*, 1995). Not surprisingly, it has been found that substance abusers with attitudes that are congruent with the Twelve-Step philosophy were more likely to participate in Twelve-Step activities during treatment (Quimette *et al*, 2001).

A relationship between frequency of NA or AA attendance and abstinence has been reported (Johnsen and Herring, 1993; Christo and Sutton, 1994), and an inverse association between NA attendance and drug-using outcomes (Fiorentine 1999; Christo and Franey 1995).

While weekly or more regular NA and AA attendance has been found to be associated with favourable substance use outcomes, less than weekly attendance appears to be no more effective than non-attendance (Fiorentine, 1999; Fiorentine and Hillhouse, 2000). Irregular attendance was found to be related to poorer outcomes than either regular or non-attendance, suggesting that there may be features of misaffiliation or incomplete affiliation that carry particular risks (McLatchie and Lomp, 1988).

Benefits of Twelve-Step affiliation have been reported among samples of drug abusers (Fiorentine and Hillhouse, 2000), and among alcohol and drug abusers combined (Christo and Franey,

1995; Ouimette *et al*, 1998; Toumbourou *et al*, 2002; McKay *et al*, 1994; Morgenstern *et al*, 1997).

Attendance and participation in Twelve-Step self-help groups during the week prior to treatment entry predicted likelihood of attaining abstinence during the first month of treatment (Weiss *et al*, 1996; Crits-Christoph *et al*, 1997).

A major study of drug use outcomes among cocaine-dependent patients studied Twelve-Step group attendance and participation (Weiss *et al*, (2005). This was a randomised, controlled study comparing different forms of psychotherapy and drug counselling. Participation in Twelve-Step groups was predictive of reduced drug use among cocaine-dependent patients. Active Twelve-Step participation by cocaine-dependent patients was found to be more important than meeting attendance, and the combination of drug counselling plus increasing Twelve-Step participation was associated with the best drug outcomes.

NA/AA has also been found to be effective as a complementary intervention. Contrary to the beliefs of some professionals, drug misusers frequently use both Twelve-Step and other types of drug treatment programmes as integrated services rather than as competing alternatives (Fiorentine and Hillhouse, 2000). Some studies have found favourable outcomes for those who attend NA/AA following other types of treatment (Fiorentine, 1999; Ouimette *et al*, 1998; Emrick, 1987) while others found no significant relationships between group attendance and favourable outcomes (Miller *et al*, 1992).

When initial treatment motivation was controlled for, patients enrolled in other forms of treatment, who also attended Twelve-Step programmes had better outcomes than those who had the other treatment alone (Fiorentine and Hillhouse, 2000). Such findings suggest that Twelve-Step programmes may be effective both as interventions in their own right but also that they can be utilised to supplement other forms of treatment to maximise the benefits accrued by patients.

Aftercare

The importance of post-treatment aftercare is widely accepted (Ouimette *et al*, 1998). The period immediately after leaving treatment is one of very high risk of relapse and adequate support should be provided for the patient during this period, so that the hard-won gains of treatment should not be lost (Gossop *et al*, 1989a). However, only a small minority of programmes have sufficient resources to provide any form of aftercare (Hubbard *et al*, 1989).

Because of its self-supporting nature, NA provides a form of aftercare at no cost to existing treatment services. Treatment programmes can make use of NA as an aftercare resource merely by recommending participation and encouraging their clients to attend meetings.

Ouimette *et al* (1998) investigated the impact of aftercare among substance abuse patients who chose to attend one of three types of aftercare groups (Twelve-Step groups only, outpatient treatment only, and outpatient treatment plus Twelve-Step groups) as well as patients who did not participate in aftercare. The patients who received no aftercare had the poorest outcomes. Patients who participated in the outpatient treatment plus Twelve-Step groups achieved the best outcomes at follow-up. In terms of the amount of intervention received, patients who had more outpatient mental health treatment, who attended Twelve-Step groups more frequently, or were more involved in Twelve-Step activities, had better outcomes.

Improved psychological health outcomes have been found to be associated with length of NA membership and duration of abstinence (Christo and Franey 1995; Christo and Sutton 1994). Drug misusers who attended NA and other Twelve-Step groups after treatment discharge have been found to show a greater decrease in drug use and related problems at one-year follow-up than patients who did not attend NA. Self-help group members also reported greater reductions in medical and alcohol problems (Humphreys, 2004), with both men and women deriving benefits of NA attendance (Hillhouse and Fiorentine, 2001).

Post-treatment NA involvement has been associated with reductions in drug use (McKay *et al*, 1994). Post-treatment Twelve-Step involvement has been found to be predictive of better outcomes for drug patients in a number of other large, prospective evaluation studies in the USA (Etheridge *et al*, 1999; Weiss *et al*, 1996, 2000; Humphreys *et al*, 1999b; Moos *et al*, 2001; Fiorentine, 1999; Fiorentine and Hillhouse, 2000).

In a study of HIV risk behaviour, NA involvement was found to be related to reduced needle-sharing and injection frequency, with decreases in risk behaviour among attenders being twice as large as those in non-attenders (Sibthorpe, Fleming, and Gould, 1994).

Residential rehabilitation programmes and therapeutic communities

Residential rehabilitation programmes are one of the longest established forms of treatment for drug addiction. Studies from the UK and the US have shown improved outcomes after treatment in residential rehabilitation programmes (Bennett and Rigby, 1990; Gossop *et al*, 1999; De Leon and Jainchill, 1982).

In DATOS, drug use outcomes after one year were good for clients who were treated in long-term residential and short-term inpatient treatment modalities in the US. Regular cocaine use (the most common presenting problem) was reduced to about one third of intake levels among clients from both the long-term and short-term programmes, as was regular use of heroin (Hubbard *et al*, 1997). Rates of abstinence from illicit drugs have also been found to improve after residential treatment. In the UK,

NTORS examined outcomes after discharge from 16 residential rehabilitation programmes. About half of the clients (51 per cent) had been abstinent from heroin and other opiates throughout the three months prior to follow-up. Rates of drug injection were also halved, and rates of needle sharing were reduced to less than a third of intake levels (Gossop *et al*, 1999).

In a naturalistic, multi-site evaluation of more than 3,000 men who received Twelve-Step, cognitive-behavioural, or combined Twelve-Step plus cognitive-behavioural treatments provided in 3-4 week inpatient programmes, all three treatments were found to be equally effective in reducing substance use and psychological symptoms. They were also equally effective at reducing post-treatment arrests and imprisonment (Ouimette *et al*, 1997; Moos *et al*, 1999; Finney *et al*, 2001). The casemix adjusted outcomes showed that the patients who received Twelve-Step treatments were more likely to be abstinent, free of substance abuse problems, and employed at one-year follow-up. The authors concluded that their findings provided good evidence of the effectiveness of Twelve-Step treatment (Moos *et al*, 1999).

Although there tends to be broad agreement between residential programmes on the general approach to treatment, they increasingly differ in their planned duration of treatment. At one time, traditional therapeutic communities (TCs) worked with planned durations of stay of two to three years (Cole and James, 1975). Traditional therapeutic communities often required at least 15 months in residence for graduation (DeLeon and Rosenthal 1979). Recent changes in client population and the realities of funding requirements have encouraged the development of modified residential TCs with shorter durations of stay.

In recent years, some TCs have modified their traditional approach and methods by supplementing a variety of additional services related to family, education, vocational training and medical and mental health (De Leon 2000). Modified TCs may work with a six- to nine-month programme, or a short-term programme of three- to six-months duration (De Leon, 2000). This has been accompanied by changes in the earlier balance of staff to include an increasing proportion of traditional mental health, medical, and educational professionals, who work alongside the recovered paraprofessionals (Carroll and Sobel, 1986; Winick, 1990-1991).

Evaluations have been conducted into TCs with programme durations varying from short-term with aftercare, to long-term programmes of over one-year duration. Improved outcomes were more likely to be found among patients who spent longer periods of time in treatment, with episodes of at least three months more likely to be associated with positive outcomes (Simpson, 1997). The reductions in illicit drug use that have been found after residential treatment have also been shown to be relatively robust, persisting across lengthy follow-up periods (Simpson *et al*, 1979; De Leon, 1989).

However, one issue which affects many research evaluations of residential programmes is that treatment drop-out is common. Typically, studies have reported that many patients leave treatment prematurely. De Leon (1985) reported that a quarter of TC clients left within two weeks and 40 per cent within three months. In common with outcomes from other treatment modalities, those clients who completed residential programmes achieved better outcomes on drug use, crime, employment and other social functioning measures (DeLeon, Janchill and Wexler, 1982; Hubbard *et al*, 1989).

Most of the evidence about the protective effect of drug abuse treatment against HIV infection has been based upon studies of methadone maintenance treatment (Sorensen and Copeland, 2000). Less is known about changes in health-risk behaviours after treatment in residential programmes. Reductions in drug injecting have also been found after treatment in both residential and outpatient treatment programmes (Hubbard *et al*, 1989). Reduced rates of HIV risk behaviour were found after patients were randomly allocated to treatment in one of two residential treatment programmes – a therapeutic community and a relapse prevention programme (McCusker *et al*, 1997). Both programmes produced reductions in injecting-risk and sex-risk behaviours.

