

## INTRODUCTION

This chapter examines the effectiveness of treatment for drug abuse and dependence as a first step in examining its role in preventing the spread of human immunodeficiency virus (HIV) infection (see ch. 1). This chapter begins with an overview of the natural history of drug abuse, particularly with respect to heroin abusers. Next a discussion of the major methodological problems in examining the effectiveness of drug abuse treatment is presented. The core of the chapter describes the results from major studies and addresses other issues related to treatment for drug abuse.

## NATURAL HISTORY OF DRUG ABUSE

### *Overview of Drug Abuse Careers*

Drug abuse is a complex, multidimensional, chronic condition. Several theoretical models have been proposed to explain the causes of drug abuse (13,169,367). They range from theories of genetic predisposition and metabolic deficiencies to theories based on psychoanalytic principles and social learning. The lack of agreement on a single cause of drug abuse has been likened to Voltaire's saying that, "A long dispute means that both parties are wrong." It might be more appropriate, however, to conclude that both parties are right. The empirical evidence does not exclusively support one model over the others, but rather suggests that elements from all the models play a role in the initiation and maintenance of abusive behavior.

The enormity of the problem lies, in part, in the fact that drug abuse is a condition that has a long course, in most cases lasting a decade or more. A simple framework highlights the necessary ingredients in the making of a drug abuser, namely "a susceptible person, an abusable drug, and some mechanism to bring the two together" (169). These three factors interact during the whole course of drug abuse. Multiple paths lead in and out of this career, which is characterized by four stages: initiation,

maintenance, cessation, and relapse (65,158,267,268). Findings of a landmark study on drug abuse showed that the average length of time from first use to last daily opiate use was almost 10 years, and that over the course of a 12-year followup, over two-thirds of clients had relapsed one or more times to daily opiate use (157,267,268). Individual susceptibility to relapsing into drug use is at the core of this cycle and can be explained by a variety of factors that may interact or operate independently (169). These factors may stem from biological, psychological, or socioeconomic conditions, and their roles may vary during the different stages of the abuse career.

Not everyone who experiments with drugs will become a casual user, and not all casual users will escalate into full-fledged abuse or dependence (addiction) (13,104). Abuse refers to a pattern of use that results in harm to the user; the user continues use despite adverse consequences. Dependence, on the other hand, is characterized by compulsive behavior and the active pursuit of a lifestyle that centers around searching for, obtaining, and using the drug. Dependence refers to the most severe state in the drug-use spectrum; the patterns of use of psychoactive substances range from experimental, occasional, and recreational use to abuse and to compulsive use, which characterizes dependence. Although treatment is intended for those dependent on drugs, the term drug abuse as used in this report encompasses both abuse and dependence.

Not all substances have the same potential for dependence, and individual biological differences may affect whether particular individuals become dependent on a drug. There is inadequate research to determine precisely the likelihood that a casual user will become addicted to various substances. Some experts hypothesize that upper estimates may be 1 out of 10 persons for alcohol or marijuana, about 3 to 5 out of 10 persons for intranasal use of cocaine and about 8 to 9 out of 10 for those who smoke or inject heroin or cocaine or smoke crack (169).

The emerging consensus with respect to cessation of daily opiate use is that it "is not simply a direct result of growing older or 'maturing out' of abuse" (267,268). Detailed and long-term followup studies with regard to cocaine are not available. Overall, however, it appears that the process of phasing out drugs is a function of a wide range of factors that also play a role in an abuser's decision to seek treatment. A "threshold point" usually arrives when the negative consequences of drug abuse outweigh the rewards derived from drug use (169,267). Previous treatment episodes, criminal justice involvement, life events, and other social conditions may converge towards slowing, or completely discontinuing drug use (11).

Natural history studies are extremely helpful in gaining insight and understanding the course of drug abuse. Clearly there is a need for more such studies, especially with regard to cocaine abuse and its routes of administration.

In general, according to the Office of the National Drug Control Strategy, not everyone who has a serious drug problem, defined as using drugs at least 200 times in the preceding 12 months, will require formal treatment to overcome the problem (104). Some (perhaps one out of four such users) may be able to overcome their drug problems with their own psychological resources and the help of friends, clergy, and other support groups (104). Drug treatment is intended mainly for people who are drug dependent (238). Because of the chronic relapsing nature of drug abuse, however, a single treatment episode will usually be insufficient; an individual may require multiple courses of treatment to move towards recovery (149,201).

Several studies have examined the course of drug abuse careers. Most of them, however, are over 20 years old and may not reflect current patterns. The majority studied samples of predominantly heroin abusers who received treatment for drug problems that in most of the cases started before 1%0 (268). Similar studies are not available for those who abuse cocaine. Some of the reported studies on heroin use suffer from a variety of methodological problems, including presenting the findings in general descriptive form and rarely employing sophisticated quantitative analyses, such as multivariate analysis (268).

### *Heroin Abuse*

Overall, these long-term followup studies have showed a trend towards reduced narcotic use and increased abstinence with the passage of time (197,268). Vaillant summarized the results from several American and European studies of heroin abusers who were hospitalized to be treated for their heroin abuse. He concluded that following initial hospital treatment, 10 percent of the narcotic abusers would never relapse, another 15 percent would be abstinent by the fifth year after treatment, and an additional 15 percent would be abstinent by the tenth year (352). Vaillant also claimed that almost 50 percent of narcotic abusers who achieve abstinence for one year would eventually relapse. Based on an 18-year follow-up of treated heroin abusers, Vaillant estimated that the annual recovery rate is 2 percent (352). Thus, the 10-year recovery rate ranged from 22 to 40 percent, depending on which study was used to derive the estimate. One should keep in mind, however, that these studies are over 20 years old and may not reflect current characteristics of drug users and patterns of drug use (e.g., use of multiple drugs) (203).

In contrast to the above studies, which examined the course of treated abusers, Waldorf and Biernacki studied the natural recovery from opiate abuse. They analyzed data from a non-random sample of 142 former heroin abusers (355,356). Half had been treated before, and half had never received formal treatment. The two samples were matched by age, sex, and race. There were no major differences found between the two samples with respect to background variables that reflected the extent of drug abuse, work experience, and education. Although there were no differences in the variables that measured motivation, more heroin abusers in the treated sample than the untreated sample established new relationships (71 percent v. 54.9 percent, respectively) and used social services, which may reflect referrals from the treatment centers. In-depth interviews revealed three distinct lifestyles of opiate abusers: the street abuser, the middle-class abuser, and the situational abuser. In contrast to the other two types, the situational abuser uses drugs in certain occasions depending on availability and has not developed the stereotype lifestyle or philosophy associated with drug use. Overall, six different patterns

of recovery were identified in their sample: 1) developmental change, which is basically maturation; 2) conversion to a spiritual, religious, or ideological group; 3) behavioral change as a result of environmental changes; 4) maintenance of the lifestyle, but cessation of drug use; 5) occurrence of alcoholism or mental illness; and 6) drifting into the mainstream of society.

### *Cocaine Abuse*

Cocaine use is characterized by a binge pattern (241). Cocaine may be used continuously until either physiological exhaustion occurs or the drug or money is depleted. Following a binge, users go through several well-defined stages; relapse may occur at any time. Initial depression and high cocaine craving followed by a clinical syndrome resembling a retarded depression characterize the post-cocaine crash, which lasts up to 4 days. Next comes a withdrawal phase, lasting up to 10 weeks, which is characterized by initial euphoria and a false sense of control followed by increased cocaine craving and an associated syndrome characterized by anhedonia and dysphoria.<sup>1</sup> During the third stage of abstinence, the subject returns to normal mood; however, occasional craving for cocaine may be triggered by myriad conditional cues reflecting the extremely reinforcing nature of cocaine. "A potential for relapse continues as long as conditioned cues exist to produce craving" (114,116).

The natural history of cocaine abuse has not been extensively studied. Thus, knowledge about how the course of cocaine abuse may differ between treated and untreated individuals and according to the route of the drug's administration is limited. A recent study shed some light on cocaine abusers who enter treatment. The study examined the pre-treatment natural history of cocaine abuse in 285 male veterans who were admitted during 1988 and 1989 to the Veterans Administration (VA) Medical Center in Los Angeles (165). The investigators examined the

period between first cocaine use and entry into treatment. The majority of the study subjects (95 percent) were entering treatment for the first time.

The mean age of first cocaine use for this group was 24, and the average total time from first cocaine use to treatment entry was 11.5 years (165). Intranasal cocaine and crack were the most prevalent forms of cocaine use (74 and 72 percent, respectively), with subjects reporting more than one route of administration. It was observed, however, that from first use to treatment entry and as subjects approached treatment, crack use increased and shifted from intranasal use and other routes of administration to crack smoking.

Four patterns of progression in cocaine use were identified: mild-moderate-severe, mild-severe, moderate-severe, and instantly severe (165). Forty-four percent of the sample reported that they started cocaine use at a mild level and subsequently engaged in severe use. An additional 30 percent started instantly with severe use; 17 percent was classified into the mild-moderate-severe group; and the remaining 10 percent started with moderate use that was followed by severe use. The results indicated that although the majority of cocaine abusers were able to maintain mild use for a considerable length of time, once they engaged in a level of moderate use, they escalated fairly rapidly to severe use.

### **METHODOLOGICAL PROBLEMS IN THE EVALUATION OF TREATMENT EFFECTIVENESS**

Evaluation research involving human behavior poses great difficulties. The core of the problem lies in the difficulty of establishing a causal relationship between the intervention (e.g., treatment for drug abuse) and the observed outcome (e.g., reduction in drug use or criminal activity). Ideally, in an experimental setting the scientist can control relevant conditions that may affect the outcome, thus making the link between cause and effect easier to establish. This is not always the case with human subjects; the investigator may be either unaware of or unable to control all extraneous factors that relate to the intervention and the outcome. Such factors may distort the observed findings and make the connection between treatment and observed outcome less clear.

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<sup>1</sup> Anhedonia is the absence of feelings of pleasure in acts that normally give pleasure. Dysthymia is an emotional state with depression of less intense degree than seen in manic-depressive disorders.

The main objective of evaluation research is to analyze whether there is a causal link between an intervention and an observed outcome. First and foremost, causal interpretation relies on the premise that in the absence of the intervention (treatment), the treated would have had the same outcomes as the untreated. Second, in the event of an observed treatment effect, the aim is to identify the factors that may have caused this effect. In study design, the primary concern is to ensure the internal and external validity of a particular study. Internal validity has been described as the *sine qua non* of causal inference (63). It refers to the likelihood that an observed outcome can be attributed to the specific intervention and not to some extraneous factor. External validity, on the other hand, refers to the generalizability of the observed results to different settings and populations. It is concerned with the issue of whether the inference drawn from the actual subjects of the study may also be applied to people outside the study population.

Biases in the design and implementation stages of a study may seriously threaten internal validity. These biases, which have particular relevance to the evaluation of treatment for drug abuse, fall into three main categories: selection bias, information bias, and confounding factors (249).

Selection bias refers to any recognized or unrecognized, measured or unmeasured correlates of the study subjects that influence the probability of their being part of the study or choosing a specific treatment intervention and that may also influence the treatment outcome. Strong personal motivation to enter treatment combined with self-selection into a particular modality or facility is a predominant example. Special elements in this category with direct relevance to the treatment of drug abuse are factors relating to the history (specific events occurring during the course of drug abuse) and maturation (possible biological and psychological processes and changes within subjects during the course of drug abuse) of subjects. These factors affect the natural history of the condition. In addition, they may either directly or indirectly influence both the decision to seek treatment and the outcome of treatment.

Information bias refers to any distortion in the process of getting the necessary information to evaluate the effect of the intervention. For example, researchers may perform a more aggressive and probing interview for only some of the subjects or may extract outcome information from available records that are incomplete or unavailable for all the subjects.

Lastly, confounding refers to the distortion of the findings by any extraneous factor other than self-selection that is related to the treatment and is also predictive of the outcome. An example is a low, ineffective dose of methadone. Reduction of opiate use is related to adequate methadone dose, usually higher than 60 mg per day (257). On the other hand, in many methadone clinics the mean average dose is well below 60 mg (see section on methadone maintenance below) (299). Thus, results from evaluation studies that do not control for daily methadone dose may inaccurately suggest **that** methadone is ineffective.

Problems relating to the feasibility of various study designs and the assessment and measurement of treatment and its outcomes are additional hurdles in evaluating the effectiveness of treatment for drug abuse. Treatment outcomes may also be influenced by a variety of intrapersonal, social, and environmental factors.

### Study Design

The ideal experimental study of the effectiveness of treatment for drug abuse would use a random sample of all drug abusers randomly assigned to the various treatment modalities. Random assignment would improve internal validity by equally distributing or at least having minimum variation in, those extraneous factors that may affect the validity of the comparisons among different groups. Random sampling would improve external validity by generating a representative sample of all abusers.

The nature of drug abuse often makes such a study difficult. Drug use is an illicit behavior, and drug abusers are a heterogeneous group with multiple personal and social problems. Identifying all

drug abusers to draw a representative sample, gaining their cooperation, and sustaining their commitment to treatment may not be realistic goals. Whether a sample of drug abusers is representative, however, bears on the generalizability of the results, not on the internal validity of the study and not on the immediate question of treatment effectiveness. On the other hand, even if a non-representative group is willing to enter treatment, the ability to assess a treatment's effectiveness is compromised if drug abusers refuse to enter the treatment modalities assigned.

When an experimental design is not a feasible option, the best alternative is the quasi-experimental design, which is based on epidemiologic principles and observational research. It should be stressed, however, that the further removed the design is from the sound principles of experimental research, the harder it is to establish a causal link between treatment and outcome. Epidemiologic studies try to simulate as much as possible the setting of an experimental design. Although the investigator does not have control over all of the relevant variables and circumstances, partial control can be accomplished through careful identification, documentation, and measurement of the known relevant factors that may influence the outcome. The essence of the situation, however, is that when non-equivalent groups are studied, biases are more likely to occur. It thus becomes harder to separate the effect of treatment from the effect of those factors that are associated with the initial non-comparability of the study groups.