The NTORS outcomes for injecting and sharing of injecting equipment showed that injecting, sharing injecting equipment, and having unprotected sex, were all substantially reduced one year after treatment entry (Gossop *et al*, 2002a). Of those drug users who were sharing needles or syringes at intake, less than 15 per cent had done so during the post-treatment follow-up period. Reductions were found among the drug users admitted to methadone treatment programmes and among those admitted to the residential treatments programmes.

Twelve-Step Facilitation programmes

A recent influential development has been the growth of relatively short-term, residential Twelve-Step Facilitation (TSF), “chemical dependency” or “Minnesota Model” programmes. These are generally closely linked to Twelve-Step principles of AA and NA, and they focus strongly upon recovery through abstinence. These programmes typically provide a highly structured three- to six-week package of residential care, which involves an intensive programme of daily lectures and group meetings designed to implement a recovery plan based upon the Twelve-Steps.

Although the Minnesota Model treatments share some structural characteristics with the therapeutic communities, there are important differences (Gerstein and Harwood, 1990). These programmes are similar to the TCs in that they are highly structured. Both during and after treatment, clients are often encouraged to attend AA and NA meetings. Among the differences are the relatively short duration of the residential component for Minnesota Model programmes, less involvement of clients in

routine “housekeeping” chores, and the greater use of professional or trained staff compared to the TCs, which rely more upon staff who are themselves “in recovery”.

In an early review (Cook, 1988) of the evidence for the effectiveness of Minnesota Model treatments, it was suggested that, despite some extravagant claims for the success of this form of treatment, there were few sound follow-up studies. Nonetheless, the review concluded that the available evidence was encouraging, with as many as two thirds of the clients treated in such programmes achieving significant improvements after treatment.

After randomly allocating drug misusers into either structured RP or a Twelve-Step Facilitation aftercare programme, an Alcoholics Anonymous approach to aftercare was found to provide favourable substance use outcomes for most groups of substance abusers (Brown *et al*, 2002). Women and individuals with a multiple substance abuse profile reported better alcohol outcomes with Twelve-Step Facilitation aftercare than their cohorts exposed to RP aftercare. Individuals with high psychological distress at treatment entry were able to maintain longer periods of post-treatment abstinence with TSF aftercare compared to their cohorts exposed to RP.

Casemix issues are important here because residential programmes often accept the most chronic and severely problematic cases (Gossop *et al*, 1998). Indeed, it is an explicit intention of stepped-care treatment approaches that residential services should be used for the more difficult cases (Sobell and Sobell, 1999; ASAM, 2001). In some instances, residential programmes have been designed to tackle such cases. For example, a residential treatment programme has been developed for homeless clients with mental illness and drug abuse problems, with results indicating significant improvements in mental health during treatment (Egelko *et al*, 2002).

Other interventions

Detoxification

Detoxification procedures are used to alleviate the acute symptoms of withdrawal from dependent drug use. Detoxification is a preliminary phase of treatments aimed at abstinence and represents an intermediate treatment goal.

Detoxification is not, in itself, a treatment for drug dependence, and is not effective on its own in producing long-term abstinence (Lipton and Maranda, 1983). Drug users who received detoxification-only treatment derived no more therapeutic benefit than formal intake-only procedures (i.e. with no specific treatment) (Simpson and Sells, 1983).

The criteria by which the effectiveness of detoxification should be judged are:

- acceptability (is the user willing to seek and undergo the intervention?),

- availability
- symptom severity
- duration of withdrawal symptoms
- side-effects (the treatment should have no side-effects, or only side-effects that are less severe than the untreated withdrawal symptoms)
- completion rates.

Detoxification has been tried in both residential and outpatient settings with the use of pharmacological agents and non-pharmacological interventions. It has been tried rapidly and slowly, and with and without counselling or other supportive services. In most heroin detoxification programmes, the withdrawal syndrome is treated with various drugs. Among those reported by Gowing *et al* (2000) are:

- methadone at tapered doses
- methadone at tapered doses plus adjunctive (additional) medication
- other opioid agonists
- clonidine, lofexidine
- other adrenergic agonists
- buprenorphine
- opioid antagonists alone or with miscellaneous adjunctive treatment
- opioid antagonists following or combined with buprenorphine
- opioid antagonists combined with clonidine
- opioid antagonists administered under anaesthesia or sedation
- hypnotic or anxiety-relieving drugs
- anti-depressant or anti-psychotic drugs
- drugs to modify receptor activity
- symptomatic medications.

Methadone detoxification treatments

One of the most commonly used procedures for the management of withdrawal from opiates involves gradually reducing doses of an opiate agonist, usually oral methadone (Kreek, 2000). In a residential setting, detoxification is often managed over periods of 10-28 days (Gossop *et al*, 1989b). Most treatments use a linear reduction schedule with regular, equal dose decrements. This leads to a significant suppression, but not elimination of withdrawal symptoms (Strang and Gossop, 1990).

The most widely used (and cheapest) option is outpatient (community) detoxification. However, consistently low completion rates have been reported for opiate-dependent patients detoxified

in outpatient programmes (Wilson *et al*, 1975; Maddux *et al*, 1980). The percentage of users treated as outpatients who achieve abstinence from opiates for even as little as 24 hours after treatment has been found to be as low as 17-28 per cent (Gossop *et al*, 1986; Dawe *et al*, 1991). This compares with completion rates for inpatient detoxification of between 80 and 85 per cent (Gossop *et al*, 1986; Gossop and Strang, 1991). The poor completion rates for outpatient detoxification may be largely due to problems of drug availability, and contact with other users and with neighbourhoods where drug use is prevalent (Unnithan *et al*, 1992).

Despite some enthusiasm for a more flexible and negotiable management of detoxification (ACMD, 1988), a study in which opiate-dependent outpatients were randomly allocated to flexible versus fixed detoxification schedules found no difference in retention rates between the two groups (Dawe *et al*, 1991).

One drawback of gradual methadone withdrawal is that it leads to a protracted residual withdrawal response, with withdrawal symptoms persisting well beyond the last methadone dose (Gossop *et al*, 1986, 1989b).

Clonidine and lofexidine

A group of drugs called alpha-2 adrenergic agonists, which include clonidine and lofexidine, have also been used in detoxification treatments. In both open and double-blind trials, clonidine has been found to produce a rapid and prolonged reduction of withdrawal symptoms (Gossop, 1988). Clonidine reduces withdrawal severity but does not completely eliminate symptoms, and in many studies, patients were given additional medication to modify residual symptoms.

When compared to existing methadone withdrawal procedures, clonidine and methadone produce broadly similar reductions in withdrawal symptoms. There are, however, differences in the pattern of withdrawal response to the two drugs. Patients experience more withdrawal symptoms in the first few days of clonidine treatment, whereas methadone patients experience more discomfort at a later stage (Gossop, 1988).

Lofexidine has comparable clinical efficacy to clonidine, but fewer side effects, particularly with regard to postural hypotension, a fall in blood pressure when the position of the body changes (Buntwal *et al*, 2000). A randomised double-blind study (Carnwath and Hardman, 1998) that compared the clinical response of low-dose opiate addicts to lofexidine and clonidine found that both drugs could be used successfully for outpatient detoxification, but that treatment with clonidine required more input in terms of staff time (Carnwath and Hardman, 1998).

Detoxification with lofexidine can be achieved over periods as short as five days (Bearn *et al*, 1998.) Encouraging results regarding the effectiveness of lofexidine are now available from a

number of studies, including double-blind, controlled clinical trials (Strang *et al*, 1999), and within the past decade, lofexidine has been increasingly widely used in detoxification programmes across the UK.

Rapid detoxification

Attempts have been made to develop rapid opiate detoxification regimens. One of the main pharmacological strategies for promoting rapid withdrawal from opiates involves the administration of opiate antagonists (naloxone and naltrexone) to precipitate an acute withdrawal state, which may then be attenuated by concurrent treatment with an alpha-2 agonist such as clonidine, benzodiazepine-induced sedation (Bearn *et al*, 1999) or a combination of the two.

Rapid detoxification has also been attempted while the patient is anaesthetised and mechanically ventilated. Very little controlled research has been carried out with such procedures, and there are serious concerns about the possible dangers of such treatments. When 106 heroin-dependent patients were randomly allocated to rapid detoxification under anaesthesia or to either a buprenorphine or a clonidine detoxification, the anaesthetic detoxification produced no reduction in symptom severity, nor any improvement in programme completion compared to the conventional treatments (Collins *et al*, 2005). The rapid anaesthetic detoxification was also associated with three life-threatening adverse events.

Any evaluation of detoxification treatments should take account of the intrinsically benign course of opiate withdrawal under conventional management (Bearn *et al*, 1999). At present, it is questionable whether the uncertain benefits of the procedure justify its use other than in a research setting (Strang *et al*, 1997).

Brief interventions

Brief interventions may have a potentially useful role with drug misusers by providing an acceptable option for individuals who would otherwise receive no assistance at all for their problems, either because they refuse referral to treatment, or who accept referral but subsequently fail to attend the service (Love and Gossop, 1985). Under these circumstances, the provision of a brief intervention is preferable to no therapeutic intervention (Heather, 1998).

The effectiveness of such interventions with illicit drug misusers is still somewhat uncertain. Brief interventions have been used mainly with cigarette smokers and heavy drinkers. Brief interventions can work but whether they actually work in day-to-day clinical practice depends upon the manner in which they are provided and the characteristics of patients and problems (Heather, 2002). It is not known to what extent brief interventions are applicable or effective with people who are long-term, dependent users of illicit drugs, often with co-dependence upon

other substances, and possibly with serious medical and mental health problems.