Prospective studies usually offer a more complete picture of treatment effectiveness than retrospective studies. Although a prospective design has the potential to eliminate some major sources of bias, it is not trouble-free. For example, adherence to the study protocol is essential to ensure that it was the intended treatment that produced the observed findings. Another problem that can seriously hamper interpretation is the attrition of patients during treatment and followup. If, for example, the patients who drop out of treatment early or who are harder to locate afterwards are those who were resistant to treatment and poorly motivated, then the results would tend to overestimate the impact of treatment.

Another critical issue is whether direct comparisons may be made among the different modalities with regard to their effectiveness. There is considerable evidence that the various modalities attract different client groups (128,149). This heterogeneity in the baseline population can compromise the comparative interpretation of any differences, since they may involve non-comparable groups.

The majority of treatment effectiveness studies use a quasi-experimental research design. Randomization among drug abuse treatment modalities has been employed in two studies. One randomized patients to methadone maintenance or residential treatment, yet produced results that were hard to interpret because of poor adherence to the study design (19). The other, a randomized blinded study of methadone v. placebo, produced meaningful results (227). Randomized studies are more common in the evaluation of specific treatment components (59,140,202,375).

Although earlier studies suffered from an abundance of methodological problems, considerable progress has occurred with advances in the measurement of variables, study design, and statistical analysis of the results.

### *Definition of Treatment and Outcome*

The actual definition, measurement, and assessment of both treatments and outcomes pose additional challenges. Treatment for drug abuse is a process that occurs over a period of time. Multiple treatment episodes may be needed for improvement or abstinence from drug use. Defining the treatment period and deciding when to measure the results of treatment may greatly influence the results. For example, for methadone maintenance (whose goal is to reduce or eliminate heroin use while the patient is receiving methadone, measurement of outcomes has occurred during ongoing treatment; however, for therapeutic communities (whose goal is a drug-free lifestyle after treatment completion), outcome measurement has begun after the client has left or completed the program. Choice of followup time after treatment is also a challenge. Outcome estimation after 1-year followup may more accurately

reflect a treatment's impact than outcomes at longer followups, which may reflect a combination of the treatment's impact and other influences on the drug abuser's life (271).

A critical issue is the use of subjective or objective measures in measuring the outcome of interest. Ideally, an experimental study would include objective measures of outcome that can be easily reproduced. Although someone would expect that self-reports of illegal behaviors, such as drug use or criminality, could severely compromise scientific studies by underreporting, at least for opiates, "measurement research indicates strong agreement between addicts' self reports and other sources of information on their opiate use, employment, and crime" (202). Another expert review on measurement in drug abuse surveys concluded that an investigator through careful, thoughtful planning and use of creative procedures, "should be able to collect acceptably reliable and valid data on the drug-using behavior of respondents in most populations" (161). Caution, however, is warranted, and corroboration of self-reports with objective measures is always a desirable ingredient in drug abuse studies.

The challenge of treatment effectiveness research is not only to establish whether any observed changes are attributed to the intervention but also to identify the most effective and most ineffective elements of treatment. Treatment consists of several components, such as drug education and counseling; urine testing; psychotherapy; medications; and educational, vocational, and other social support (13). Modalities also vary in the goals of treatment (most notably drug-free v. maintenance). Moreover, even within the same modality, there is variation in the provision and quality of services and the settings in which they are offered.

Drug abuse is a disorder that affects many aspects of abusers' lives and the society within which they function. This reality has certain implications for the objectives of drug abuse treatment. The first and foremost goal of drug treatment is cessation of illicit drug use. Also important are other outcomes, including a decrease in criminal activity, increase in

social productivity, and improvements in mental and physical health (13). Defining and measuring these outcome categories further complicate the task of treatment evaluation.

An additional factor in reviewing evidence of treatment effectiveness is the possibility of publication bias. To the extent that publications reject studies that report negative findings (no treatment effect), the published literature will overestimate treatment effectiveness.

### *Summary*

In summary, the evaluation of drug abuse treatment poses significant challenges. Controlled experiments, although difficult to design and conduct, are increasingly becoming more common. A wide array of factors complicate the assessment of treatment effectiveness. The chronic relapsing pattern of drug abuse, the heterogeneous composition of the drug-abusing population, and the problems created by patient self-selection of treatment modalities are some of the problems researchers face. In addition, the difficulty of specifying often intangible treatment components, such as the overall profile of the program with the complex interactions of patient expectations and staffs abilities and attitudes, may further exacerbate the evaluators' task (13).

Improvements in study design and analysis are expected to strengthen the validity of research results. In the meantime, evaluations of adequately designed and implemented studies that provide consistent evidence may provide useful information for social policy. When one analyzes existing scientific knowledge on the effectiveness of treatment of drug abuse and its policy implications, it is useful to recall the words of Bradford Hill, one of the pioneers in establishing standard criteria for causal inference:

All scientific work is incomplete-whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time (142).

## **DARP AND TOPS: A DESCRIPTION OF THE TWO NATIONAL MULTIMODALITY STUDIES**

Much of the collective knowledge of treatment effectiveness, such as general characteristics of clients in the various modalities, the natural history of abuse, and factors related to treatment effectiveness, stems from two large federally-funded studies. The Drug Abuse Reporting Program (DARP) begun in 1969 and the Treatment Outcome Prospective Study (TOPS) begun in 1979 examined different treatment modalities throughout the United States. Because of their significant contribution to the field of drug abuse research, these two studies are described in detail below.

### *Drug Abuse Reporting Program (DARP)*

DARP, the first comprehensive large-scale evaluation project, was initiated in 1969 as a national data collection system to evaluate community-based treatment centers (268). The need for such action arose after the treatment expansion that took place during the late 1960s. Funded by the National Institute on Drug Abuse (NIDA) and conducted by the Institute for Behavioral Research of the Texas Christian University, DARP provided valuable information on a substantial segment of the clients in publicly funded drug abuse treatment centers. DARP also documented changes over time in treatment clientele and drugs used.

Between 1969 and 1974, approximately 44,000 clients in 52 treatment centers around the country were described and assessed (268). Standardized data collection instruments were used at client admission and bimonthly while clients were in treatment. These instruments measured "client characteristics, type of drug used, alcohol consumption, productive activity (employment), and criminality.

These initial data served as a baseline for a series of followup studies on three admission cohorts clients entering treatment during 1969-71, 1971-72, and 1973-74 (269,270,271). Followup studies initiated in 1974 examined outcomes associated with the various treatment modalities. Followup assessment included a complete history of the type and duration of drug abuse treatment and gathered

additional information on illegal drug use, criminality, and employment. Outcomes were reported only for people who, during the year of followup, had been out of treatment or out of jail for at least 3 months.

A total of 6,402 clients from 34 treatment centers participated. This randomly drawn sample included both males and females and was stratified for age, race-ethnicity, treatment type, length of time spent in treatment, and geographic location of the program. Overall, 83 percent (5,340 of those selected) were located, and 73 percent were interviewed face-to-face. All the major modalities were represented. Subsequently, there was also a 12-year followup study on a targeted sample of 697 black and white daily opiate users. Of this sample, 70 percent were interviewed; the remaining either refused (2 percent), were not located (20 percent), or were deceased (8 percent) (261,270,271). Although outcome measurement relied on self-reports, the investigators state that comparisons of a sample of self-reported data with urine testing results and criminal justice records provided evidence for the accuracy of self-reported data (267).

As the first large-scale, field-based evaluation of drug abuse treatment, DARP contributed substantially to the field of drug abuse research by addressing major methodological problems. For example, it established criteria for the definition and measurement of treatment, its characteristics, and associated outcomes.

It should be noted that the DARP findings presented in this report pertain mainly to users of opiates and only to white and black males, since these subgroups were consistently represented in all treatment groups in the followup samples.

### *Treatment Outcome Prospective Study (TOPS)*

Conducted from 1979 to 1981, TOPS was the second large-scale, comprehensive, longitudinal evaluation study. This study built on the experience of the DARP study. Funded by NIDA and conducted by the Research Triangle Institute, TOPS provided more extensive information than DARP about the natural history of drug abusers (details

about drug abusers' lives before, during, and after treatment) and drug abuse treatment.

The study population included 11,750 clients from 41 programs across the country. Although these programs were purposely selected and did not represent a random sample of all publicly funded programs, the authors stated that they accurately reflected the types of clients and the range of treatment services available between 1979 and 1981 (147,149). The investigators arrived at this conclusion by comparing TOPS programs and clients with available national data on treatment programs and client characteristics.

Three admission cohorts were formed based on whether the clients entered treatment in 1979, 1980, or 1981. Clients in the three admission cohorts were interviewed at initial contact, 1 month into treatment, and at 3-month intervals while in treatment. Information was gathered on the types of drugs used, alcohol consumption, mental health, criminal behavior, and economic productivity. Those clients who entered the TOPS programs and completed the initial interview made up the population from which the followup samples were drawn. A total of 4,270 people formed the three stratified samples. Followup occurred at 3 months, 1 year, 2 years, and 3 to 5 years after leaving treatment. Response rates varied by modality and length of time since leaving treatment, with somewhat lower rates for methadone clients than those in therapeutic communities and outpatient drug-free programs (see ch. 3 for descriptions of the major treatment modalities). Of the initial sample, response rates ranged from 70 to 80 percent in each followup period up to 2 years and were about 65 percent for the 3- to 5-year followup. The investigators compared characteristics of respondents and non-respondents and concluded that the resulting bias from the non-respondents would not distort the study's conclusions.

The results from the TOPS study reported later in the chapter were based on approximately 10,000 clients in 37 programs representing all the major modalities and refer to those patients who spent at least 3 months in treatment. Three outcome measures, including drug use, criminal activity, and productivity, were used. Reductions in drug use were

documented separately for heroin and cocaine. Criminal activity was measured as the self-reported involvement in predatory crimes (such as robbery, burglary, larceny), thus excluding crimes related directly to drug use, such as drug dealing. Productivity was measured by weeks of full-time employment. With respect to the reliability and validity of the self-reported data, the investigators stated that, "varied analyses demonstrate that the TOPS data are on the whole reliable and valid (149)."

In addition to reporting the prevalence of the above outcome measures, the investigators calculated 1-year abstinence and improvement rates. The abstinence rate for a specific drug is the proportion of people who were regular users in the year before treatment and who did not use the drug at all in the year after treatment. The improvement rate, a less strict criterion, is the proportion of regular users in the year prior to treatment who either ceased use completely or decreased the frequency the year following treatment. In contrast with the prevalence rates, which provide a robust picture of drug use, the latter measures provide information on changes among individuals who engaged in this behavior prior to treatment. It should be kept in mind that the abstinence and improvement rates reported in the following sections pertain to treatment clients who spent at least 3 months in treatment. The exact proportion of clients who remained in treatment for at least 3 months at each modality is reported separately in the respective sections.

## **TREATMENT EFFECTIVENESS**

This section describes the results from the major studies on the effectiveness of drug abuse treatment. In evaluating treatment effectiveness, one should keep in mind that treatment goals differ among modalities. Treatment duration and graduation are basic concepts of therapeutic communities and outpatient drug free programs; the ultimate goal is drug-free status after treatment completion. For methadone maintenance, however, the goal is reduction or elimination of opiate use during treatment. In addition, drug-free status is a goal for some methadone maintenance programs.

Since most of the studies on treatment effectiveness are modality-specific, each of the major modalities will be addressed separately: methadone maintenance; other pharmacological agents including Levo-Alpha-Acetyl-Methadol (LAAM), naltrexone, and pharmacotherapies for cocaine abuse; therapeutic communities, and outpatient drug-free programs. A review of research on specific modalities is followed by a review of studies that relate to more than one modality. Next, results of the most recent cost-benefit analyses related to drug abuse treatment are presented. Finally, other contemporary issues related to treatment are addressed, including treatment of special populations, dual morbidity (the coexistence of both substance abuse and a psychiatric disorder), polydrug use (the concurrent use of more than one drug), relapse prevention, and aftercare services.

### *Methadone Maintenance*

This treatment modality is directly related to prevention of HIV infection. Methadone maintenance is intended to curtail heroin use. Since most heroin abusers administer the drug intravenously, methadone maintenance by reducing heroin use, has the potential to interrupt a major route of HIV transmission.

Since 1964, when the first studies by Dole and Nyswanter were reported, hundreds of thousands of heroin abusers have been managed by methadone maintenance, and numerous articles have been written about this treatment modality. A literature search revealed approximately 13,000 articles on substance abuse in general, 4,000 of which referred to methadone maintenance (246). Methadone maintenance, "has been evaluated as much as any human service modality in history" (262). These evaluations have been either part of large multi-program national studies or individual studies of specific programs. Many thorough reviews have examined the collective evidence for methadone maintenance effectiveness (13,39,66,68,262). This section will analyze findings from some of the major studies along with results reported by the review articles.

## **Randomized Experiments**

**Methadone Maintenance and Placebo**--The first randomized, double-blind study of methadone maintenance effectiveness was conducted in Hong Kong between 1972 and 1975 among 100 heroin addicts who volunteered to participate (227). After all were stabilized on a daily dose of 60 mg of methadone, they were randomly assigned to two groups. The first group received methadone with an average dose of 97 mg per day. The second group, the control group, had their methadone gradually reduced by 1 mg per day to no methadone and thereafter were maintained on placebo. Both groups had access to a wide range of ancillary services and were followed for 3 years.

At the 8-month followup, there was a marked difference in the proportion of patients continuing treatment between the two groups (10 percent and 76 percent for the placebo and methadone maintenance groups, respectively) (227). After 3 years, 56 percent of the methadone group was still in treatment, in contrast to 2 percent of the control group (1 out of 50 placebo clients was still in treatment). With respect to illicit narcotic use, the investigators noted that evidence for persistent use of heroin (measured by urine testing) accounted for 31 of the 49 discharges (dropouts) of the control group. Among the treatment group, the proportion of patients with one or more urine samples positive for heroin rose initially to almost 60 percent but declined sharply and stabilized around 35 percent after the fourth month. Criminal activity, measured by the rate of convictions per man-month of enrollment, for the placebo group was more than double that for the treatment group (3.17 v. 1.41).

**Methadone Maintenance and Therapeutic Communities**--In 1980, Bale and his colleagues attempted to overcome the major methodological obstacles and perform a systematic comparison of methadone maintenance and therapeutic communities (19). They designed a prospective study, employing random assignment to the two modalities, and a followup of all patients regardless of retention in treatment. The study population comprised 585

male veterans who used heroin. These individuals were randomly assigned either to methadone maintenance or to one of three therapeutic communities participating in the study. Data were collected on drug use, criminal behavior, and work and school attendance. Patients were followed up to 1 year.

Only 108 patients entered the treatment modality to which they were initially assigned; another 103 waited a required period of 30 days and then they exercised their options to enter a different program (19). The methadone program retained 31 percent of those originally assigned, while 21 percent switched to residential treatment. With regard to those assigned to residential programs, 39 percent remained in the residential programs, and 9 percent entered methadone treatment. Forty-two percent of the sample spent no time in any treatment, except a detoxification program.

Among those in treatment, retention problems occurred. Although 74.5 percent of the total methadone maintenance clients remained in treatment for the first year, only 20 percent were still in therapeutic communities TC programs after the first 6 months. The 1-year outcomes (drug use, criminal activity, and work or school attendance) for all subjects in therapeutic communities and methadone maintenance showed no statistically significant differences. Overall, the study was severely compromised, especially because of veterans' refusal to enter the assigned treatment, high dropout rates,

and the option to switch modalities. Because of these methodological problems, the results with respect to treatment effectiveness were rendered almost uninterpretable (13,128).

### Multi-Program Nonrandomized Study

Ball and colleagues assessed the effectiveness of methadone maintenance in a cross-sectional study of six methadone maintenance programs in the Northeast (20). The study sample of 617 heroin abusers consisted of a stratified sample of new admissions and longer-term clients already in treatment for at least 6 months. The sample was further classified with respect to time in treatment with 126 new admissions, 342 moderate-stay clients (those with an average stay of 0.5 to 4.5 years), and 149 long-term clients (those with an average stay over 4.5 years). The 1-year retention rate was 63.4 percent for the moderate stay clients and 86.3 percent for the long-term group. The mean number of years of heroin use was 11.1 for the whole sample. Of those newly admitted, 66.7 percent said they had used heroin in the past 30 days, and 14.5 percent reported using other opiates. The prevalence of opiate use in the past 30 days was less than 100 percent because this sample included drug users who were in a transition period from jail, other incarceration, or detoxification to methadone maintenance. In addition to heroin use, 58 percent of those newly admitted reported using cocaine, and 38.7 percent reported using alcohol to intoxication. Table 4-1 presents the findings of the study according

**Table 4-1-Percent Self-Reported Heroin Use and Crime by Males by Time in Methadone Maintenance Treatment, 1985<sup>a</sup>**

Status in past 30 days	Last addiction period (N=617)	New admission sample (N=126)	In treatment 0.5 to 4.5 years (N=342)	In treatment 4.5 years (N=149)
No heroin use or crime	NA	25.4	655	83.2
Only heroin use	19.0	37.3	15.8	3.4
Only crime	NA	7 . 9	11.1	9.4
Both heroin use and crime	81.0	29.4	7.6	4.0
Total	100.0	100.0	100.0	100.0

ABBREVIATION: NA = not available from the reference.

a The Chi square value for this table is 303.8, which is significant at the .01 level.

b The authors described this group as having been in transition during the previous 30 days.

SOURCE: Ball, Corty, Meyers, et al. (20).

to length of stay in methadone maintenance. There were four outcome measures: heroin use; criminal activity; both heroin use and criminal activity, and success, defined as no heroin use or criminal activity during the past 30 days.

Of those with moderate stays (**0.5-4.5 years**), **15.8** percent reported using heroin in the past 30 days and an additional 7.6 percent were involved with both heroin and crime (20). Overall, 65.5 percent of the moderate-stay sample were defined as successes, with no heroin use or criminal activity in the past 30 days. Even larger improvements were reported among those who remained in treatment for more than 4.5 years. Overall, 83.2 percent of these long-term clients were classified as successes. Heroin use was reported by only 3.4 percent of long-term clients, while an additional 4 percent were involved in both heroin and crime. The investigators also reported similar patterns of smaller rates of cocaine use and to a lesser degree alcohol use. Substantial differences in both heroin use and criminal activity were observed, especially for long-term methadone maintenance clients.

### National Studies

DARP Study--The reported findings of the first- and third-year followups pertain to only white and black males who were admitted to treatment,

regardless of the time they spent in treatment. Interviews were conducted with 73 percent of the sample targeted for followup (a random sample of all those who originally entered treatment) (see table 4-2) (272). Daily opiate use declined from 100 percent 2 months before treatment to 36 percent and 24 percent at the first and third years of followup, respectively.

Criminal activity was measured as the percentage of clients undergoing any arrest or incarceration during the year of followup. Of those entering methadone maintenance, a substantial majority (88 percent) had reported at least one arrest in their lifetimes (272). This proportion reporting any arrest was 27 and 20 percent, respectively, during the first and third years of followup. Similarly, any incarceration declined from 50 percent prior to treatment to 28 and 30 percent at 1- and 3-year followups.

At baseline (previous 12 months), 33 percent were employed half-time or more (272). During the third year after treatment, the proportion rose to 58 percent.

TOPS Study--The impact of methadone maintenance on heroin and cocaine drug use, criminal activity, and economic productivity are presented in table 4-3 (149). These findings pertain to

**Table 4-2-Percent Self-Reported Opiate Use, Criminal Activity, and Employment by Males<sup>a</sup> in Methadone Maintenance Treatment, DARP**

Category	Pre-treatment period <sup>b</sup>	During 1 year after treatment	During 3 years after treatment
Daily opiate use .....	100	36	24
Arrest .....	88	27	20
Incarceration .....	50	28	30
Employment half-time or more .....	33	57	58

<sup>a</sup> Statistics refer only to white and black males.

<sup>b</sup> The pre-treatment periods varied: 2 months for opiate use, lifetime for arrest and incarceration, and previous 12 months for employment.

<sup>c</sup> Average followup rates were 79 percent for cohorts admitted to treatment from 1969 to 1971 and from 1971 to 1972 and 64 percent for the cohort admitted in 1973 to 1974.

SOURCE: Simpson and Sells (272).

**Table 4-3--Percent Self-Reported Drug Use, Criminal Activity, and Employment by Methadone Maintenance Clients Treated at Least 3 Months, TOPS<sup>a</sup>**

Category	Year before treatment	3 months in treatment	3-months followup	1-year followup	2-year followup	3-5 year followup
Regular heroin use .....	63.5	<b>5.9</b>	<b>16.0</b>	<b>16.7</b>	<b>14.9</b>	<b>17.5</b>
Regular cocaine use <sup>b</sup> .....	26.4	9.4	17.4	17.5	12.0	16.5
Serious predatory crimes .....	31.8	9.8	18.8	19.0	15.2	16.2
Full-time employment .....	24.2	25.9	16.5	20.1	29.3	17.7

ABBREVIATION: NA = not available.

<sup>a</sup>No statistics on followup rates for clients treated at least 3 months were presented. For all those on methadone maintenance regardless of the duration of treatment, followup rates ranged from 75 percent for 3 months followup to 65 percent for 3-5 year followup.

<sup>b</sup>Weekly or more frequent use.

SOURCE: Hubbard, Marsden, Rachal, et al. (149).

methadone maintenance clients who had remained in treatment for at least 3 months; these clients represent nearly 69 percent of the sample targeted for followup (a stratified sample of those who completed intake procedures). The median time spent in treatment was approximately 7 months (147,149,150). The followup sample, however, includes those who were in long-term maintenance (approximately 25 percent of the sample).

During the year before admission to methadone maintenance, 63.5 percent of clients used heroin regularly. At 3 months after entry, only 5.9 percent were regular users (weekly or more frequent use) (149). This proportion increased gradually after treatment and stabilized at 17.5 percent (a threefold decrease from the pre-treatment level) at the 3- to 5-year followup (measured from date of admission). Improvement was also reflected in two other outcome measures, the abstinence and improvement rates. Of regular heroin users during the year before treatment, more than half had ceased heroin use altogether the year after treatment (abstinence rate). Similarly, 70 percent had either stopped or decreased their use in the year subsequent to treatment.

The original proportion of regular cocaine users during the year prior to treatment was 26.4 percent (149). This rate dropped to 9.4 percent after 3 months in treatment and increased gradually to 16.6 percent at the 3- to 5-year followup. The 1-year abstinence and improvement rates were 40 and 70 percent, respectively. This pattern of cocaine increase may reflect the resurgence and higher initiation rate of the drug in the early 1980s (149).

Criminal activity (measured as involvement in serious predatory illegal acts) showed similar decreasing patterns. During the year prior to treatment, 31.8 percent engaged in such activity (149). After being in treatment 3 months, the proportion dropped to 9.8 percent. Thereafter, the rate increased and stabilized at 16.2 percent at the 3- to 5-year followup (half of the rate during the year before treatment). Similarly, the investigators noted that two out of three clients reporting illegal acts prior to admission had ceased their involvement the year after treatment.

There was no major difference in the percentage of fully employed clients 1-year before admission and at the 3- to 5-year followup. In fact, a decrease was observed (24.2 declining to 17.7) (149). The improvement rate indicated that 18 percent of the clients had more weeks of full-time employment in the year after treatment. The strict outcome criterion (full-time employment) together with the lack of an adequate control group and the multitude of factors that influence employment may help explain the contrasting outcomes between the significant improvements in drug use and criminality, on one hand, and the overall unchanged level of economic productivity on the other.

#### Additional Studies on Crime Reduction

Anglin cites several additional studies from a variety of geographic locations across the country that demonstrate the effectiveness of methadone maintenance in reducing crime (13). In a study in San Antonio, Maddux and Desmond found that

methadone maintenance treatment rates were inversely related to community crime rates (198). Moreover, when funding reductions forced premature discharge of clients in the community, crime rates increased. Another study by Hunt and colleagues compared methadone maintenance clients with narcotic users not in treatment (151). Methadone maintenance clients were involved in less criminal activity, especially for serious crimes, such as robbery, burglary, and drug dealing. Finally, in summarizing the overall effects of methadone maintenance on crime, Ball and colleagues, in the study described earlier, found a consistent and uniform decrease in the 14 types of crime that they examined (20). Prior to treatment, people in the sample were involved in 306.8 mean crime days per year. For those in treatment for at least 6 months and less than 4.5 years, the reported mean crime days plummeted to 24 per year. A further reduction to 18 days was reported for those in treatment for more than 4.5 years.

### **Natural Experiments**

The shortcoming of not having randomly assigned groups or an adequate control group is uncertainty in the interpretation of positive findings. In order to be able to conclude that treatment was the contributing factor, other plausible explanations should be excluded. Studies that take advantage of a policy or program change (natural experiment) and examine subsequent outcomes may provide less equivocal results (13,17,149). In his most recent review of the effectiveness literature, Anglin describes such studies. One study by McGlothlin and his colleagues examined the consequences of the involuntary termination of a methadone maintenance clinic in California (207). The 94 clients who were forcibly discharged were compared with a matched sample of 83 clients from another operating clinic. The 2-year followup showed that 54 percent of those forcefully discharged had reverted to heroin abuse. Those discharged were almost two times more likely to be arrested or incarcerated than the comparison group. Similar findings were reported from another study in San Diego, where some of the clients of a closed clinic transferred to private methadone maintenance programs, while others were unable or unwilling to do so (14). Higher rates of illicit drug use, crime, and drug dealing, and more contact with the criminal justice system were reported for those who did not transfer.

### **Maximum Achievable Effectiveness of Methadone Maintenance**

For a recent presentation at a NIDA conference on treatment improvement, Kreek compiled the best reported outcome levels that properly run methadone maintenance programs can be expected to achieve (187). A distinction between primary and secondary treatment goals was made. The primary goals were reduction in heroin use and voluntary retention for more than 2 years. The best observed outcome with respect to the proportion of methadone maintenance clients abstaining from heroin was 85 to 98 percent (299). Overall, 2-year retention rates exceeded 65 percent. Secondary goals and the achieved levels were 1) reduction in cocaine use (30- to 40-percent decline) and alcohol abuse (20- to 30-percent decline); 2) reduction in criminality and antisocial behavior (more than a 70-percent decline in criminal acts and arrests reported in some programs); and 3) improvement in socialization and productivity including employment, resumption of education, and homemaking (60-percent improvement observed in some programs).

### **Factors Related to Treatment Effectiveness of Methadone Maintenance**

Methadone maintenance clinics provide a wide spectrum of ancillary services to their clients, though they vary in the type, intensity, and quality of services offered. The core of these programs is the daily administration of methadone as a pharmacologic means of blocking the effects of opiates while simultaneously avoiding withdrawal, thus reducing their use. Variables related to the provision of both methadone and ancillary services have been identified as influencing treatment outcome to one degree or another. This section will focus on the methadone-related parameters. Other factors that relate to treatment effectiveness and cut across modalities will be reviewed at the end of the treatment effectiveness section (see section on Parameters Related to Treatment Outcome).

**Methadone Dosage**--There is great variability in the way individuals metabolize drugs, and this is certainly true for methadone. Beyond individual differences, some of the factors that have been found to influence the clearance of methadone from the body include other concurrent conditions, such as chronic diseases, the intake of other pharmacologic agents,

and pregnancy. Due to individual differences in the rate of methadone removal, what constitutes a dosage of methadone adequate to exert its pharmacologic action may differ from person to person. If the dose is inadequate, the methadone concentration in the blood may fall below a critical level before the administration of the next day's dosage, and the patient may experience symptoms of abstinence, which can lead to heroin use to relieve them (97,98,262). This pharmacologic reality supports the notion that methadone maintenance should be viewed as a procedure similar to providing pharmacotherapy to stabilize and maintain any other chronic condition, such as diabetes.

This view, which has a profound impact on how to determine an appropriate dose, is not shared by everyone. There have been two main arguments posed by methadone opponents: 1) that methadone is bad because it simply substitutes one opiate for another (which technically speaking is true) and 2) that providing methadone, and especially higher doses, will lead to increased illegal diversion of methadone (18).