Brief interventions have been tried with drug misusers seeking treatment with varying results. In a study of outpatient drug misusers, a brief motivational intervention led to increased rates of abstinence from cocaine and heroin at follow-up (Bernstein *et al*, 2005). Baker *et al* (2005) reported increased rates of abstinence from amphetamine use after a brief cognitive-behavioural intervention with regular amphetamine users, though there were no treatment outcome effects for such other variables as crime, social functioning, health and HIV risk behaviours. Other studies have produced results ranging from improved treatment outcomes (Saunders *et al*, 1995, Stotts *et al*, 2001) to no effect (Miller *et al*, 2003).

One evaluation of a brief intervention for reducing risk behaviours associated with HCV transmission in injecting drug users randomly allocated users to an individually tailored brief behavioural intervention or a standardised educational intervention (Tucker *et al*, 2004). Significant reductions in HCV risk behaviours were found in both groups at follow-up, but the brief intervention was not found to be any more effective than the standard educational materials. In other studies, motivational interviewing was not found to have any effect upon HIV risk behaviours (Burke *et al*, 2003).

Treatment of cannabis problems

Brief interventions have often been used with adolescent substance misusers. Many such interventions have used treatments based upon motivational interviewing principles, and these have often been used with cannabis misusers (Stephens *et al*, 2004).

Evaluations of outpatient treatment programmes for adolescent cannabis users have produced mixed results. Some studies reported increases in cannabis use following outpatient drug abuse treatment (Hubbard *et al*, 1985). In a review of five controlled trials, cannabis misuse was found to be responsive to the same types of treatment as other drug misuse disorders (McRae *et al*, 2003). However, many patients did not show a positive treatment response, suggesting that cannabis dependence is not easily treated.

Other evidence suggests that treatment for cannabis dependence can be effective (Steinberg *et al*, 2002). Two randomised trials evaluated the effectiveness and cost-effectiveness of short-term outpatient interventions for adolescents with cannabis use disorders. Interventions included motivational enhancement therapy, cognitive-behavioural therapy and family therapy. All interventions demonstrated significant treatment effects at follow-up, with similar clinical outcomes across sites and conditions (Dennis *et al*, 2004).

Adolescents with cannabis problems have been found to respond well in terms of reduced drug misuse and improvements in other problem behaviours when given multidimensional family therapy, a relatively short-term, manualised intervention delivered on a once a week outpatient basis (Liddle *et al*, 2001).

In a randomised controlled trial of brief cognitive-behavioural interventions for cannabis misusers, participants were randomly assigned to either a six-session cognitive-behavioural therapy (CBT) programme, a single-session CBT intervention, or a delayed-treatment control group (Copeland *et al*, 2001). Those receiving the six-session treatment reported greater reductions in cannabis consumption than the control group, and participants in both treatment groups reported fewer cannabis-related problems than those in the control group.

A study of illegal drug use among young people found that a brief (single session) intervention led to some early reductions in cannabis use, but that the initial reductions were not sustained from three-month to 12-month follow-up. At the later follow-up, drug use was no different from that of the no-treatment control group (McCambridge and Strang, 2005). A similar dissipation of treatment effects has been reported among problem drinkers after brief interventions (Wutzke *et al*, 2002).

In a study of manual-guided, outpatient, group-based treatments for adolescents who were mild-to-moderate substance abusers, participants significantly reduced cannabis use at six- and 12-month follow-up with no changes in alcohol use or criminal involvement (Battjes *et al*, 2004).

Studies are also inconsistent regarding the relative effectiveness of brief interventions versus longer treatments for cannabis misusers. Adult cannabis misusers seeking treatment were randomly assigned to an extended 14-session cognitive-behavioural treatment, a brief two-session motivational interview treatment, or to a delayed treatment control condition (Stephens *et al*, 2000). Participants in both the 14-session and the two-session treatments showed greater improvement than controls at follow-up, with no significant differences between the two active treatment conditions.

A different result was obtained in a randomised controlled trial that evaluated the efficacy of brief interventions for cannabis-dependent adults. When cannabis use outcomes were compared after two sessions of motivational enhancement, nine sessions of cognitive-behavioural therapy plus case management, and a delayed treatment control condition, both active treatments reduced cannabis use and related problems more than the control condition. The nine-session treatment was more effective than the two-session treatment (Marihuana TPRG, 2004).

The addition of a single session of motivational interviewing to

drug treatment programmes provided in both inpatient and outpatient settings was found to have no effect upon drug use outcomes (Miller *et al*, 2003).

Adding voucher-based incentives to coping skills and motivational enhancement can improve cannabis use outcomes (Budney *et al*, 2000). Young cannabis misusers rarely seek treatment and are difficult to engage in treatment when referred by outside agencies. To evaluate treatment engagement strategies, cannabis users referred by probation services were randomly assigned to either three-session motivational enhancement, or three-session MET plus contingency management (Sinha *et al*, 2003). Participants in both conditions reported significant reductions in cannabis use and improvement in legal problems. Participants in the combined treatment condition were more likely to complete the three-session intervention.

For more severely problematic cases, brief interventions may provide insufficient treatment input. After a single motivational interview, hospitalised psychiatric patients with co-existing substance use problems continued to use. Cannabis use remained at intake levels and was no different from that of a control group (Baker *et al*, 2002). More extensive interventions may be required for such groups.

Needle and syringe exchange schemes

The risk behaviour of drug users has been the focus for various preventive activities. Dissemination of information about the transmission of blood-borne infections is one of the least controversial prevention responses. This has been widely used, and, in some circumstances, such measures can be effective (Selwyn *et al*, 1987). Needle and syringe exchange schemes have also been established in many countries.

Needle and syringe supply has been widely used in the UK and elsewhere to reduce the harms associated with injecting drug use. Needle and syringe supply programmes do not represent a “treatment” in the same sense as pharmacological, psychological and psychosocial treatments such as methadone maintenance, cognitive-behavioural therapies, or therapeutic communities.

There are many reasons why people share syringes, but problems of restricted availability are typically reported by injectors as one of the most common reasons for sharing injecting equipment (Stimson *et al*, 1988; Wood *et al*, 2002).

Needles, syringes and other injecting equipment have been supplied to users in a number of ways. Some services provide needles and syringes (either free of charge or for sale) but make no requirement for the return of used equipment. In other services, needles and syringes are provided on an exchange basis (either on a one-for-one, or some other agreed basis).

Some exchange schemes were operating in the UK as early as 1986. It was as a consequence of the successful implementation of the initial pilot needle exchange projects that there was a rapid expansion of needle exchange schemes in the UK during the following years. By the end of 1989, it was estimated that there were about 120 such schemes (Stimson *et al*, 1990), and by 1997, nearly all health authorities in the United Kingdom were providing some form of syringe exchange service (Parsons *et al*, 2002).

Different needle exchange distribution methods may reach different subgroups of injectors. In one study that compared exchange programmes in pharmacies, fixed sites, and mobile exchange programmes (vans), there was an increase in risk profiles from pharmacy to fixed-site to mobile exchange vans, with van users generally at higher risk than fixed-site and pharmacy users (Miller *et al*, 2002). It has also been found to be difficult to attract younger injecting drug users to exchange programmes (Bailey *et al*, 2003).

A review of 14 studies provided evidence that needle exchange schemes were also feasible and could lead to reductions in injecting-risk behaviours when provided within prison settings (Dolan *et al*, 2003).

Needle exchanges in the United Kingdom are often located in drug treatment agencies and in community pharmacies. Although pharmacists are not obliged to provide needle exchange as part of their National Health Service contract, a survey conducted in England found that more than 12,000 community pharmacies were providing sterile injecting equipment, either as needle exchange, or for sale “over the counter” (Sheridan *et al*, 2000). One worrying finding about pharmacy-based schemes is that it was not known what methods of disposal were used, and that only about one-third of the injecting equipment given to users was returned to pharmacy based exchange schemes (Sheridan *et al*, 2000).

One response to this has involved supervised injecting facilities. A study of public order problems during the weeks before and after the opening of a safer injecting facility in Vancouver measured changes in the number of drug users injecting in public, publicly discarded syringes and injection-related litter (Wood *et al*, 2004). The opening of the safer injecting facility was associated with improvements in several measures of public order, including reduced public injection drug use and public syringe disposal.

When needle exchange services first opened, it was thought that drug injectors who used them would do so repeatedly. This tended not to happen, and one feature of the schemes has been their high turnover of clients (Stimson *et al*, 1990).

Initiation and continued attendance at syringe exchange programmes by high-risk drug injectors has been found to be

independently associated with cessation of syringe sharing. A cohort of drug injectors at a syringe exchange programme was followed up over a six month period (Bluthenthal *et al*, 2000). At follow-up, high-risk injectors were more likely to quit sharing syringes, as were those who continued using the programme when compared with non-users of exchange programmes, and after controlling for confounding factors.

In a prospective study, a cohort of untreated injecting drug users was followed up for about a year (Gibson *et al*, 2002). After controlling for baseline risk behaviours, there was a more than twofold decrease in odds of HIV risk behaviour associated with use of a needle exchange programme. The study concluded that use of the exchange had a substantial protective effect against HIV risk behaviour and may have been especially important for injecting drug users (IDUs) without other sources of syringes.