The interplay of scientific, moral, and political arguments in the evolution of methadone policies has been examined and analyzed by Attewell and Gerstein (18). With respect to dosage policies, they note that the mean dosage levels of programs "became strategic symbols of their toughness and desire to wean abusers from methadone" (18). The authors argue that methadone dosage became "a pawn in an organizational struggle" that resulted in a steady decline in the average dose over the years.

A low dose of methadone has traditionally been one that is less than 40 mg a day, while a high dose has been defined as a dose over 60 mg a day (170).<sup>2</sup> The role of methadone dosage has been thoroughly examined in a critical review by Hargreaves, which was part of NIDA's landmark conference "Research on the Treatment of Narcotic Addiction: State of the

Art" (130). With the research question "What evidence do we have that various methadone dose practices are more effective than others," a careful and analytic review of 22 studies covering 11 years of research was conducted. All 22 studies were evaluated for their quality and strength of evidence. The conclusion was that there is a dosage effect, especially early in treatment. The participating researchers further agreed that a daily dosage in the range of 50 to 100 mg with a mean around 80 mg would be sufficient for the majority of the patients. Evidence suggested, however, that for a substantial minority (10 to 30 percent) of patients, doses as high as 100 mg per day were superior to 50 mg, especially for the first 5 to 10 months of treatment. Furthermore, the researchers also agreed that higher dosages enhance retention in treatment, especially in the early phase, and lower rates of illicit drug use.

The final conclusion stated that, "no single methadone dose is best for all patients" (69). Researchers suggested that dosages be individualized for each patient. Although a daily dose of 100 mg or less is thought to be sufficient in most cases, some circumstances might require higher doses. On the other hand, methadone doses below 50 or 30 mg per day, are considered to be inappropriate (69).

The study of six methadone maintenance clinics in the Northeast by Ball and colleagues also examined the effect of dosage on opiate use (98). The data on dosage were pooled over all the programs, which had different policies and support services. Although these were cross-sectional data, there was a striking inverse relationship between daily methadone dose and the frequency of heroin use. At a daily dose of 35 mg or less, a little over one-third of the clients used heroin regularly. By contrast, at 80 mg per day, there was practically no opiate use.

With respect to dosage changes, a recent review of methadone maintenance treatment by Kreek further recommends that dose changes should not be used as a reward or punishment, but rather that dosage should be determined after a careful and scientific evaluation (186). The scientific reasoning for such a policy is that stable doses play a crucial role in normalizing the heroin-induced changes of

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<sup>2</sup> The distinction between low and high dose used in the literature should not be confused with the distinction between effective and ineffective dose levels, as studies have indicated that 60 mg of methadone per day may be the lowest effective dose (257).

many physiological functions. Thus, an abrupt disruption of stable plasma levels could lead to relapse by initiating drug hunger and drug-seeking behavior.

**Retention In Treatment**--The study of the association of remaining in treatment with the degree of treatment effectiveness is a good example of the inherent limitations of drug abuse research. Many factors that may play a role in retaining clients in treatment (e.g., patients' characteristics, program variables, dosage, and other policies) may also have an impact on the outcomes and thus confound the real association between treatment retention and positive outcomes. Nevertheless, it is noteworthy that a wide variety of studies with different designs and data analysis sophistication have consistently found duration of treatment associated with outcome improvements. Retention rates in methadone maintenance, although higher than the other modalities, vary among different programs. Overall, the reported range for a 2-year period is from 55 to 85 percent (258). Retention is influenced by both client and treatment characteristics (68). Client factors associated with retention and better adjustment to methadone maintenance were older age, low criminal background, better employment history, and lack of psychopathology.

It should be noted that methodological problems impede generalizations and predictions. The most appropriate design, a randomized clinical trial, may be difficult to achieve. Even in observational or epidemiologically designed prospective studies, from which most of these results come, the existence of an

unmeasured metabolic deficiency or biochemical difference could seriously confound and invalidate any prognostic ability of other factors. With respect to program characteristics, programs with more flexible strategies, including dosage policies, are reported to have superior retention records (13). A study comparing three programs found that flexible policy programs retained clients, on the average, 9 months longer than other programs (13). A multivariate analysis of the non-compliant clients in the study by Ball, et al., found that those patients on lower doses (less than 30 mg per day) had the higher risk of non-compliance, while program affiliation was not a significant factor. By contrast, however, noncompliance in the mid- and high-dose programs, was program related. The authors suggest that program policy, treatment procedures, and staffing patterns seemed to influence compliance rates (294).

At the NIDA "State of the Art" conference, there was also agreement that research findings indicate that patient performance (measured by drug use, employment, and criminality) is a good predictor of retention while the patient is still in treatment (69). The majority of researchers at the conference also agreed that the longer the duration of treatment, the more likely it was that a positive outcome would be sustained following treatment (66,72). The findings from the more recent TOPS study support these conclusions (149). Multivariate regression analysis of the TOPS data, which controlled for several factors, demonstrated that time in treatment was the strongest predictor of favorable outcomes (table 4-4). Significant results were demonstrated for those who

**Table 4-4-Odds Ratios for Post-Treatment Outcomes in the First Year after Methadone Maintenance Treatment, by Treatment Duration, TOPS**

Outcome	Comparison group < 1 week n = 86	Time in treatment			
		1-13 weeks n = 161	14-52 weeks n = 268	>52 weeks and discharged n = 137	Long-term maintenance n = 183
Regular heroin use <sup>b</sup> .....	1.00	1.16	0.83	0.47 <sup>c</sup>	0.23 <sup>d</sup>
Regular cocaine Use.....	1.00	1.2	1.05	0.59	1.11
Predatory crimes .....	1.00	0.81	0.81	0.59	0.36 <sup>d</sup>
Full-time employment .....	1.00	0.70	1.13	1.74	1.44

a self reports from 835 of the 1,539 clients who were sampled for followup.

<sup>b</sup>Weekly or more frequent use.

<sup>c</sup> <.05

<sup>d</sup> p <.001

SOURCE: Hubbard, Marsden, Rachal, et al. (149).

had been in treatment continuously for 2 to 3 years, as is shown in table 4-4. Indeed, those in long-term maintenance were four times more likely to have decreased their regular heroin use (odds ratio =0.23) than those with less than 1 week in treatment (the comparison group). Similarly, those with more than 52 weeks in methadone maintenance were two times less likely to be engaged in regular heroin use (odds ratio =0.47) than the comparison group. Moreover, these long-term maintenance clients were three times less likely to engage in predatory illegal activity (odds ratio= 0.36). With respect to client characteristics, it was found that females, Hispanics, users of heroin only, those with three or more previous drug abuse treatments, and those who were not heavy alcohol users were more likely to remain longer in treatment (149). All the above conclusions were the product of a multivariate analysis of a carefully designed prospective study, which further strengthened the existing evidence.

**Other Treatment Correlates--Methadone maintenance programs differ substantially in their general program policies regarding dosage, admission, discharge, readmission, detoxification, urine testing, take-home privileges, and the provision of other positive or negative incentives to their clients. With the exception of dosage, none of these components have been extensively studied. Overall, though, it appears the answer is "a qualified yes" that the above elements do, indeed, affect treatment outcome (72). With respect to the provision of incentives, the evidence is neither consistent nor clear-cut. Stitzer and Kirby in a recent review reported that both positive incentives (such as take-home privileges) and negative incentives (threat of treatment termination) "have been shown to promote abstinence among some proportion of treatment patients" (285). Since the positive findings are not valid for all clients, however, the challenge is to identify and characterize those clients who can benefit the most from such measures. Similarly, more research is needed to establish whether and for whom the various policy components influence treatment outcomes.**

Methadone maintenance programs also differ in various program characteristics that are part of the overall treatment environment (e.g., the type, range,

and quality of services provided; the patient-to-staff ratio; and the staff background, expertise, and attitudes). The dynamic interplay of these factors constitutes what Anglin calls "program personality." Although these elements are not easily measurable or quantifiable, they have been found to influence treatment outcome (13,68). The extent to which these variables render their influence directly or indirectly by increasing retention and the duration of treatment is less clear. Ball's study of the six methadone maintenance programs described earlier provides evidence about the influence of program characteristics on treatment outcome (21). This study, despite its cross-sectional nature, suggests the extent to which differences among treatment programs may result in differences in effectiveness. Regardless of the initial selection of well-established methadone maintenance programs with above average patient-to-staff ratios, there was a wide disparity in each clinic's ability to decrease drug use. The proportion of current users while in treatment varied among the programs from 9.8 to 57.1 percent. Although it was hypothesized that the most powerful predictor of success would be patient characteristics, subsequent analysis suggested that certain program variables were more closely related to program success rates. The identified variables were dosage, retention rates, staff turnover rates, and the closeness of the relationship between staff and patients. According to the investigator, the study highlighted the importance of staff characteristics in influencing treatment outcomes. Anecdotal evidence from confidential interviews with program personnel also revealed a relationship between program morale and treatment effectiveness (21,241a).

**Achieving a Drug-Free State--Researchers differ on what the ultimate goal of methadone treatment should be. Studies indicate that a drug-free state may not be a totally realistic goal, at least not for the majority of the patients, because of relapse (130). The overwhelming evidence is that the beneficial effects of methadone are mainly confined to the time when the client is still in treatment. In a review primarily of studies of methadone maintenance programs in New York City, which examined the fate of methadone maintenance clients who had left treatment or been discharged, the author states that "a consistent finding is that in NYC it is really hard to**

achieve abstinence even for those clients who complete methadone maintenance and detoxify voluntarily” (130). Even those who have been favorably discharged face a less than 50 percent chance of maintaining abstinence for 3 years. Between 70 and 80 percent of discharged patients return to illicit opiate use within 1 to 2 years after leaving methadone maintenance (187,309). A study by Dole and Joseph, which examined the pattern of heroin use among patients with at least 3 interrupted cycles of treatment, found decreases in opiate use while in treatment, with subsequent increases in usage after leaving treatment (99).

Stimmel and his colleagues studied 335 former methadone maintenance clients to determine their ability to remain abstinent from narcotic use (283). The subjects were classified according to the reason that they were detoxified from methadone and left treatment: 17 percent were considered to have completed treatment, 30 percent were voluntarily discharged, another 30 percent violated the rules, and 24 percent were arrested. The followup rate was 80 percent with approximately 26 months followup time. At the end of the study period, 35 percent of the followup sample were narcotic-free, 58 percent had relapsed to narcotics, 4 percent were incarcerated, and another 4 percent had died. It should be noted that the mean duration of followup for those who remained narcotic-free was shorter than for those who relapsed. Thirty-five percent of relapses occurred among the group with 3 or more years of followup. Discriminant analysis was performed to identify factors associated with drug-free status. The dominant variable was reason for detoxification, followed by duration of methadone maintenance, and length of followup. Indeed, of those methadone maintenance clients that the program staff considered as having realized the full benefit from methadone maintenance, 83 percent were able to maintain abstinence, in contrast to 14 to 21 percent of those detoxified for other reasons.

As to what types of clients are more likely to achieve the goal of abstinence, researchers have found the most encouraging results with clients who are older, who have been stabilized in methadone maintenance for at least 2 to 3 years, who have

psychological support, and who have demonstrated less criminality and better social functioning (13,187,262).

## Medical Maintenance

An alternative experimental approach to the traditional daily dispensing of methadone at clinics is based on the concept of medical maintenance. This approach calls for stable, non-drug using, socially rehabilitated patients to take home as much as a 28-day supply of methadone from a physician at a primary care setting. Methadone is dispensed in tablet form and can be taken on a daily basis by the patient. The first published evaluation study examined 40 former heroin abusers who entered the program after they had met several well-defined criteria (230). The followup time ranged from 12 to 55 months. These preliminary results showed an annual retention rate of 94 percent. Overall, 8 of 40 patients (20 percent) relapsed into illicit drug use. This estimate includes five patients who returned to traditional methadone maintenance because of cocaine use. The authors argue that this approach has benefits for the clients (decreased frequency of visits and increased self-esteem), as well as for society (reduced cost and increased availability of methadone maintenance slots). There are, however, certain limitations of medical maintenance, probably the most important of which is the likelihood of illegal diversion of the large doses of methadone, whose street value can reach \$2,400 for a 28-day supply (366)?

The medical maintenance concept has the potential for being a beneficial treatment approach for some clients. However, there is clearly a need to replicate the above findings, to address the various methodological concerns, and, most importantly, to identify those patients for whom it would be most helpful.

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3 The distribution of methadone, a synthetic opiate, is tightly controlled by Federal regulations. Methadone may be diverted into illegal channels because of demand created by people who seek to control withdrawal symptoms, to detoxify themselves, or to obtain the pleasant **altered state of consciousness** that methadone produces (68a).

## Summary of Methadone Maintenance Effectiveness

Methadone maintenance has been used to treat hundreds of thousands of heroin abusers over the past 25 years in a wide variety of social, economic, and geographical settings. Its safety and effectiveness have been established in numerous studies (13,66,68,69,72,170,262). For a substantial majority of opiate abusers, who enter methadone maintenance, drug use and criminality decrease and health status improves. On average, three-fourths of the clients on long-term maintenance cease illicit opiate use (258).

The consistency of the scientific literature regarding the safety, efficacy and effectiveness of methadone is overwhelming, yet some still consider methadone a controversial treatment modality (299). Methadone has been criticized for simply substituting one abuse with another, for not being as beneficial for cocaine and other drug abuse as it is for opiate abuse, for not producing a robust improvement in all the maladaptive behaviors associated with substance abuse, and for not achieving high enough outcomes even with regard to opiate use. As stated in NIDA's landmark review, although some criticism of methadone maintenance is warranted, much of it is not supported by the scientific data (66,72,167). With the connection between intravenous (IV) drug use and AIDS, the importance of resolving the issues of what can and cannot be accomplished with methadone treatment and how methadone maintenance's fullest potential can be achieved is becoming more prominent.

Two basic distinctions about methadone maintenance are important for evaluating this modality. The first distinction concerns the premise that methadone is a cure or a "magic bullet" for the drug epidemic as opposed to a pharmacologic substance to counterattack illicit opiate dependence. The second distinction concerns methadone's efficacy as opposed to its effectiveness.