A comparison of drug injectors recruited from an exchange programme and from an area in the same city with no exchange programme, found regular attendance at the exchange programme was associated with less frequent and lower risk HIV injection risk practices (Ouellet *et al*, 2004).

In a study that tracked drug injectors from before until after syringe exchange was implemented, significantly lower seroconversion rates were found among drug injectors using syringe exchanges compared to controls (Hahn *et al*, 1997). Other studies obtained similar findings (Schoenbaum *et al*, 1996).

Needle exchange schemes have been seen as having played an important and effective role in helping to keep HIV seroprevalence at a relatively low level in the UK (Durante *et al*, 1995; Stimson, 1995). HIV prevalence rates among drug injectors in London declined from about 13 per cent in 1990, to ten per cent in 1991, and to seven per cent in 1993 (Stimson, 1995), and the low and stable HIV prevalence rates across most cities in the UK have been attributed, in part, to the early introduction of harm reduction interventions and syringe exchange schemes.

Conventional treatment services also play an important role in tackling blood-borne infections. Improvements in injection risk behaviours have been found both among drug users admitted to methadone treatment and among those admitted to residential treatments programmes (Gossop *et al*, 2002). Drug misusers who attend needle exchange schemes may also be successfully referred to drug maintenance or other treatment programmes (Kuo *et al*, 2003).

In a global survey of 81 cities, it was estimated that HIV prevalence decreased by an average of 5.8 per cent per year in 29 cities with established exchange programmes. In contrast, the rate increased by an average of 5.9 per cent per year in 51 cities without such programmes (Hurley *et al*, 1997).

A meta analysis of change and comparison data from 47 studies concluded that needle sharing consistently declined among exchange attenders, suggesting the such programmes are effective in reducing injection risk behaviours (Ksobiech, 2003).

A review of 42 studies that evaluated syringe exchange effectiveness concluded that although syringe exchange alone may not be sufficient to prevent the spread of HIV among drug injectors, there is substantial evidence that syringe exchange programmes are effective in preventing HIV risk behaviour and HIV seroconversion (Gibson *et al*, 2001). Studies that failed to show a positive effect tended to use weaker research designs which were vulnerable to selection biases by comparing programme attenders and non-attenders within a single community. Drug users who attend exchange programmes are often less socially integrated, and more involved in a range of high-risk injecting and other behaviours (Schechter *et al*, 1999; Ouellet *et al*, 2004).

Prevention and treatment of hepatitis infections

Because of the high transmissibility of hepatitis C virus (HCV), it has proved more difficult to tackle hepatitis C infection. Despite the widespread implementation of needle and syringe exchange schemes, there remains a continuing problem of needle sharing and an extremely high prevalence of hepatitis C infection rates among injecting drug users (Garfein *et al*, 1996; Gossop *et al*, 1997; Best *et al*, 1999). Improving access to needles and syringes as an isolated intervention may not be sufficient to prevent the spread of viral hepatitis infections, especially in circumstances where these are highly prevalent (Wood *et al*, 2002). However, even with regard to hepatitis infections, there have been encouraging findings to suggest that attendance at syringe exchange programmes can lead to reduced rates of infection with hepatitis B and C (Hagan *et al*, 1995).

Hepatitis B vaccination rates remain low among drug users. In prospective studies of street-recruited injecting and non-injecting drug users in New York City, about a quarter had a previous HBV infection. Of the users deemed susceptible to HBV and offered vaccination, more than half (54 per cent) received at least one dose of the vaccine, of whom 41 per cent completed all three doses (Ompad *et al*, 2004). Among IDUs attending mobile health care services linked to a syringe exchange programme, 63 per cent were found to be eligible for vaccination, and of the vaccine-eligible clients, 66 per cent completed three vaccinations (Altice *et al*, 2005).

No vaccine is currently available to protect users against hepatitis C infection. The prevention strategies most often used with drug misusers involve HCV support groups and risk-reduction counselling (Alter, 2002; Litwin *et al*, 2005). Treatments for alcohol problems among drug misusers should be improved since, for individuals infected with HCV, heavy drinking is extremely risky, but even low levels of alcohol consumption have

been found to be associated with increased risk of viraemia and hepatic fibrosis (Pessione *et al*, 1998).

Acupuncture

Various “complementary therapies” have been used to treat drug addiction. One of the most frequently used involves acupuncture. There may be more than 400 substance abuse clinics in the United States and Europe providing some form of acupuncture treatment (Margolin *et al*, 2002).

In a study of acupuncture for the treatment of opiate withdrawal, acupuncture was found to be less effective than a standard methadone detoxification treatment (Gossop *et al*, 1984). In a single-blind, randomised, placebo-controlled study of auricular acupuncture in the treatment of cocaine addiction, the results showed no significant treatment differences between true and placebo acupuncture, and no differences between the three dose levels of acupuncture (Bullock *et al*, 1999).

When auricular acupuncture was used with cocaine-dependent inpatients, no outcome differences were found between treatment and control groups, though a retrospective analysis suggested that those who received acupuncture were more likely to remain in treatment (Otto *et al*, 1998).

A study of auricular acupuncture as a detoxification treatment for heroin addiction found high rates of attrition in both active and placebo groups, but those who received active acupuncture stayed in treatment longer than those assigned to the sham condition (Washburn *et al*, 1993).

In a randomised, controlled, single-blind clinical trial of 620 cocaine-dependent patients, participants were randomly assigned to receive auricular acupuncture, a needle-insertion control condition, or a relaxation control condition (Margolin *et al*, 2002). Acupuncture was no more effective than a control condition in reducing cocaine use. Patients who received acupuncture were not retained in treatment longer than those in the control conditions. The results did not support the use of acupuncture as a stand-alone treatment for cocaine addiction or in contexts in which patients receive only minimal concurrent psychosocial treatment.

A comprehensive review of clinical trials, meta analyses and systematic reviews of acupuncture found that evidence regarding the effectiveness of acupuncture in the treatment of drug addiction was inconclusive and difficult to interpret (Birch *et al*, 2004). A systematic review of nine randomised controlled trials concluded that the results provided no support for the use of acupuncture for the treatment of cocaine dependence (Mills *et al*, 2005).

Treatment processes

There is increasing agreement that research should pay greater attention to questions of process, and specifically to how treatment works and how it can be improved (Prendergast *et al*, 2002; Simpson, 2004). Surprisingly little is known about the processes of treatment as it is actually delivered, or how to identify “active” and “inert” components of treatment (Hubbard *et al*, 1989; Moos, 1997; McLellan *et al*, 1997).

No single treatment can be universally effective for drug dependence. A range of different interventions are required. Despite widespread recognition of the importance of providing treatments that are appropriate to the diverse needs and problems of patients, many programmes offer only a single type of treatment. In such situations, those patients who are a good fit for a given approach are more likely to remain in treatment, and those who are less well suited are more likely to drop-out (Carroll, 1997).

Treatment duration and treatment retention

Length of time in treatment has been found to be related to favourable post-treatment outcomes (Simpson and Sells 1983; Simpson, 1997; Orlinsky *et al*, 2004). The relationship between treatment retention and outcomes is replicated across residential and outpatient programmes in major national evaluation studies (Simpson and Sells, 1983; Hubbard *et al*, 1989, 1997; Gossop *et al*, 2003).

Time in treatment is linked to improved outcomes when compared to the patients’ pre-treatment behaviours or to comparison groups (Simpson, 1981; DeLeon, 1989; Hubbard *et al*, 1989; Simpson *et al*, 1997). Patients who stay in treatment longer and who complete a course of therapy have been found to be more likely to achieve the best outcomes, regardless of the outcome measure (Simpson and Savage, 1980; Hubbard *et al*, 1989). In a study of 21,000 patients with substance use disorders, patients who received longer periods of care improved more than those who had shorter episodes (Moos *et al*, 2000).

Treatment duration effects have been reported from studies of drug-free and drug maintenance programmes, from programmes in residential and outpatient settings, from methadone maintenance and methadone plus day-care therapeutic community programmes, and with patients dependent upon opiates or upon cocaine (Hubbard *et al* 1989; Ball and Ross, 1991; De Leon *et al*, 1995; Joe *et al*, 1999; Etheridge *et al*, 1999).

Patients from the NTORS residential programmes who remained in treatment for longer periods of time achieved better one year outcomes than those who left earlier, in terms of abstinence from opiates and stimulants, reduced injecting, and for reduced criminal behaviour (Gossop *et al*, 1999). The effect of time in

treatment was confirmed after controlling for the influence of other potential predictive factors.

Treatment outcomes tend to improve as retention increases from three months up to 12 to 24 months or more (Simpson *et al*, 1997). Such findings have been used to support the concept of “minimum retention thresholds” for effective treatment, often defined as 90 days for residential and outpatient care, and a year for methadone treatment programmes (Simpson, 1981). Other studies have found a more linear relationship between time in treatment and improved outcomes, with a stronger relationship between treatment duration and improvement for long-term residential treatment (Zhang *et al*, 2003).

A randomised trial of relapse prevention in residential programmes found improved outcomes for both three-month and six-month programmes, and for patients in the three month programme, continued treatment beyond three months appeared to further delay time to first drug use (McCusker *et al*, 1995). A further study showed little additional benefit for a 12-month versus a six-month therapeutic community programme (McCusker *et al*, 1997). The authors suggested that their results provided support for continuing treatment for up to six months.