Methadone, a synthetic opiate, can prevent both drug hunger and opiate withdrawal symptoms for 24 to 36 hours. When administered to tolerant patients, it causes no euphoria or sedation and in adequate

doses can block the effects of heroin (187). This property makes methadone a drug-replacement therapy that allows an "illicit short-acting opiate administered with needles to be replaced with a legal long-acting safe, and orally administered substance" (379). Consequently, methadone "frees the abuser from the vicious cycle of always chasing a 'fix' and from vacillating between being sick and being high" (167). Both the individual and society can benefit substantially from this substitution, with benefits continuing to occur as long as the patient is in treatment.

Because of drug abuse's chronic relapsing nature, methadone is frequently compared to insulin therapy for diabetes and to anti-hypertensive treatments (224,238,258). This analogy is relevant because it not only increases understanding of methadone's role, but also helps to clarify the way that methadone should be evaluated. Both hypertension and insulin-dependent diabetes can be controlled by appropriate medication. Although some patients may be able to discontinue insulin or anti-hypertensive treatment at some point, others, probably the majority, will continue indefinitely on adequate doses of medication to control their disorders. Accordingly, the effectiveness of their prescribed medications is assessed while the patient is still in treatment, by measuring blood sugar or blood pressure. Even with these treatments, however, not all patients show the same response to treatment, which can be more or less successful for certain patients.

The second distinction, between methadone's efficacy and effectiveness, also entails important policy implications. The concepts of efficacy and effectiveness stem from randomized clinical trial research.<sup>4</sup> The efficacy of treatment refers to the observed results of experimental research done under ideal conditions and circumstances. When an efficacious treatment is implemented in the real world, the magnitude of the effect may differ due to

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<sup>4</sup>Efficacy is the probability of benefit to individuals in a defined population from an intervention applied for a given problem under ideal conditions of use. Effectiveness, on the other hand, is the probability of benefit to individuals in a defined population from an intervention applied for a given problem under average or actual conditions of use.

contamination from other real life parameters and inappropriate implementation. This is especially true for methadone maintenance, whose effectiveness has been said to vary from 40 to 98 percent (21,299). It is conceivable that this variability may partially be attributed to different population characteristics. The evidence, however, points to non-client related variables. Ball's study found that differential effectiveness was related both to length of a patient's stay and the quality of provided treatment.

Even an ideal methadone maintenance program has two distinct yet interrelated components. One is the administration of the pharmacologic substance, and the other is the variety of ancillary services that are offered. Methadone is a synthetic opiate with a very clear pharmacologic role: to bind to the opiate receptors, reduce drug craving, and inhibit the occurrence of the painful opiate withdrawal syndrome. On the other hand, biological and psychosocial vulnerabilities make drug abuse a multi-dimensional disorder. Drug abuse occurs in people who enter treatment with a variety of other problems (e.g., existing psychiatric and non-psychiatric illnesses and family, financial, employment, and legal difficulties). Ancillary services are intended to address these problems. The goals of methadone maintenance treatment vary from decreasing illicit opiate use (as a direct effect of methadone's action) and related criminal activity to increasing employment, social integration, and the quality of life. The extent of a program's success depends also on other program and staff-related variables, patient-related variables, and societally influenced factors beyond methadone's influence.

Ample evidence **testifies to** the high success rates of the whole package of methadone maintenance treatment. With regard to specific treatment components, evidence about the importance of adequate dosage is particularly strong. Experimental studies are needed, however, to examine the interaction of methadone dose with other non-pharmacological treatment elements, such as take-home policies; frequency of urine testing; the availability, type, and intensity of support services, and human factors, from program management to staff's attitudes and qualifications. Random assignment of drug abusers

to different treatment plans within the same modality seems to be more practical than random assignment to different modalities (59).

The great variation in success rates suggests that somewhere in the implementation process, effectiveness may have been compromised. More than 700 methadone maintenance programs operate in the United States, with great variability in their policies (13,21,187,299). For example, a 1989 survey by the U.S. General Accounting Office of 24 methadone maintenance programs revealed that daily average dosage levels ranged between 21 to 67 mg (299). At 21 of the 24, the average dose was below 60 mg per day, which according to C. Schuster, the NIDA Director, "more studies have found to be the lowest effective dose" (257). Counselor-to-patient ratios ranged from 1:15 to 1:96. Less than one third of the programs surveyed provided on-site educational and vocational services (6 and 4, respectively), and only one program had separate aftercare services. At the same time, continued heroin use by the patients ranged from 2 to 47 percent.

These results suggest that in many programs methadone maintenance does not reach its potential. This finding also begs the question of whether scientific evidence guides the operation of these programs. Research findings have produced strong evidence of the importance of adequate methadone dosage in reducing opiate use. Although increasing treatment slots and improving the quality of the existing services are important steps in the battle against opiate abuse, flexible dosage policies have the potential to rapidly improve the effectiveness of methadone maintenance. Administering a sufficiently high dose for methadone to achieve effectiveness assumes particular importance in light of the HIV epidemic.

### *Other Pharmacological Agents*

Medications can have a substantial effect on the treatment of drug abuse. Medications can be administered easily and can complement other medications, behavior modification, or psychotherapy. Moreover, they may provide opportunities to intervene in various stages of the recovery process in order to prevent relapse.

## **Naltrexone**

Naltrexone blocks the effects of heroin by binding to the narcotic receptors, but does not produce euphoric effects and is not addictive (see ch. 3). Naltrexone can be used as a short-term blockade agent during the transition from drug use to abstinence, as an occasional blockade agent for high-risk relapse situations, or as a long-term maintenance agent to protect against relapse.

In contrast to its efficacy, its effectiveness may be more limited. Although naltrexone is an efficacious pharmacological agent and has been observed to decrease opiate use and reduce drug craving, it has not been well accepted by heroin abusers (123,168). In practice, high dropout rates occur, especially during the induction period; 40 percent of patients often discontinue treatment by the end of the first month (168). This phenomenon may result partly from naltrexone's producing opiate withdrawal if the client has used heroin within the last 3 to 7 days (35). Depending on the type of patient and the level of support, average retention rates range from 1 to 6 months or longer (168). Higher retention rates have been found for health professionals and business executives, for whom success rates as high as 75 percent have been reported (168). The common denominator of success appears to be a highly motivated patient with family support. Strategies to improve compliance with naltrexone, such as individual and group counseling, family therapy, and contingency contracting are discussed in more detail in a review by Kosten and Kleber (180).

To realize naltrexone's potential, further efforts are needed to "demonstrate the range of patients for which the drug is best suited, and the setting and supportive approaches that should be administered" (168). Another promising option for enhancing naltrexone's effectiveness is the current development of its administration in a depot form (i.e., skin implants that gradually release the drug into the bloodstream) (238). Such an approach might extend the drug's action and require less frequent administration.

## **Levo-Alpha-Acetyl-Methadol (W)**

Like methadone, LAAM is a narcotic agonist intended to occupy the narcotic receptors, prevent withdrawal symptoms, and block heroin effects. The

main difference between the two drugs is that LAAM is longer acting and can be administered just 3 times a week instead of daily, thus reducing the need for take-home methadone and the likelihood of diversion (121). NIDA has recently awarded a contract to Biometrics Research Institute to sponsor LAAM to the Food and Drug Administration for marketing approval (see ch.3) (35). Patient acceptance of programs administering LAAM and retention rates (varying from 17 to 77 percent), however, are a problem. Abuse patterns, possible metabolic differences, and patient lifestyles and treatment expectations (e.g., some clients may need daily contact with the clinic, while others may find it annoying and disruptive) may play a role in overall effectiveness (121,164,290). Thus, methadone and LAAM may not be equivalent interventions for all heroin abusers. This reality underscores the importance of further research to identify those patients for whom each agent is more appropriate and to match them accordingly.

## **Pharmacotherapies for Cocaine Abuse**

Several medications under development or in the early stages of testing may assist the treatment of cocaine abuse. In fact, the latter category includes certain drugs already used to treat other disorders, especially depression.

The potentially useful drugs for cocaine abuse are employed to ameliorate cocaine-associated anhedonia, depression, or craving. Some clinical studies have found that certain currently used antidepressants decrease cocaine craving and depression, thus facilitating the abstinence process. The most promising drugs so far are the tricyclic antidepressants desipramine and imipramine (114,115,117). Another drug that may reduce withdrawal distress and craving is bromocriptine, a drug used to treat Parkinson's disease (106). Bromocriptine works faster than desipramine, but wears off more quickly. This pattern suggests that bromocriptine may be more effective in the early phases of withdrawal, while desipramine may be more helpful in the later stages of cocaine abstinence (106).

Although initial results are promising, thorough scientific evaluations, with randomized placebo-controlled double blind studies and longer followup

times, are necessary to establish efficacy and to identify groups that are most likely to benefit.

### Combined Therapy for Heroin and Cocaine Abuse

A potentially helpful drug for treating the dual abuse of heroin and cocaine is buprenorphine (see ch. 3). This drug is a partial opiate agonist, that is, it has a diminished opiate effect compared with full agonists, such as methadone. Its slow onset entails a minimal risk of overdose and minimal withdrawal (35). It produces a generalized feeling of contentment and has been used effectively to detoxify heroin abusers (181,259). In addition, buprenorphine has the potential to facilitate the transition from opiate abuse to drug-free status, naltrexone, or methadone maintenance (310). During clinical studies, buprenorphine seemed to decrease cocaine use among opiate users (181). Results from another study of daily administration of buprenorphine to rhesus monkeys that were self-administering cocaine showed that cocaine use was suppressed during the daily administration of buprenorphine (211).

### Summary of the Effectiveness of Other Pharmacotherapies

Despite the potential that pharmacotherapies other than methadone hold for drug abuse treatment, their promise has not fully materialized. Further research is needed to show how these pharmacotherapies can be used in appropriate ways as adjunct to longer term treatment. Many of these promising medications are currently undergoing controlled clinical trials. It is imperative that evaluations be conducted to establish not only their efficacy but also their effectiveness in actual treatment environments.

#### *Therapeutic Communities (TCs)*

Transmission of HIV infection is not confined to IV heroin use. Sharing of injection equipment regardless of the choice of drug (heroin, cocaine, amphetamine) and crack-related high-risk sexual behaviors all relate to HIV spread. Treatment in TCs does not target specific drugs of abuse; rather it aims at a complete behavior change and a drug-free lifestyle. Thus, TCs have the potential to contribute to efforts to prevent HIV infection among the populations they serve.

Information on the effectiveness of TCs comes primarily from two national evaluation studies (DARP and TOPS) and program-specific evaluations conducted mainly by De Leon (76). This section presents separately the findings for each study. All the evaluations reviewed here involve TCs with planned durations of stay exceeding 12 months.

### Program-Specific Studies

In the early 1970s, a series of evaluation studies were conducted at Phoenix House, the largest TC in the country. Two cohorts, one admitted in 1970-71 and the other in 1974, were followed to examine treatment effectiveness. The majority, 85 percent, of the admitted population of the 1970-71 cohort were heroin abusers, while 53 percent of the 1974 cohort abused heroin. These proportions reflect the predominance of heroin as the primary drug of abuse during the 1970s and the changing patterns of drug use in the middle of the decade. The early cohort was followed for 5 to 7 years, and the second cohort (1974) was followed for 2 years. Followup rates of the original samples were 80 percent (76,80). The outcome measure was absolute success throughout the years of followup (not at year of followup like other studies), defined as self-reported achievement of total abstinence from drugs and no criminal activity, a rather stringent criterion.

Tables 4-5 and 4-6 present the findings for program graduates and dropouts, respectively, according to the type of drug and time spent in treatment. After two years of followup, 95 percent of the 1970 cohort and 90 percent of the 1974 cohort program graduates were abstinent from opiates and had no involvement with criminal activity. When

**Table 4-5--Percent Success Among Program Graduates, Phoenix House**

Cohort	Years to followup	Percent Success <sup>a</sup>	
		Opiates	All drugs
1970	2	95	89
	5-7 (mean = 6.4)	79	75
1974	2	90	68

<sup>a</sup>Defined as self-reported achievement of total abstinence from drugs and no criminal activity. The traditional period of TC treatments is 18 to 24 months.

SOURCE: De Leon (76); De Leon and Jainchill (82); and De Leon, Wexler, and Jainchill (84).

**Table 4-6--Percent Success<sup>a</sup> Among Program Dropouts, Phoenix House**

Cohort	Years to followup	Months in treatment	
		< 12	> 12
1970.....	3-6 (mean = 4.7)	17	42
1974.....	2	25	52

<sup>a</sup>Defined as self-reported achievement of total abstinence from drugs and no criminal activity.

SOURCE De Leon (76); De Leon and Jainchill (82); De Leon, Wexler, and Jainchill (84).

non-opiate drugs are taken into account, 89 percent of the 1970 cohort and 68 percent of the 1974 cohort were successes. After a mean of 6.4 years of followup of the 1970 cohort graduates, the success rate for those whose primary drug of abuse was heroin, was 79 percent, while it was 75 percent from all graduates regardless of the primary drug of abuse. The results for those who did not complete treatment (dropouts) according to the time they spent in treatment are shown in table 4-6. The mean followup time was 4.7 years for the 1970 cohort dropouts and 2 years for the 1974 cohort dropouts. For the earlier cohort, the success rate at followup for those who remained in treatment fewer than 12 months was 16 percent, compared with 42 percent for those in treatment at least 12 months. Similarly, of the 1974 cohort 25 percent who spent fewer than 12 months in treatment v. 52 percent of those who spent at least 12 months in treatment remained successful 2 years after dropping out of the program. Multiple regression analysis of the data found that time in treatment was the most significant predictor of success (76,77,79,84,89).

DeLeon also conducted an extensive review of the literature on the effectiveness of TCs. The review examined studies that varied considerably in study design, sample size, length of followup, and degree of sophistication in the data analysis (75). DeLeon concluded that all studies showed consistent findings with regard to treatment effectiveness. Drug use and criminal behavior decreased, while social functioning (employment or school involvement) increased. Consistent results pointed towards significant improvements on most psychological scales during treatment and followup. Self-esteem, ego strength, socialization, and depression scores all improved, although they did not reach normal, healthy levels (75,78). Furthermore, those studies that compared program graduates with program dropouts found significant positive differences on all outcomes for those completing the planned duration of treatment.

### DARP Study

The reported findings from this large-scale national evaluation pertain to white and black males only. It should also be noted that these outcomes pertain to *all clients who were admitted* to treatment regardless of the length of time they spent in treatment. The outcome measure was daily opiate use and is reported for the 2 months before entering treatment and during the first and third year post-treatment. Table 4-7 presents the findings. Although the prevalence of daily opiate use was 100 percent before treatment in TCs, it dropped to 39 percent during the first year after treatment and dropped further to 26 percent during the third year post-treatment. The prevalence of any lifetime arrest

**Table 4-7--Percent Self-Reported Opiate Use, Criminal Activity, and Employment by Males<sup>a</sup> in Therapeutic Communities, DARP**

Category	Pre-treatment period <sup>b</sup>	During 1 year after treatment	During 3 years after treatment
Daily opiate use .....	100	39	26
Arrest .....	95	33	23
Incarceration .....	62	33	32
Employment half-time or more .....	20	61	68

<sup>a</sup>Statistics refer only to white and black males.

<sup>b</sup>The pre-treatment periods varied: 2 months for opiate use, lifetime for arrest and incarceration, and previous 12 months for employment.

<sup>c</sup>Average followup rates were 79 percent for cohorts admitted from 1969 to 1971 and from 1971 to 1972 and 69 percent for the cohort admitted in 1973 to 1974.

SOURCE Simpson and Sells (272).

or incarceration was 95 percent and 62 percent, respectively, among clients entering treatment. These arrest and incarceration rates were reduced to 23 and 32 percent, respectively, during the third year after treatment. The rate of incarceration was higher than the rate of any lifetime arrest during the third year. This may be a reflection of no new arrests for some abusers during that year, at the same time that some may have been in jail serving time from arrests in previous years. The proportion of clients who were employed half-time or more at baseline (previous 12 months) was 20 percent. During the third year after treatment the proportion more than tripled to 68 percent (272).

**TOPS Study**

**Drug Use**--The results for drug use are reported separately for heroin and cocaine (see table 4-8). These results pertain to those who stayed in treatment at least 3 months. By the end of the third month, however, 56 percent of the TC clients discontinued treatment. The median time spent in treatment of the total TC sample was 11 weeks (147,149,150). The findings from those who remained fewer than 3 months are similar with respect to heroin use to those who stayed 3 months or more. With regard to cocaine use and criminal activity, however, those who spent fewer than 3 months had worse results than those who remained more than 3 months (149).

One year before treatment, the prevalence among TC clients of heroin use was 30.9 percent and cocaine use was 27.6 percent. After 3 to 5 years of

followup, the numbers of regular heroin and cocaine users (weekly or daily use) decreased about two thirds to a prevalence of 11.8 and 9.6 percent, respectively. These improvements are also reflected in the 1-year abstinence rate. Of those using heroin 1-year prior to treatment, more than 50 percent ceased using it the year after treatment; the equivalent figure for cocaine was 47 percent. The overall improvement rate (those who either stopped or decreased use during the year after treatment) for those who remained in treatment for at least 3 months was 70 percent for heroin and 68 percent for cocaine.

**Criminal Activity**--More than half of the residential clients of TCs (60 percent) were involved in some kind of criminal activity in the year prior to treatment (table 4-8). This proportion plummeted to 3.1 percent while in treatment, increased gradually to 28.9 percent at 1 year after treatment, and dropped again to 19.8 percent at the 3- to 5-year followup. Of those who engaged in criminal activity during the year prior to treatment, 75 percent had not been involved in criminal activity during the year after treatment.

**Employment**--Only a small proportion (15.3 percent) of the clients entering residential TC treatment were employed full-time the year before entry (table 4-8). The proportion of full-time employed clients more than doubled immediately after treatment, and although it fluctuated subsequently, it stabilized at 38.7 percent at the 3- to 5-year followup (approximately 2.5 times higher than originally).

**Table 4-8-Percent Self-Reported Drug Use, Criminal Activity, and Employment by Therapeutic Community Clients Treated at Least 3 Months, TOPS<sup>a</sup>**

Category	Year before treatment	3 months in treatment	3-month followup	1-year followup	2-year followup	3-5 year followup
Regular heroin use <sup>b</sup> .....	30.9	0.3	10.7	11.5	13.2	11.8
Regular cocaine use.....	27.6	0.1	12.9	15.5	8.0	9.6
Serious predatory crime.....	60.9	3.1	25.2	28.9	24.0	19.8
Full-time employment.....	15.3	2.2	35.8	27.7	20.9	38.7

ABBREVIATION: NA = not available

<sup>a</sup>No statistics on followup rates for clients treated at least 3 months were presented. For all those in therapeutic communities, regardless of the duration of treatment, followup rates ranged from 81 percent for 3-months followup to 65 percent for 3-5 year followup.

<sup>b</sup>Weekly or more frequent use.

SOURCE: Hubbard, Maraden, Rachal, et al. (149).

Time in Treatment and Outcome--Several studies that examined "time-in program" factors have been reviewed by DeLeon and Anglin (13,75,77). Although the magnitude of the effect of time in treatment varied across studies, few studies failed to demonstrate a positive effect. The authors concluded that time spent in treatment was the most powerful predictor of a favorable outcome (13,77,82). It should be noted, however, that establishing the causal link between time in treatment and treatment effectiveness is methodologically a formidable task. Factors external to treatment that influence the natural history, such as self-selection and motivation, can confound the results by contributing to observed outcomes.

One of the more methodologically sound studies that attempted to overcome these limitations was conducted by Holland in 1983 (144). The study sample consisted of 400 former residents of Gateway House, a TC in Illinois with a planned duration of treatment of 2 years. Three admission cohorts were included according to the year of first admission to the facility (1968-1970, 1970-1972, and 1972-1974). The subjects were further classified into four groups according to the time spent in the program (fewer than 3 months, fewer than 9 months, more than 9 months but not treatment completion, and graduation from treatment). To measure treatment effectiveness, composite indexes were constructed for the following outcome measures: drug use, alcohol use, criminality, employment, and social stability. Data

analysis was performed in two stages. The initial analysis examined changes in the outcome criteria between baseline and followup. Post-treatment improvements in all areas except alcohol use were observed for all four groups. The degree of improvement increased with increasing time in treatment. In the second stage, the investigator attempted to evaluate alternative hypotheses that could have explained the observed treatment effects. Multiple regression analyses and time-series analysis examined the validity of several rival hypotheses: an interaction between maturation and selection; differences in time between discharge and followup among the four groups; differential followup completion rates for the above groups, and differential validity of the self-reported data. The conclusion of the study was that, "data probes revealed that, in general, time in program was the single best predictor of post-treatment outcome and that the data failed to support the rival hypotheses" (144).

Data from the TOPS study were also analyzed through multivariate regression analysis to examine factors associated with the observed outcomes and behaviors. These independent variables consisted of sociodemographic measures, prior treatment episodes, sources of referral, pre-treatment drug abuse patterns, treatment durations, and subsequent treatments. The analysis of these data (shown in table 4-9 supports the conclusion that for heroin abusers, time spent in treatment was the primary factor associated with treatment effectiveness.

**Table 4-9--Odds Ratios for Post-Treatment Outcomes in the First Year After Residential Treatment, by Treatment Duration, TOPS**

Outcome	Time spent in treatment				
	Comparison group 1-13 weeks n = 60	14-26 weeks n = 325	c 1 week n = 137	27-53 weeks n = 95	>52 weeks n = 114
Regular heroin use <sup>b</sup> .....	1.00	0.69	0.43	0.52	0.28 <sup>c</sup>
Regular cocaine <sup>b</sup> .....	1.00	0.98	1.04	0.85	0.38
Predatory crimes .....	1.00	1.07	0.61	0.43 <sup>c</sup>	0.29 <sup>d</sup>
Full-time employment .....	1.00	0.57	0.87	0.90	2.65 <sup>e</sup>

a Self reports from 731 of the 1,282 clients who were sampled for followup.  
Weekly or more frequent use.

>< .05  
p <.001  
e p <.01

SOURCE: Hubbard, Marsden, Rachal, et al. (149).

Overall, positive results were more likely to be achieved by those who remained in treatment for more than 52 weeks. Clients who spent more than 52 weeks in treatment compared with those who left prematurely within the first week were 72 percent less likely to use heroin, 70 percent less likely to be involved in criminal activity, and 165 percent more likely to be fully employed. Although they were also 60 percent less likely to use cocaine, this difference did not reach statistical significance (149).

**Dropout Rates**--Although people treated in TCs have successfully achieved a **variety** of positive outcomes in addition to reducing drug use, their overall impact is severely impaired by their limited ability to keep clients in treatment, either for the whole planned duration or for a time sufficient for treatment to exert some positive influence. Research shows that clients leave treatment prematurely for both personal and program-related reasons (79). This difficulty retaining clients is certainly related to the rigorous, demanding, confining, and confrontational nature of treatment in the TC environment.

There is a consistent temporal pattern of dropping out of TCs. A compilation of studies showed that the sharpest dropout rate occurs during the first 30 days after admission, during which 35 to 50 percent leave. The dropout rate continues to increase further, so that by the end of the third month into treatment, the cumulative dropout rate ranges from 50 to 70 percent. Thereafter, the rate of leaving treatment slows. The retention at 1 year is between 15 and 25 percent, and actual completion rates range from 10 to 15 percent. Recent reports indicate that there was an improvement in retention rates in the latter part of the 1980s (79). Although it is hard to identify the exact reasons for such an improvement, it is speculated that the improvement may be partially attributed to client characteristics (e.g., an aging opiate-users cohort, fear of relapsing into cocaine and crack abuse) and improved staff training (79).

**Predictors of Retention**--Research on predicting retention and identifying client attributes that influence retention in TCs has not been particularly informative, with a few possible exceptions (75,79). A distinct client profile does not seem to exist;

however, client variables such as severe criminality and psychopathology do appear to be negatively associated with retention. Factors such as personal motivation (intrinsic pressure), readiness (one's perceived need for assistance to change), and suitability (the appropriateness of the client-treatment match) may influence the decision not only to enter but also to remain in treatment as well (156). Data from TOPS indicated that older clients, those who were not married at the time of treatment, those who were not depressed at entry into treatment, and those who were referred by the criminal justice system were more likely to remain longer in treatment (149). In addition to the influence of client characteristics on retention, it has been suggested that program parameters related to quality (e.g., staff composition, experience, and administration) might play a role, but these factors have not been fully evaluated. De Leon noted that although there are limitations in prediction studies, "Psychological, motivational, perceptual and other 'dynamic' variables appear more relevant to retention, than do 'freed' variables such as demography, drug use pattern, and family background" (79). An ongoing NIDA-funded study, which uses an experimental design to examine the effect of three interventions on modifying early dropout from a TC, has shown some encouraging results (79).

### Summary of TC Effectiveness

The substantial improvements among drug abusers who continue in TCs and the persistence of these changes years after treatment are consistent with TCs' effectively reducing drug use, at least among those who commit themselves to complete the whole course of treatment. It is noteworthy, however, that, a sizable minority of dropouts, 30 to 35 percent, also appear to be successful during the followup period (76). Of all those admitted to treatment, regardless of time in treatment, 30 percent achieved absolute success (no drugs, no crime), with improvement rates ranging from 50 to 60 percent (76,81). Success rates do not vary considerably (no more than 15 percent variation) among specific programs (80). In judging these results, one should keep in mind that the program-specific evaluations probably were performed in the more research-oriented programs that had the drive and

capability to evaluate themselves. Program-specific results might therefore show higher effectiveness rates than would those present in the average TC facility. On the other hand, results from the national studies are averages over several programs that may also include some shorter term or modified residential programs (149). These results may therefore dilute the effectiveness of the more traditional, homogeneous, and higher quality programs.

It should be noted that these high success rates were observed among abusers who completed treatment in TCs. Although real improvements are also seen among clients who spent some time in treatment but left prematurely, the self-selection of clients remaining in treatment may directly influence the direction and the size of the observed beneficial effect of treatment (242). It should be further noted that the likely cumulative effect of time in treatment relates mostly to heroin use.

It is indeed a severe limitation of the TCs that only a small minority of their clients remain in treatment long enough to realize the associated benefits (10 to 15 percent of those admitted). Whether these highly motivated individuals would attain the same improvements in the absence of the specific intervention is unclear. It should also be noted that TOPS data showed that TC residents were characterized by greater problem severity among many dimensions, including more involvement with multiple drug abuse (149). These factors may influence retention and contribute to high drop-out rates.

Factors that influence retention other than client characteristics (e.g., treatment environment vari-

ables) should also be identified. Efforts should be made to identify those patients for whom this structured residential program would be most beneficial. Increasing retention rates in TCs might play a significant role in reducing the use of drugs and associated crimes.

Finally, although the effectiveness of the traditional TCs has been evaluated, the same cannot be said for the shorter-term residential programs. As yet no studies have evaluated the effectiveness of the 21-day, 30-day, or 6-month residential programs.

### *Outpatient Drug-Free (ODF) Programs*

Data regarding the effectiveness of outpatient drug-free (ODF) programs are sparse and stem primarily from the two large-scale national multi-modality studies (DARP and TOPS) that included ODFs in their evaluations. It should be kept in mind that the reported effectiveness of ODFs pertains to an amalgam of centers, a diverse collection of programs with little uniformity, whose common denominator is their drug-free philosophy and outpatient nature. As mentioned in chapter 3, ODFs usually provide some or all of the following services: counseling therapy, education, ancillary services, and a 12-step program. These services are not dependent on the type of drug of abuse.

### **DARP Study**

Pre-treatment and 1- and 3-year post-treatment outcomes for opiate addicts with respect to daily opiate use, employment, and criminality of ODF clients are presented in table 4-10. These findings

**Table 4-10-Percent Self-Reported Opiate Use, Criminal Activity, and Employment by Males<sup>a</sup> in Outpatient Drug-Free Treatment, DARP**

Category	Pre-treatment period <sup>b</sup>	During 1 year after treatment	During 3 years after treatment
Daily opiate use .....	100	44	28
Arrest .....	87	34	22
Incarceration .....	51	34	36
Employment half-time or more . . . . .	24	52	66

<sup>a</sup> Statistics refer only to white and black males.