Research into methadone maintenance clearly shows an association between longer stays in treatment and positive post-treatment outcomes. One of the first large-scale studies of methadone maintenance in the late 1960s found reductions in drug misuse and criminal behaviour outcomes were associated with longer periods in methadone maintenance (Dole and Joseph, 1978).

A comprehensive review of the literature concluded that patients who remained in methadone treatment for at least two to three years of continuous maintenance were more likely to benefit than patients who received briefer periods of maintenance, and that this was unlikely to be due merely to processes of selective attrition (Ward *et al*, 1998b).

Rapid and ready access to treatment, higher methadone doses, a flexible policy regarding dosage, a non-punitive approach to illicit drug use, and an explicit orientation toward maintenance rather than abstinence have been found to lead to increased retention rates (Ward *et al*, 1998b).

Patients who remained continuously in methadone maintenance have been found to be less likely to seroconvert than those who did not (Williams *et al*, 1992; Metzger *et al*, 1993; Friedman *et al*, 1995). Longer periods of methadone treatment have also been found to be related to lower rates of HIV infection (Hartel and Schoenbaum, 1998).

Time in treatment is a complex measure, and one which should, in many respects, be regarded as a proxy indicator of other factors. Time in treatment is not, in itself, sufficient for clinical

improvement (Joe and Simpson, 1975). Patients who actively participate in the programmes and make cognitive and behavioural changes during treatment achieve superior outcomes to others who stay for comparable periods but who do not make such changes (Simpson, Joe *et al*, 1995; McLellan, Arndt *et al*, 1993).

Many of the factors that predict treatment retention may also be predictive of improved outcomes. The findings regarding a treatment threshold for improved outcomes may reflect the tendency of the more motivated patients to stay longer and engage better with treatment. Patient engagement has been related to both the intensity and duration of treatment participation, and engagement is associated with positive outcomes (Joe *et al*, 1999).

Although patients who remain in treatment for longer periods of time show better outcomes, some of those who leave treatment at an earlier stage also show improvements at follow-up (Gossop *et al*, 1999). More than a third of the NTORS patients who remained in residential treatment for only relatively short periods of time were subsequently found to be abstinent from heroin at one year. Early leavers may derive varying degrees of benefit from treatment. Even the simple procedure of admitting patients to a treatment programme may lead to some improvement in drug use problems (Simpson and Sells, 1983).

It is, however, a matter for concern that the planned durations of some treatment programmes have been made shorter than the minimum thresholds that have been identified as being associated with improved outcomes (Gossop *et al*, 1999). Where short periods of treatment fall below the minimum threshold, these may not provide effective outcomes for their patients.

It is unfortunate that decisions about treatment duration are frequently not made on clinical grounds but by an outside purchaser of services (Leshner, 1997; Swift and Miller, 1997). The length of programme duration and the provision of residential treatment services are two features of treatment provision which have been put most severely under threat (Etheridge *et al*, 1997; Horgan, 1997). It would be self-defeating if services were to be cut back below effective levels of functioning.

Programme completion

Treatment completion has also been linked to better outcomes after treatment (McLellan *et al*, 1997). In a study of treatment outcomes of men and women randomly assigned to two therapeutic communities of different treatment durations, treatment completers achieved better outcomes in terms of reduced drug use and arrests, and increased employment (Messina *et al*, 2000). Longer treatment durations appeared to be particularly beneficial for women.

Treatment completion has been found to be related to improved

outcomes in studies with adolescent drug abusers (Williams and Chang, 2000). Treatment retention was related to increased abstinence in patients treated in long-term residential and outpatient drug-free programmes, and treatment retention was more strongly predictive of abstinence in younger adults (Grella *et al*, 1999).

Where patients fail to complete treatment, attrition frequently occurs at a relatively early stage of treatment. Retention may be seen as an indicator of appropriateness of fit between patient, therapist, treatment intervention, and setting (Carroll, 1997). Treatment drop-out may reflect some sort of mismatch, with the patient thinking that they are in the “wrong” treatment setting, the “wrong” sort of group, with the “wrong” therapist, or that they have been assigned goals that they are not willing to accept. Many patients who drop-out of one programme usually seek treatment again in another (Peterson *et al*, 1994; Strang *et al*, 1996).

The types of procedures and strategies that have been found to improve treatment retention in clinical areas other than drug addiction are also likely to be applicable and effective in improving retention among patients with drug problems. Motivational interviewing techniques can be helpful in increasing rates of reattendance after an initial assessment session (Carroll *et al*, 2001).

Intensity

Treatment intensity may be reflected in the amount of treatment input, and a “dose-response” relationship has been found in different treatment settings. Studies have shown that a greater “therapeutic dose” of treatment is related to greater improvements in outcomes, with the quantity and range of treatment services within a programme (e.g., counselling, medical care, assistance with employment, housing and family therapy) representing important factors contributing to treatment effectiveness (McLellan *et al*, 1997).

In general, higher session attendance predicts better outcomes (Simpson, 2004). In a study of the impact of treatment intensity on cocaine use, a substantial treatment dose-response relationship was found (Rosenblum *et al*, 1995). The more cognitive-behavioural sessions attended by cocaine using methadone patients, the greater the reduction in cocaine use at follow-up, even after controlling for drug use at intake and background variables.

In a study of aftercare programmes, the number of relapse prevention sessions attended was found to be related to improved drug use outcomes (Brown *et al*, 2002). In a study of outpatient drug treatment, more frequent participation in group counselling was predictive of higher rates of abstinence from both illicit drugs and alcohol (Fiorentine, 2001). This was found for patients who completed the six month treatment programme.

Frequency of counselling was also found to be predictive of reduced post-treatment drug use, whether or not the patient completed treatment (Fiorentine and Anglin, 1996).

Increasing the opportunity for group and individual counselling in outpatient drug treatment programmes has been shown to enhance programme effectiveness (Fiorentine and Anglin, 1997). Even in otherwise effective programmes, increased client participation in group and individual counselling was found to further improve outcomes. In a study of the relationship between drug- and alcohol-counselling and substance misuse outcomes in methadone treatment programmes, drug-focused counselling was found to be associated with less frequent heroin and cocaine use at follow-up (Gossop *et al*, 2006). Alcohol-focused counselling, however, was related to higher levels of drinking at admission but was not associated with drinking outcome. These results suggest that there are complex interactions between presenting substance use problems, provision of counselling and treatment outcomes, and that these interactions differ by substance type.

In general, these findings support the view that service providers should encourage and facilitate frequent participation in group and individual counselling, and that increased access to group and individual counselling in outpatient programmes also leads to increased participation in counselling, and to enhanced programme effectiveness.

Enhanced counselling has been found to produce stronger therapeutic relationships between counsellors and patients, which in turn had a positive relationship with patients’ engagement with treatment and with improved treatment outcomes (Fiorentine *et al*, 1999; Simpson *et al*, 1997). Such findings have been replicated in different patient groups. In a study of women with children, for example, Marsh *et al* (2000) found that enhanced access to, and use of, drug abuse treatment services (number of services used) was related to reductions in the use of drugs and alcohol.

With respect to frequent participation in group counselling, treatment completion and regular attendance at Twelve-Step meetings, it has been suggested that “more is better” (Fiorentine 2001), or even that “much more is much better” (Fiorentine and Hillhouse, 2000).

In a comparison of a standard methadone maintenance versus an enhanced programme with a therapeutic community day-care programme, the enhanced programme produced greater reductions in illicit drug use and fewer psychological problems, with the degree of exposure to treatment serving as a key factor in leading to the improved outcomes (De Leon *et al*, 1995).

Treatment outcomes have been studied in controlled clinical trials where the “dose” of treatment services has been systematically varied. In a study of individual psychotherapy and counselling

services during methadone maintenance treatment, patients were randomly assigned to receive standard drug counselling alone, or drug counselling plus one of two forms of professional psychotherapy over a six-month period (Woody, McLellan, and Luborsky 1984). Patients who received additional psychotherapy showed greater reductions in drug use, more improvements in health and personal functioning, and greater reductions in crime than those receiving counselling alone. Greater improvements were found in the more intensive treatment conditions during treatment and at follow-up (Woody *et al.*, 1987).

Other studies showed that the patients who received the most treatment services showed the greatest improvement, particularly in the areas of personal adjustment and public health and safety risk (McLellan *et al.*, 1993).

Some studies have found that enhanced psychosocial services have only a modest effect upon illicit drug use outcomes among methadone maintenance patients (Saxon *et al.*, 1996). The authors suggested that treatment outcome may depend upon some threshold level of services, and that surpassing that threshold may not lead to further treatment gains. Treatment enhancements should not be seen merely as increases in the number of sessions, and outcomes should not be measured simply in terms of illicit drug use but should encompass other outcome domains (e.g. social functioning, criminal behaviour, physical and mental health) (McLellan *et al.*, 1998). Some studies have failed to show any benefit from increased numbers of sessions when outcomes are measured only in terms of illicit drug use (Alterman *et al.*, 1994).

Patients with drug misuse problems who received specialist outpatient mental health care have been found to achieve better outcomes than patients who did not receive such care, and intensity of care was found to be particularly related to improved outcomes among patients with both substance use and mental health problems. In a comparison of a standard treatment (twice weekly outpatient group counselling) with an enhanced programme (standard treatment plus individualised case management with access to extra services), it was found that the patients receiving enhanced care showed improved outcomes. These improvements included reduced substance use, physical and mental health problems, and better social functioning (McLellan *et al.*, 1998).