<sup>b</sup> The pre-treatment periods varied: 2 months for opiate use, lifetime for arrest and incarceration, and previous 12 months for employment.

<sup>c</sup> Average follow-up rates were 77 percent for cohorts admitted to treatment from 1969 to 1971 and from 1971 to 1972 and 70 percent for the cohort admitted from 1973 to 1974.

SOURCE: Simpson and Sells (272).

pertain to white and black males only and refer to all clients admitted to treatment. Daily opiate use declined from 100 percent prior to treatment to 44 and 28 percent 1 and 3 years after treatment, respectively. The proportion of those who were employed half-time or more rose from 24 percent at baseline to 53 percent during the third year after treatment. Both measures of criminality also improved: any arrest declined from 87 percent to 22 percent during the third year post-treatment, and arty incarceration dropped from 62 to 32 percent at the same time interval (272).

**TOPS Study**

Table 4-11 shows the TOPS findings relating to ODF programs with respect to drug use, criminality, and employment. These findings refer to those who spent at least 3 months in treatment (149). By the third month, nearly 64 percent of the clients had either dropped out, transferred, or completed treatment; the median time spent in treatment for the total ODF sample was 7.9 weeks (149,150). For people who spent fewer than 3 months in treatment, the magnitude of the observed improvement in all three outcome measures was smaller than the improvement observed among those who remained in treatment more than 3 months.

**Drug Use**--The prevalence of heroin and cocaine users among ODF clients was small; however, within this group both heroin and cocaine use decreased. Among those who entered ODF programs, 8.6 percent used heroin and 12.8 percent used cocaine regularly (weekly or more frequently) the year before (the majority of clients were using marijuana and

prescription drugs) (149). The prevalence of regular users of both drugs declined by half at the 3- to 5-year followup to 4.6 and 5.6 percent, respectively, for heroin and cocaine. Because of the relatively small numbers of heroin users, abstinence and improvement rates could not be calculated. Measurement of abstinence and improvement rates were possible for cocaine users who remained in treatment at least 3 months. Of those who used cocaine regularly during the year before treatment and who stayed in treatment at least 3 months, 42 percent ceased use the year following treatment (abstinence rate), and a total of 77 percent either stopped use completely or decreased it during the year after treatment (improvement rate).

**Criminal Activity and Employment**--During the year preceding treatment, 33.5 percent of ODF clients were involved in a predatory illegal act (149). This proportion declined to 7.6 percent at the 3- to 5-year followup. Similar improvement was observed among ODF clients with respect to full-time employment. Although 27.1 percent were fully employed 1 year before treatment, almost twice as many (49.7 percent) were fully employed 3 to 5 years after treatment. These improvements are reflected in the abstinence rate for illegal activity (for those who spent at least 3 months in treatment). Almost two-thirds of the clients reporting illegal acts the year prior to treatment had eliminated their criminal involvement the year after treatment. Similarly, more than one-third (35 percent) of those who were not fully employed the year before treatment had engaged in more weeks of full-time employment in the year after treatment.

**Table 4-1 I-Percent Self-Reported Drug Use, Criminal Activity, and Employment by Outpatient Drug-Free Clients Treated at Least 3 Months, TOPS<sup>a</sup>**

Category	Year before treatment	3 months in treatment	3-month followup	1-year followup	2-year followup	3-5 year followup
Regular heroin Use <sup>b</sup> .....	8.6	3.0	5.1	4.9	4.9	4.6
Regular cocaine Use <sup>b</sup> .....	12.8	3.5	9.0	8.1	2.9	5.6
Serious predatory crimes .....	33.5	9.4	11.0	18.7	14.5	7.6
Full-time employment .....	27.1	36.0	38.2	38.5	39.4	49.7

ABBREVIATION: NA = not available

<sup>a</sup>No statistics on followup rates for clients treated at least 3 months were presented. For all those in outpatient drug free programs, regardless of the duration of treatment, followup rates ranged from 84 percent for 3-month followup to 65 percent for 3-5 year followup. Weekly or more frequent use.

SOURCE: Hubbarrr, Marsden, Rachal, et al. (149).

Dropout Rates--Although perhaps to a lesser degree, outpatient drug-free programs suffer from the same drawback as TCs, namely a limited ability to retain clients in the program for the planned duration of treatment. The TOPS data showed that within a week or less, 21 percent, and by the end of the first month, 36 percent had dropped out (147,149,150). By 3 months, approximately 64 percent of the clients had either dropped out, transferred, or completed ODF treatment. Overall, longer stays of treatment were related to factors such as older age, female sex, education beyond high school, criminal justice referrals, and no heavy alcohol use (149,150).

Treatment Duration and Outcome--A multivariate analysis of the TOPS data examined the effect of treatment duration on various outcome measures (table 4-12). In contrast with the other modalities, the analysis indicated that length of treatment was a statistically significant predictor of both criminal activity and full-time employment, but not of heroin or cocaine reduction (149). Those who stayed in the program more than 26 weeks were half as likely to be involved in illegal activity, and almost twice as likely to be fully employed than those with less than 1-week attendance. Client population characteristics (better educated, most likely to be first treatment episode) or the absence of a real length of treatment effect may account for the observed lack of an association between time in treatment and lower heroin and cocaine use.

### Summary of ODF Effectiveness

Interpretation of treatment results of the ODF programs is hampered by the lack of uniformity among ODF programs. Based on the DARP evidence, Anglin and Hser in their review stated that although the ODF modality appeared to be as effective as the other modalities, the number of clients served was usually small, and the most favorable outcomes were observed among those clients who used opiates less than daily, usually together with other drugs, or who used only non-opiates (13). The more recent TOPS data suggest lower drug use and other favorable outcomes for the drug users treated in this modality. However, direct comparison with the other modalities may not be appropriate because of the self-selection of patients to each modality and the subsequent differences among the client populations. The investigators suggest that clients attracted to ODF treatment are people with less severe problems and better societal functioning who may be more amenable to change (149). Positive outcomes for those who remained in treatment for at least 3 months were reflected in the improvement rate for cocaine (77 percent of regular users in the year before treatment who ceased or reduced drug use the year after treatment) and the levels of employment (a doubling of the pre-treatment proportion at the 3- to 5-year followup) (149).

Although the drug use, criminal activity, and social productivity, of those in ODF programs improve at least for the specific and selective client

**Table 4-12-Odds Ratios for Post-Treatment Outcomes in the First Year After Outpatient Drug-Free Treatment, by Treatment Duration, TOPS**

Outcome	Time spent in treatment			
	Comparison group < 1 week n = 183	1-13 weeks n = 344	14-26 weeks n = 165	>26 weeks n = 162
Regular heroin use . . . . .	1.00	1.03	1.43	0.35
Regular cocaine . . . . .	1.00	1.14	1.15	0.76
Predatory crimes . . . . .	1.00	0.73	0.63 <sup>c</sup>	0.47 <sup>d</sup>
Full-time employment . . . . .	1.00	0.90	1.35	1.95 <sup>c</sup>

a Self reports from 854 to 1,449 clients who were sampled for followup.

Weekly or more frequent use.

< . 0 5

p c .01

SOURCE: Hubbard, Marsden, Rachal, et al. (149).

population they serve, more needs to be learned with respect to the diversity among ODF programs and their clients. Furthermore, because studies of ODF programs, unlike those of methadone maintenance and TCs, have not documented treatment content, conclusions about ODFs maybe more tentative.

Organizational and structural elements that may contribute to treatment effectiveness are not clearly known.. To this end, program-specific research that takes into account program content may shed light on ODF effectiveness. This knowledge, while currently limited, is of extreme importance because of the potential that outpatient programs hold for a more cost-effective provision of drug abuse treatment.

### *Results Combining Treatment Modalities*

Some studies report overall treatment effectiveness without distinguishing among treatment modalities. These studies are summarized below.

In a carefully designed prospective study, McLellan and colleagues examined the effect of substance abuse treatment on several outcomes, including alcohol and drug use and the use of medical, legal, employment, family, and psychiatric support services (209). They compared a group of 225 mostly heroin abusers with a comparable group of 57 abusers who received fewer than 15 days of treatment. The followup time was 6 months. Admission and followup data were based on the addiction severity index, a standardized instrument based on self-reported data from a 30- to 40- minute clinical interview. This useful diagnostic tool, whose reliability and validity have been demonstrated, measures problem severity in six areas (i.e., medical, legal, employment, family, psychological, and substance abuse) and yields a 10-point rating of the above dimensions (208). The treatment programs included a methadone maintenance clinic, a short-term 45-day intensive therapy group based on Narcotics Anonymous principles, and a 60-day drug abuse rehabilitative program offering a variety of ancillary services. Assignment to a program was based on a combination of personal preference, clinical judgment, and chance. Overall, 13 percent of the drug abusers dropped out of treatment, but the dropout rates did not differ significantly among the various programs (209).

The investigators stated that the observed positive findings pertained to all of the above programs. The results for the treated group suggested major improvements in most areas, notably a decrease in the average days of opiate use (in the past 30 days) from 13 to 3 days and increased employment days (in the past 30 days) from 3 to 10 at the time of the 6-month followup. In addition, the comparison of the two samples revealed significantly better post-treatment outcomes and larger treatment effects across all seven outcome dimensions.

Kosten and his colleagues at the Substance Abuse Treatment Center of the Connecticut Mental Health Center followed 150 opiate abusers for 2.5 years (183). Their facility included inpatient detoxification, methadone maintenance programs, a naltrexone outpatient program, and a therapeutic community program. The patients were assessed at admission and at followup with the addiction severity index, At the 2.5 year followup, significant improvements had occurred in drug use and legal and psychological problems. At admission, the mean days of opiate use were 23.7 in the last 30 days, which after 2.5 years dropped to 4.9 days, a statistically significant difference. Likewise, the mean number of crime days declined from 14 to 3.8, and the mean number of anxiety days declined from 11.7 to 5.8 (both of the above improvements were statistically significant).

The investigators of the DARP study presented a comprehensive summary across treatment modalities of a 12-year followup of a sub-sample of the stratified random sample of 4,107 patients who were selected for the 6-year followup study (270). This sub-sample comprised 490 patients who were all daily opiate users at the time of admission. Daily opiate use decreased from 100 percent to 28 percent at the 3-year followup and decreased further to 24 percent at the 12-year followup. Although nonopiate use initially declined from 55 percent to 35 percent at the 6-year followup, this trend was reversed to 47 percent at the 12-year followup. Since greater use of cocaine accounted for this increase, clients may have been substituting cocaine for heroin use. Similarly, the employment pattern fluctuated during these years of followup from 36 percent of clients reporting 6 or more months of employment pre-DARP to 61 percent at year 3 and 54 percent at year 12. Finally, criminal involvement, measured as percent with any

arrest, decreased steadily from 87 percent pre-DARP to 22 percent and 13 percent at the 6- and 12-year followups, respectively.

### *Acupuncture*

It has been suggested that acupuncture can serve as an alternative mode of drug abuse treatment (275). Acupuncture for drug abuse treatment involves the insertion of three to five special needles under the surface of the external ear for a period of time, a process that can be performed on an out-patient basis. Proponents of this technique claim that it can control withdrawal symptoms and drug craving and reduce the fears and hostilities that are usually present in traditional drug abuse treatment settings (275).

Advocates view acupuncture as an adjunct treatment during detoxification. It is further considered to be only one component of drug abuse treatment, which includes such activities as daily urine testing, counseling, participation in Narcotics Anonymous, and educational and employment referrals (275).

The efficacy and effectiveness of acupuncture in treating drug abuse, however, have not been established (368). Recently, in 1989, encouraging results were reported from a placebo-controlled study with regard to treatment of alcoholism (43). Eighty subjects described as severe recidivist alcoholics were randomly assigned to a treatment (acupuncture at specified ear points) and a control group (acupuncture at non-specific ear points). Treatment duration was 8 weeks, and followup time was 6 months, with a followup rate of 77.5 percent. Retention and program completion differed significantly between the two groups, with 21 of the 40 patients in the treatment group and only 1 of the 40 in the control group completing treatment. At the 6-month followup, control patients had more than twice the number of drinking episodes and admissions to a detoxification center.

Additional research is needed to provide conclusive evidence about the short- and long-term effectiveness of acupuncture in treating drug abuse. Randomized controlled studies seem to be a feasible option in the evaluation of this technique. Further,

studies could be done on a blinded basis, since a sham acupuncture process can be used as a placebo, while all drug abuse clients receive the other treatment elements.

### *Parameters Related to Treatment Outcome*

Almost all of the studies that evaluated treatment effectiveness also examined whether other factors related to clients or programs influenced treatment outcomes. This distinction may overlook possible interaction between these sets of variables. Proving that a certain factor relates to-treatment outcome is a very challenging methodological endeavor, even for the most soundly designed studies. Even if there were no interactions among variables, it would be difficult to dissect their contributions due to the lack of a strict experimental setting and procedures. One of the most problematic factors of abuse research is clients' self-selection of treatment modalities, which has a profound potential to confound the findings of any study that does not use random allocation to treatment. Despite these problems, the strength and consistency of the evidence provided and reproduced by a variety of studies, especially those employing prospective designs and sophisticated analysis, may overcome some of these limitations. The following section describes some additional characteristics in addition to those highlighted earlier in the modality-specific research.

### **Patient Characteristics**

A spectrum of individual characteristics may influence treatment outcome. Some characteristics relate to the social environments of abusers (e.g., social support systems). Demographic factors, such as age, gender, ethnicity, and education may also be important. Finally, there are more dynamic characteristics, such as an abuser's motivation, severity of abuse, and psychopathology. Not surprisingly, the former characteristics have been more extensively examined than the latter, since their measurement is more simple and feasible. The evidence thus far, as summarized by Anglin and Hser in their review of treatment effectiveness, is that, "abusers who have a more stable family background, an intact marriage, a job, a history of minimal criminality, less evidence of alcohol or polydrug use, and less severe psychiatric disorders are more likely to achieve a better outcome

in most programs (13).” Thus, this circularity resembles the “rich get richer, and the poor get poorer” phenomenon; the attributes of a better outcome may be the same factors that influence the decision to seek and remain in treatment in the first place. The real challenge for drug abuse treatment is to achieve or improve success with the “poorer” clients as well.