Studies of patients being treated for cocaine dependence have also found that greater amounts of treatment services can improve treatment outcomes (Higgins *et al.*, 1991). The enhanced treatment condition retained more patients in treatment, produced more abstinent patients and longer periods of abstinence, and produced greater improvements in personal functioning than the standard treatment.

More treatment input, in terms of more psychiatric, family,

employment, and medical services, has been found to produce better drug misuse outcomes and better social adjustment at follow-up, when provided in both inpatient and outpatient settings, (McLellan *et al.*, 1994).

In a study of the relative effectiveness of programmes consisting of inpatient treatment prior to outpatient care, or direct admission to outpatient treatment, greater improvements in drug use outcomes were shown in the patients who received inpatient treatment first (McKay *et al.*, 2002).

However, treatment is only one of the many factors that affect substance use and other outcomes, and the strength of the relationship between most treatment process factors and subsequent outcomes has generally been found to be rather weak (McLellan *et al.*, 1994).

Multiple treatments and combined treatment

Research has often evaluated the effects of single, specific interventions. In practice, treatment programmes seldom provide single, specific interventions. Typically, they provide a package of different interventions and services. Also, patients seldom receive only one exposure to treatment. The majority receive several, and some receive many treatment episodes.

Multiple treatments

In many programmes, half or more of those in treatment are likely to be repeat admissions (Institute of Medicine, 1990). Repeat admissions are typical for methadone treatment programmes where as many as two-thirds of the patients may be second or later admissions (Hubbard *et al.*, 1989).

Among the NTORS patients, 80 per cent had received at least one addiction treatment episode in the previous two years, with 75 per cent having been prescribed an opiate substitute drug, and more than a quarter having previously been in residential treatment (Gossop *et al.*, 1998). Almost one in five of the NTORS patients had attended NA in the two years prior to intake.

The question of how multiple treatment episodes contribute to patient outcomes is not properly understood, though drug misusers with a greater number of previous treatments have been found to have lower completion rates in outpatient than in residential treatment settings (Klein *et al.*, 2002).

Problem drug users have contact with medical and psychiatric as well as addiction treatment services. Almost half of the NTORS clients had been treated in an Accident and Emergency Department during the previous two years, a quarter had received inpatient treatment in a general hospital, and a substantial minority had received previous psychiatric treatment (Gossop *et al.*, 1998).

Combined and supplementary treatments

Treatment programmes in real-life clinical settings typically provide a package of interventions. Methadone treatments, for example, are rarely restricted merely to the provision of methadone pharmacotherapy, and improved outcomes are obtained when a comprehensive package of interventions is provided. Non-pharmacologic aspects of methadone treatment can include individual counselling, group therapy, couples counselling, urine testing, contingency contracting, HIV testing and counselling, primary medical care services, and psychiatric assessments and treatment of comorbid disorders (Strain and Stoller, 1999).

Methadone-only interventions may help some patients achieve reductions in opiate use when compared to pre-treatment levels of drug use, and when compared to patients on a waiting list comparison group (Yancovitz *et al*, 1991), though the amount of improvement to methadone-only treatment is often unsatisfactory (McLellan *et al*, 1993).

Several studies have looked at whether patients who receive additional treatment services do better than those who receive “standard” treatment only. Methadone maintenance patients who also received community reinforcement treatment did significantly better than a standard treatment group in terms of reduced illicit drug use (Abbott *et al*, 1998).

Adding social services to existing programmes improves the outcomes of addiction treatment (McLellan *et al*, 1998). Patients treated in the enhanced programmes showed less substance use, fewer physical and mental health problems, and better social function at follow-up than controls. Patients who received a greater range of services (psychiatric, medical, family and employment) during treatment have been found to achieve better outcomes (McLellan *et al*, 1994).

A study of the provision of methadone with supplementary treatments investigated whether the addition of counselling, medical care and psychosocial services improved the efficacy of methadone treatment programmes (McLellan *et al*, 1993). Patients were randomly assigned to one of three treatment groups: methadone alone with no other services (minimum methadone service, MMS); methadone plus counselling (standard methadone service, SMS); or methadone plus counselling and medical, psychiatric and family therapy (enhanced methadone service, EMS).

Patients who received methadone with contingency-based counselling (the SMS group) showed more improvements, faster, and greater improvements than the methadone-only patients. The inclusion of psychosocial services in addition to the counselling (the EMS condition) produced more improvements than standard treatment in employment, alcohol use, criminal activity and psychiatric status. The enhanced group showed

better outcomes than the standard treatment condition on 14 of the 21 outcome measures, with significantly better outcomes among the EMS patients in the areas of employment, alcohol use and legal status.

The use of contingency management techniques has been found to be effective in reducing continued drug misuse when used in conjunction with methadone maintenance programmes (Stitzer *et al*, 1982; Kidorf and Stitzer, 1993; Iguchi *et al*, 1996; Stitzer *et al*, 1986; Silverman *et al*, 1996; Strain *et al*, 1999; Griffith *et al*, 2000).

Although many patients respond well to addiction treatment programmes by showing reductions in their illicit drug use and other problem behaviours, some fail to achieve improvements. About one in four patients treated in methadone programmes tend not to respond well to treatment (Institute of Medicine, 1990a; Gossop *et al*, 2000). Contingency management has been found to be particularly useful as a treatment intervention for “non-responsive” patients (Iguchi *et al*, 1988; Robles *et al*, 2000).

In a comparison of a standard methadone maintenance programme with a combined methadone maintenance plus day-care therapeutic community programme, the enhanced programme led to greater reductions in heroin use, cocaine use, needle use, criminal activity, and psychological dysfunction (De Leon *et al*, 1995). The patients who remained in the enhanced treatment condition for at least six months showed the most marked overall improvement.

Combined treatment packages have been studied in the major prospective treatment outcome studies, including DARP (the Drug Abuse Reporting Programme), TOPS (Treatment Outcome Prospective Study), NTORS (National Treatment Outcome Research Study), and DATOS (Drug Abuse Treatment Outcome Study). All of these studies showed that drug misusing patients made substantial improvements in their problem behaviours after treatment (Simpson and Sells, 1983; Hubbard *et al*, 1989, 1997; Gossop *et al*, 2003).

Large-scale, prospective, multi-site treatment outcome studies have played an important role in improving our understanding of treatment effectiveness (Simpson, 1997). They provide valuable information about drug misusers, the separate stages of their addiction careers, their various and complicated involvements with treatment services, and, of course, the changes that occur in their drug use and other problem behaviours across extended periods of time after treatment. An important feature of these treatment outcome studies is that they investigate the effectiveness of treatment provided in existing services under day-to-day clinical circumstances.

Studies of patients being treated for cocaine dependence have also found that a broader package of treatment components can

improve treatment outcomes. Cocaine-dependent patients seeking outpatient treatment were randomly assigned to either standard drug counselling and referral to AA, or to a multi-component behavioural treatment integrating contingency-managed counselling, community-based incentives, and family therapy (Higgins *et al*, 1991). The enhanced treatment condition retained more patients in treatment, produced more abstinent patients and longer periods of abstinence, and produced greater improvements in personal functioning than the standard treatment. Further studies of the components of treatment found that family therapy (Higgins *et al*, 1994), incentives (Higgins *et al*, 1993), and contingency-based counselling (Higgins *et al*, 1991) each contributed to the improved outcomes.

An additive effect has been found for treatment and Twelve-Step involvement (Fiorentine and Hillhouse, 2000). Drug users who spent longer periods in treatment, who successfully completed treatment, and who attended Twelve-Step meetings on a weekly or more frequent basis, were more likely to maintain abstinence than those who participated only in treatment, or only in the Twelve-Step programmes.

In a randomised, controlled study of Twelve-Step group attendance and drug counselling with cocaine-dependent patients, the combination of drug counselling plus participation in Twelve-Step groups was associated with the best drug outcomes (Weiss *et al*, 2005).

Patient-treatment matching

The idea of matching patients to treatment is widely accepted, but it is unclear precisely how this should be done in clinical practice. Existing treatment services seldom routinely conduct comprehensive assessments for large numbers of treatment seekers, who are then selectively referred to a diverse and well-developed system of treatment services. A more modest expectation is that interventions within each programme should be tailored to patient needs. But even this limited application of patient-treatment matching requires a level of sophistication in assessment procedures and availability of comprehensive services that is uncommon in the real world (McLellan, Grissom, *et al*, 1997).

No single drug treatment modality has been found to be superior to other modalities for all drug users (Prendergast *et al*, 2002; Institute of Medicine, 1990). Several studies have failed to find treatment matching effects in terms of patient outcomes (McKay *et al*, 1997; Klein *et al*, 2002).

However, some modalities are more appropriate for some clients than for others. An obvious case is methadone maintenance treatment, which is intended specifically for clients who are opiate-dependent. Similarly, while residential treatment programmes and outpatient drug-free programmes treat clients with various drug misuse problems, residential and inpatient

programmes are better suited for clients who require more intensive services because of their more severe drug and other problems.

It is also increasingly accepted that the severity of patient needs is related both to the length and type of treatment required (Hoffman *et al*, 1994; Simpson, Joe and Brown, 1997). In DATOS, cocaine-dependent patients with the most severe problems were more likely to enter long-term residential programmes, and better outcomes were reported by those treated for 90 days or longer. Patients with the least severe cocaine problems at programme intake generally displayed good responses after treatment in all treatment conditions, but those with medium- to high-level problems achieved better outcomes after longer treatment stays (Simpson *et al*, 1999).

Evidence supports the effectiveness and efficiency of reserving more intensive services for patients with more severe problems (Gottheil *et al*, 2002, Hser *et al*, 1999 and Thornton *et al*, 1998). Matching comprehensive services to patient needs is an effective treatment practice, especially for high-need patients.

Where patients present with different types and severity of problems, effective organisations tend to adjust their mix of services to meet these needs (D'Aunno and Vaughn, 1995). The effectiveness of treatment may be less influenced by the amount of counselling per se than by the provision of targeted interventions which are specifically directed towards the problems of the individual patient (Etheridge *et al*, 1999).

In an early study (Woody *et al*, 1984) opiate addicts were randomly assigned to receive drug counselling alone, counselling plus cognitive-behavioural psychotherapy, or counselling plus psychotherapy. Patients were grouped according to the number and severity of their psychiatric symptoms. Overall, the addition of professional psychotherapy was associated with greater benefits than was drug counselling alone. Low-severity patients made approximately equal progress with added psychotherapy or with counselling alone. High-severity patients made little progress with counselling alone, but with added psychotherapy made considerable progress and used both prescribed and illicit drugs less often.

When patients were randomly assigned to standard treatment or to "matched" services that provided sessions directed at psychiatric, family, or employment problems, it was found that matched patients stayed in treatment longer, were more likely to complete treatment, and had better post-treatment outcomes than did the standard patients treated in the same programmes (McLellan, Grissom, *et al*, 1997).

After random assignment to high-structure, behaviourally-oriented, or low-structure, individual counselling, the more depressed clients were found to show significantly better control of substance use in high-structure behavioural counselling, while

the less depressed and helpless patients realised better control in low-structure treatment (Gottheil *et al*, 2002).

This was also found in another study in which substance-dependent patients were randomly assigned to either high-structure, behaviourally-oriented or low-structure, individual counselling. Patients with a more severe drug problem did better with a greater degree of structure, while those with a lesser problem benefited more when exposed to a less structured approach (Thornton *et al*, 1998).

The provision of services meeting the need for vocational training, child care, transportation, and housing has also been shown to produce beneficial effects. A higher level of needs and services matching (defined either by the ratio of services received to services desired, or by the total level of met versus unmet needs in the eight problem areas) predicted significantly longer treatment retention (Hser *et al*, 1999).

In a prospective study of a US cohort of more than 3,000 addiction treatment patients, the more patients' needs were matched to treatment provision, the greater their improvement in drug use in the follow-up year (Friedman *et al*, 2004).

In a study of cocaine misusing patients with differing degrees of "problem severity" (defined in terms of psychological and social functioning, legal status, and drug use history), longer retention (over 90 days) in residential treatment was associated with better post-treatment outcomes among high-severity patients (Simpson, Joe, Fletcher, Hubbard, and Anglin, 1999). Patients with lower problem severity at intake were able to benefit from less intense, outpatient care. Drug misusers with greater substance use severity at admission to treatment have been found to show greater improvements after inpatient plus outpatient treatment than after outpatient treatment only (McKay *et al*, 2002).

Patients' views about treatment are important because they influence the individual's willingness to approach and use treatment services. Where treatment is tailored to the specific needs of the patient, it is likely to lead to increased patient satisfaction and treatment engagement, and it can also affect treatment compliance. Among the treatment factors that affect treatment satisfaction are accessibility, adequacy, contact and impact of services received (Marsden *et al*, 2000).

Studies that have investigated the impact of treatment satisfaction on outcome have produced mixed results. In studies of methadone maintenance, only modest associations were found between satisfaction and measures of treatment outcome (Joe and Friend, 1989; Gossop *et al*, 2003). In a study of patients in day-care and residential settings, Chan *et al* (1997) found that treatment satisfaction was correlated with treatment retention and with several measures of outcome at six-month follow-up.

Service issues

Programme delivery

Programmes that provide similar types of treatment have been found to differ in the outcomes achieved by those treated in them (Ball and Ross, 1991; Gossop *et al*, 1998/DoH; Simpson *et al*, 1997). Patient outcomes are affected not just by specific treatment interventions but by the quality of care and other service provision issues. The treatment package includes the policies and services of the treatment service, the institutional context, the physical design of the facilities, and the overall characteristics of the patient and staff groups (Moos, 1997).

Programmes that have been assessed as being well implemented have been found to be more likely to produce better outcomes (Prendergast *et al*, 2002). Indications of a well-implemented programme included proper design of programmes, training in the treatment protocol, monitoring of treatment delivery, low drop-out rates, and other evidence that treatment was delivered as intended.

In a detailed study of the services provided to methadone maintenance patients in six US programmes, one of the stronger predictors of outcome was what actually happened to each patient during treatment in terms of the delivery of treatment services (Ball and Ross, 1991). Service components that were specifically related to improved outcomes were the provision of a high level of services, with a high percentage of patients seen in individual counselling sessions, good quality of counselling, good quality of medical services, and high rates of attendance for medication.

Between 1995 and 1999, a national study of outpatient methadone programmes across England found patient numbers had doubled during this time and average waiting times increased (Stewart *et al*, 2004). Drug users who have to wait for longer periods have been found to be less likely to enter treatment (Festinger *et al*, 1995) and more likely to use heroin during treatment (Bell *et al*, 1994). While patients are waiting for treatment they continue to be exposed to health risks, to engage in criminal behaviour, and to generate costs to health and welfare services (Best *et al*, 2002).

Many programmes lack the resources and trained staff which are required to provide good quality services (Etheridge *et al*, 1997; Institute of Medicine, 1990). Studies showed significant decreases in the amount and in the range of treatment services provided to patients in the United States during the 1990s compared to the level of services provided a decade earlier (Etheridge *et al*, 1997). This was linked to a corresponding decrease in the proportion of patients who reported that services were able to meet their treatment needs. Methadone treatment programmes generally provided the lowest level of counselling and other services. Other studies also showed a decline in the range of outpatient treatment

services (D'Aunno and Vaughn, 1995).

Where drug-dependent patients have special needs, this creates further difficulties within “stripped down” services. The problems and needs of individual patients have been found to be broadly reflected in the types of treatment programmes that they approach. The ways in which different drug users make contact with treatment services may be due to a mixture of self-selection as well as more formal service referral processes. These processes vary according to the ways in which national (and regional) service systems operate.

However, we still know relatively little about the relationships between service delivery factors and programme effectiveness (Moos, 1997; Simpson, 2002). Better assessments and conceptual models are required for the investigation of programme resources, staff functioning, and organisational climate (Heinrich and Lynn, 2002; McCaughrin and Howard, 1996).

Casemix issues

Treatment outcomes are also affected by patient factors, including readiness for treatment, and type and severity of presenting problems. There has been increased recognition of the clinical treatment needs of drug misusers with co-occurring mental, and other disorders, and of the heterogeneity of this group with regard to types of substances used and mental disorders.

Drug misusers with more severe drug problems (including severity of dependence, injection frequency and multiple drug use), criminal history, and psychosocial dysfunction at treatment intake often tend to achieve poorer outcomes, and programmes with higher severity caseloads face more difficult treatment challenges (Klein *et al*, 2002; Simpson, 2004).

In a study of drug-dependent patients admitted to outpatient, inpatient, or residential treatment settings, there was an interaction between problem severity and treatment retention. Clients with more prior treatment episodes and more drug-related problems tended to respond less well to outpatient treatment than to more intensive inpatient or residential programmes (Klein *et al*, 2002).

Patients with multiple drug problems and those who have psychological and physical health problems are particularly likely to be found within the residential treatment programmes (Simpson *et al*, 1997). Such patients frequently require intensive treatment and multiple services. These interventions may be costly to provide, and are not available in many services, especially within typical community-based programmes operating with limited resources.

Patients in UK residential treatment modalities such as rehabilitation and inpatient units have been found to have more serious problems at intake than patients in outpatient

methadone programmes (Gossop *et al*, 1998). Patients in the rehabilitation programmes had the longest heroin careers, were more likely to be regular stimulant users, and were more likely to share injecting equipment. They were also more likely to have had pre-treatment drinking problems in addition to their drug problems, to have been actively involved in crime and to have been arrested more times than the other patients. Drug users in methadone reduction programmes tended to be younger, had used heroin for the shortest time, were more likely to confine their drug use to heroin and less likely to have broad patterns of polydrug or alcohol use, and were less likely to share injecting equipment.

Treatment for women

It is not fully understood to what extent special interventions and services may be needed for women. Among the treatments sometimes proposed for women are family therapy, group therapy, separate women-only services, and female rather than male therapists. Few scientific studies have investigated or supported the superiority of such interventions, and there is little evidence supporting the superior efficacy of any particular treatment modality for women (Institute of Medicine, 1990b).

Where men and women with comparable sociodemographic characteristics and similar problems have been treated for drug misuse problems, they do equally well in the same treatment settings (Alterman *et al*, 2000; Stewart *et al*, 2003). There is little to support the widely held view that women are harder to treat than men, or are less likely to recover. Treatment outcome studies have found similar outcomes for women and men despite the fact that some of the women's pre-treatment problems may be more severe than those of their male counterparts (Fiorentine *et al*, 1997; Stewart *et al*, 2003).

In a study of treatment outcomes for women and men treated in both outpatient and residential programmes for methamphetamine problems, women demonstrated greater improvement in family relationships and medical problems, and similar improvement in all other areas, compared to men (Hser *et al*, 2005). These improvements were found despite the fact that more women were unemployed, had childcare responsibilities, were living with someone who also used alcohol or drugs, had been physically or sexually abused, and reported more psychiatric symptoms. A study of gender differences found that women tended to stay in treatment longer than men, and that there were broad similarities in outcomes for women and men (Hser *et al*, 2003).

The effects of patient-therapist matching on the basis of both race and sex have been investigated in a study of treatment for cocaine users (Sterling *et al*, 2001). The study provided no results to support these sorts of matching.

Women in treatment samples are far from uniform in their treatment needs and their perception of need (Davis *et al*, 2002). However, many drug-dependent women have serious psychiatric symptoms, and many have experienced abuse. Both of these issues are likely to require specific attention.

Childcare issues are also extremely important. Few addiction treatment services provide child care facilities (Swift *et al*, 1996), and this may be a practical reason why some women are deterred from seeking or remaining in treatment (Reed, 1987; DAWN, 1994).

Co-ordination of services

Drug misusers with psychiatric problems and other health care problems have relatively high rates of contact with various sorts of health care services (Alterman, McLellan and Shifman, 1993; Gossop *et al*, 1998). The presence of both substance use and psychiatric problems within the same individuals is increasingly recognised as among the more difficult issues to be tackled by psychiatry (Schuckit and Hesselbrock, 1994).

In a system in which treatment services specialise either in treating mental disorders or substance use disorders, the mental health needs of drug users are often not properly met (Hall and Farrell, 1997). Staff in both psychiatry and addiction treatment settings may need enhanced training to improve their ability to detect, assess, and respond to those with comorbid or dual diagnosis disorders (Scott *et al*, 1998).

Where drug users present with both psychiatric and substance use problems, failure to address their mental health problems leads to poorer outcomes (McLellan *et al*, 1983). More could be done to establish and strengthen the links between substance use and mental health services.

Treatment manuals

One way of improving the treatment integrity and standards of treatments delivered in services which are required to operate with restricted resources and limited availability of properly trained staff, has involved the use of treatment manuals. Treatment manuals have been called a “small revolution” in psychotherapy research (Wilson, 1996). Manuals can provide direction about treatment methods and procedures by specifying what the therapist should do within sessions, and how the sessions should proceed. Manuals may be particularly useful where interventions are delivered by therapists with limited training and expertise. An important distinction to be made here is that between the ideals of “best practice” and the reality of treatment interventions delivered under day-to-day conditions in existing services.

On the other hand, treatment manuals are no panacea. They tend to be more suited to the treatment of clearly defined and specific problems, rather than the diverse and diffuse problems

presented by many drug-addicted patients. The advantage of manuals is their concrete and specific descriptions of procedures. However, strict adherence to manualised treatment does not guarantee good outcomes. Manuals can also be a weakness in that they find it difficult to allow flexibility for differing patient needs. Hettema *et al*, (2005), for example, found that motivational interviewing tended to be less effective when delivered under manual-guided conditions. Therapeutic competence has been found to be more likely to produce improved outcomes than simple adherence to manualised procedures (Barber *et al*, 1996).

Therapist effects

Treatment outcomes are also influenced by the nature and the quality of the relationship between the patient and therapist. There is powerful support for this effect from psychotherapy research, based on over 1,000 studies (Orlinsky *et al*, 2004). A review of 79 empirical studies of the relationship between therapeutic alliance and outcome indicated that the overall relationship between therapeutic alliance and treatment outcome is moderate but consistent, regardless of the many other variables that have been suggested to influence this relationship (Martin *et al*, 2000). One of the main therapist characteristics which has been found to relate to drug misuse treatment outcomes is good interpersonal skills (Najavits and Weiss, 1994).

Pressure to change

Drug users may give various reasons for seeking treatment (Anglin *et al*, 1989b; Hubbard *et al*, 1989). In many cases, the person will present with distressing and sometimes urgent problems. In addition to drug misuse problems, these may involve physical or psychological problems (a serious infection, chronic depression), or social pressure (an imminent court case, pressure from a partner). In many cases, although the person may be aware of the need to change, they are also likely to be ambivalent both about drugs and about treatment (Orford, 2001).

People approach treatment services and enter treatment programmes with different expectations of what the therapeutic process will entail. The extent of the differences between what the patient expects and what they receive is likely to interfere with progress or reduce treatment adherence (Meichenbaum and Turk, 1987).

Motivation and treatment readiness should not be viewed as global, undifferentiated constructs (De Leon 2000). These factors are more complex and include readiness for personal change, as well as readiness to engage with the treatment programme, and with specific intervention activities. Readiness also includes patient attributes, including motivation, skills and resources, and confidence and self-efficacy (Dansereau, Evans, Czuchry, and Sia, 2003).

Treatment in criminal justice settings

Drug Treatment and Testing Orders (DTTOs) to provide treatment in the community for drug misusing offenders were introduced in the UK by the 1998 Crime and Disorder Bill. An evaluation of the impact of DTTOs upon offending at two-year follow-up found that reconviction rates were high (80 per cent), and completion rates were low with only 30 per cent of the sample completing their programmes (Hough *et al*, 2003). Better outcomes were found among those who completed their orders.

In the US, one response to the lack of treatments in correctional services has involved the expansion of community-based alternatives such as drug courts (Belenko, 2002), or diversion programmes (Hser *et al*, 2003b).

Studies to assess the treatment needs of drug misusers in prison suggested that inmates need a range of treatment modalities, and that the existing delivery of correctional treatment is highly inadequate relative to need (Belenko and Peugh, 2005). About one-third of male and more than half of female US prison inmates were estimated to need long-term residential treatment.

The higher levels of projected treatment needed among female prison inmates are consistent with other studies that find multiple health and social problems among female offenders (Belenko and Peugh, 2005; McClellan *et al*, 1997; Prendergast *et al*, 1995). Increased attention should be paid to gender-specific treatment needs of female inmates, and to the expansion of treatment capacity in women's correctional facilities.

A review and meta analysis of research on correction-based treatment programmes in Germany found that educational programmes had no effect on recidivism but that social therapy programmes led to reduced recidivism (Egg *et al*, 2000).

Participation in prison-based treatment programmes has been found to lead to reductions in criminal recidivism and relapse to illicit drug use with stronger effects for participation in residential programmes (Butzin *et al*, 2002). A number of studies have found that participation in residential treatment during imprisonment, followed by continuing care in the community, yields reductions in recidivism and relapse to drug use (e.g. Knight *et al*, 1999 and Martin *et al*, 1999).

Other studies have demonstrated the importance of aftercare support (Martin *et al*, 1999). In a matched group, quasi-experimental design, the impact of residential aftercare on recidivism following prison-based treatment for drug-involved offenders was investigated (Hiller *et al*, 1999). Therapeutic community treatment in prison, especially when followed by residential aftercare, was effective for reducing post-release recidivism rates.

The issues involved in providing effective treatment in prison are similar to those for treating addicts in other settings. In studies of therapeutic community programmes provided within prisons, programme participation, time spent in treatment, programme completion, and the provision of aftercare were all found to lead to much greater effectiveness than treatment entry (Martin *et al*, 1999; Wexler *et al*, 1999; Knight *et al*, 1999). The evaluation of DTTOs in the UK also concluded that programme retention and completion were key treatment process variables (Hough *et al*, 2003).

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Reader information

Document purpose	To inform commissioners and treatment providers based on up-to-date evidence of what works, in terms of effectiveness of drug treatment	Cross reference	<i>Models of care for drug misusers</i> , 2005 (consultation version). NTA treatment effectiveness strategy 2005-08 (Online)
Title	Treating drug misuse problems: evidence of effectiveness	Superseded documents	<i>Models of care for drug misusers</i> , 2002
Author	Michael Gossop, Kings College London	Contact details	National Treatment Agency for Substance Misuse 8th floor, Hercules House, Hercules Road, London SE1 7DU. Tel 020 7261 8801 Fax 020 7261 8883 Email nta.enquiries@nta-nhs.org.uk www.nta.nhs.uk
Publication date	May 2006	Gateway/ROCR approval	The NTA is a self-regulating agency in relation to the Department of Health Gateway
Target audience	Primarily providers and commissioners of drug treatment services in England, and service users and carers.	Research briefings	These briefings commissioned by the NTA are summaries of the research evidence on a particular topic to help inform providers and commissioners of services. They are not NTA guidance but are aimed at helping providers and commissioners reflect on local service provision.
Circulation list	Managers and commissioners of treatment services Co-ordinators and chairs of local partnership (e.g. drug action teams and crime and disorder reduction partnerships) Service user and carer groups Directors of public health, social services, police and probation services Special health authorities Medical directors of primary care trusts and mental health trusts Managers of prison healthcare Regional government department leads on drugs Central government department leads on drugs Royal Colleges	© National Treatment Agency, London, 2006	The text in this document may be reproduced free of charge in any format or media without requiring specific permission. This is subject to the material not being used in a derogatory manner or in a misleading context. The source of the material must be acknowledged as the National Treatment Agency. The title of the document must be included when being reproduced as part of another publication or service.
Description	A summary of international research evidence on drug treatment effectiveness		

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