### **Program Characteristics**

In the same review, Anglin and Hser state that certain program elements (e.g., psychotherapy, urine testing, legal coercion, and program policies and staffing), when implemented appropriately, have been found to exert a beneficial effect (13).

Psychotherapy addresses the “broader range of psychiatric symptoms that are prominent among drug abusers” (234). The majority of evidence suggests that psychotherapy may be related to improved outcomes for selected groups of abusers. It appears that especially for abusers with moderate to severe psychiatric problems, psychotherapy has the potential to improve treatment outcomes (234,377).

Monitoring illicit drug use while in treatment through urine testing is a common practice. The existing evidence suggests that urine testing alone does not improve treatment outcome; however, there is evidence that linking urine testing results with positive or negative contingencies does influence treatment outcome (13,285).

With regard to whether those who enter treatment under some form of legal coercion tend to benefit from treatment, the reviewers note that the majority of the findings, especially from the better designed studies, “generally support the idea that a collaborative relationship between the Criminal Justice System (CJS) and community treatment delivery systems produces, at an aggregate level, enhanced treatment outcomes” (13). In other words, the results tend to be at least comparable to outcomes produced from those who enter treatment voluntarily.

### *Matching*

A major area that holds promise for increased treatment effectiveness and efficiency is matching individual clients to specific treatment and treatment components according to their needs. Two related and well designed studies conducted by researchers at the VA Medical Center in Philadelphia and the Department of Psychiatry of the University of Pennsylvania are relevant to this issue.

A retrospective analysis was performed in a 1978 cohort of 282 drug-dependent male veterans treated in the VA treatment network to identify possible program-patient matches that were associated with favorable or unfavorable results (210). Patients were evaluated with the addiction severity index both at admission and at 6-month followup. Initial analysis indicated that a patient’s psychiatric severity as estimated at admission was the single best predictor of most outcome measures. Based on this finding, the sample was classified into low, mid, and high psychiatric severity groups, and the data were reanalyzed. Results of the second analysis revealed that the low severity group improved significantly regardless of the modality, while the high-severity group showed poor outcomes regardless of their treatment program. In contrast, specific program factors related to improved outcomes were identified in the group with the mid-level of psychiatric severity. The findings from this retrospective study were then used to develop treatment assignment criteria and were subsequently tested in a prospective study.

The prospective study involved 321 drug-dependent patients, all male veterans who were evaluated at intake with the addiction severity index instrument and were eligible in 1980 for assignment to one of the programs in the VA treatment network (210). These programs included a combined alcoholism-other drug abuse 60-day inpatient treatment program, a 60-day TC, and a methadone maintenance clinic. A matching strategy was devised according to psychiatric severity and severity of other problems, such as medical condition, employment, alcohol use, other drug use, legal status, and family relations. Of all patients entering drug abuse treatment, 48 percent were matched to the program

that was predicted to be the best for them. Reasons for not matching were lack of a treatment slot in the assigned program (27 percent), patients' refusal (13 percent), and assignment errors (7 percent). Matched patients were compared with the mismatched during treatment and 6-month followup. It should be noted that treatment staff were blind to the matching status. Followup information was obtained for 94 percent of the subjects. Outcome criteria included psychiatric adjustment, alcohol use, other drug use, medical condition, employment, legal status, and family relations.

Overall, people in drug abuse treatment improved regardless of the client matching status and type of program. Treated patients showed decreases in both opiate and non-opiate drug use (67 and 50 percent, respectively), a 67-percent decrease in criminal activity, and a 20-percent increase in earned income. With regard to the patient matching status, the performance during treatment revealed that matched patients were more motivated during treatment, stayed in treatment longer, and had fewer irregular discharges than the mismatched patients. The 6-month followup results showed that matched patients had better outcomes in all categories than the mismatched. Matched patients had 27 percent better outcomes than the mismatched patients. The beneficial effects of matching were not confined to a particular treatment program or a particular patient group.

Such studies are of particular importance to the drug abuse treatment field and are long overdue. Additional research is needed to identify and test initial matching criteria. Criteria may be used to assign a particular type of patient not only to a treatment program but also to the appropriate treatment components and to the appropriate level of needed services. Research is also needed to identify whether additional factors particular to certain groups, such as racial or ethnic minorities or women, should be included in the matching strategy. To utilize the potential knowledge gained from research, a referral and treatment network, community-based and coordinated needs to be in place. Such a network could also reassign clients to another component or form of treatment if the initial treatment episode was not effective, or to aftercare

services when the client was considered fit to reenter the community. All this research ultimately could lead to a practice that has been common for a long time in the management of other medical conditions, namely an individually tailored treatment plan that takes into account the drug abuser's history and needs.

### *Other Contemporary Issues Related to Treatment*

#### **Special Populations**

Women--Substance abuse among women has not received adequate attention (160,311,314). Although the prevalence of illicit drug use is higher among men than women, the extent of the problem, the rising trends (especially for cocaine and crack use), and the consequences of drug abuse among women are alarming. The HIV epidemic has increased concerns about female drug use. Female abusers can be infected via drug-related or sexual behavior and subsequently transmit the virus to their partners and infants.

In 1988, approximately 9 percent (5.4 of the 60 million women of childbearing age (age 15 to 45) reported using an illicit drug in the past month (330). One million of these women had tried cocaine. A substantial majority of women seeking mental health services have had alcohol and other drug problems, which constitutes the second most frequent reason after depression for seeking treatment (32,212). Recent studies estimated that every year, 375,000 infants are exposed to illicit drug use *in utero*, nearly one-third of whom (100,000) are exposed to cocaine (51,53,122). Babies born to drug-using mothers tend to suffer higher mortality and morbidity rates. The consequences depend on the drug of abuse, the duration of use, and the dose taken. Death rates for infants of drug-using mothers are reported to be 4 times higher than for infants born to non-drug using mothers (160). Infants of abusers, especially of women using heroin, experience severe withdrawal symptoms after birth. In addition, *in utero exposure* may result in a spectrum of short- and long-term health impairments (219,277). At least one hospital study demonstrated that women using illicit drugs come from all socio-demographic groups (301). The rate of exposure among patients of private and public

hospitals was the same. Furthermore, there were no major differences in exposure between black and white women. Of those reporting illicit drug use, the majority of women in the above study (75 percent) reported use of cocaine (301).

With respect to drug use and HIV infection, the statistics are equally troublesome. Women make up 20 to 30 percent of the regular intravenous heroin-using population, an estimated 100,000 to 150,000 users (153). Currently, approximately 10 percent of all acquired immunodeficiency syndrome (AIDS) cases are women. About half of them (52 percent) were IV drug users, and an additional 20 percent were infected by heterosexual contact with an IV drug-using partner (349). Furthermore, of the 2,258 AIDS pediatric cases as of May 1990, nearly 60 percent were caused by exposure to HIV that was related to IV drug use (IV drug use by the mother or her sexual partner).

Between 1985 and 1988 the death rate among women of reproductive age (15 to 44 years of age) due to HIV infection quadrupled (60). In contrast, rates of other causes of death among women of reproductive age have remained relatively constant in the last decade. In 1988, the death rate of black women was nine times the rate of white women (60). Young black women in New York were nearly four times more likely to die of HIV infection than young white women (30 per 100,000 v. 8 per 100,000 respectively). If current mortality trends continue it is estimated that HIV/AIDS will become one of the five leading causes of death by 1991 among women of reproductive age (60).

Medical costs for children born to drug-using mothers can be substantial. One study in Los Angeles estimated in 1986 that the hospital care for the extended stay of 915 drug-exposed babies (70 percent were exposed to cocaine) totaled \$2.2 million (127). A report by the Office of the Inspector General for the U.S. Department of Health and Human Services Administration estimated that the health care and special services of crack babies will soon reach \$500 million (122).

Despite the significance of the female drug abuse problem, the issue has not been extensively studied until recently (32,160). It appears that the causes of

drug use, the natural history, and the needs of the female drug abuser are different from those of men (71,212). These differences have profound implications for appropriately addressing drug abuse treatment and prevention of HIV infection for female abusers. More specifically, research indicates that women are often influenced by intimate partners or male relatives to initiate and continue drug use and that their drug use serves a coping function in part as well as a desire to "get high." Women are more likely than men to use drugs at home, alone, or with intimate friends. Women's drug supplies depend primarily on their partners and friends. Female abusers also tend to have feelings of powerlessness and low self-esteem. They often lack a social network and face difficulties in maintaining intimate relationships. They tend to be very emotionally and sexually dependent on males (71,153,212). They often neglect themselves, and it is not uncommon for pregnant female abusers to delay identifying their condition and to wait until late in the course of pregnancy to seek prenatal care.

With respect to drug abuse treatment, women are often unrepresented and underserved (72,288). There are barriers for those women seeking treatment, and even for those who are admitted. Only a few centers provide a range of services tailored to their unique needs. According to one researcher, "male program staff... employed a confrontational therapeutic style uncomfortable for women, and directed them into gender stereotyped tasks and training" (56). Furthermore, treatment programs do not address the important issues of sexual exploitation and violence in which female abusers often live (56).

Most of the information on treatment effectiveness comes from studies with overwhelming majorities of male subjects. Some studies have found gender-related differences. One prospective study of urban black youth found that the benefits of treatment for heroin abuse were more evident among females than men (42). After entering treatment, the annual probability that a woman would be abstinent increased and was somewhat greater than men's. Similarly, in another prospective study of male and female drug abusers in a TC, De Leon and Jainchill found that females entered treatment with greater degrees of psychopathology,

but at followup showed greater improvement than males and seemed to require less time in treatment to achieve the same goals. Women's improvement appeared to be related to social role functions that were modified during residency at the TC (82).

Obstacles that have made it difficult to get women into treatment include their inadequate knowledge about drug abuse and its optimal management; lack of interest, insensitivity, and negative attitudes towards women; and insufficient resources (288). The hurdles pregnant abusers face in getting treatment for their abuse were illustrated in a recent study in New York City (54,57). According to a survey of 78 programs, fewer than one-half (46 percent) were accepting pregnant women. Furthermore, not all of these programs were equipped to address the special needs of pregnant women (less than half of the programs that did accept pregnant women provided prenatal care). Only two programs had provisions to accommodate the children of their female clients. Moreover, as the author states, "effective availability was further limited by restrictions on method of payment or specific substance of abuse" (55). Access to treatment was especially difficult for those women on Medicaid and using crack (56)

In 1989, the National Association of State Alcohol and Drug Abuse Directors estimated that the total number of women per year, including pregnant women, who are currently receiving treatment for alcohol and substance abuse is almost 550,000, with the total number of pregnant women being nearly 30,000. It was also estimated that 4 million women need treatment, of whom about 250,000 are pregnant (218).

Regardless of pregnancy, it is imperative that the needs of female abusers be addressed by the drug abuse treatment system and that they be reflected in the types of services offered by drug treatment programs. These needs can be identified by understanding the social, economic, psychological, and physiological dimensions of female drug abuse. Programs that tailor their services to women could integrate medical and reproductive care with psychiatric and counseling services, parenting

training, day care, and social and rehabilitative services. A substantial amount of research on female drug users has been compiled, and comprehensive treatment programs, especially for crack and cocaine, have been proposed (358). Since no effective pharmacotherapy for cocaine is yet available, it is imperative that these programs be carefully evaluated.

Studies that examined the impact of comprehensive programs for treating drug abuse in pregnant women (especially heroin abusers) have found positive results, both in lowering mortality and in overall improvement of pregnancy outcomes (52,85,287). Reviewers state that studies demonstrate that when the health, legal, and child care needs of women have been addressed, treatment programs' retention and effectiveness rates have improved (13,149).

Both the cocaine and crack epidemics and the HIV epidemic have helped bring this issue to the forefront and may motivate the treatment system to better address the problem of female substance abuse. This multifaceted problem will require a multidimensional treatment approach that addresses women's special needs.

**Populations Involved With the Criminal Justice System--**There is an undeniable link between drug abuse and criminal activity. Heroin and cocaine abusers are among the most serious street criminals (190,304). It is estimated that each daily heroin user annually commits more than 100 crimes, such as burglary and theft (159). Furthermore, during periods of daily use, drug abusers' crime rates and incomes have been 2 to 6 times higher than during periods of nonuse or less than daily use. Less than one percent of self-reported crimes by cocaine and heroin abusers resulted in an arrest (159). A substantial majority of arrestees, however, also reported drug use. The Drug Use Forecasting program of the National Institute of Justice monitors recent drug use among a sample of persons arrested in selected U.S. cities. Data indicate that about 60 percent of arrestees in 1987 were using drugs other than alcohol before the time of their arrest (190). As noted in chapter 2, more recent data from 14 cities showed that the prevalence of cocaine use (confirmed with

urine testing) among arrestees was more than 50 percent in 7 cities. Although less than 10 percent of arrestees in 9 cities had positive urine tests for opiates, an overwhelming majority of those (81 percent) also tested positive for cocaine (336).

The reported statistics are similar with respect to inmate populations. Of all State prisons' inmates sampled in 1986, 62 percent reported having ever used illicit drugs on a regular basis; 43 percent reported daily use during the month before the most recent offense; and 35 percent were under the influence of a drug at the time of the offense (190,351).

In 1987, nearly 2 percent of the adult population in the United States (about 3.5 million) were under some form of correctional supervision (on probation, in jail or prison, or on parole) (336). Since drug use is so extensive among individuals in contact with the criminal justice system, an opportunity exists to fight the problem by providing drug treatment for this population. Although permanent abstinence may be an unlikely outcome for many of them, their drug use and criminality may be reduced. According to experts, there is currently limited treatment available for the drug abuse offender (12,13). It has been estimated that 11 percent of the total inmate population of State prisons are under substance abuse treatment (351). The majority of treatment programs consist of drug education, counseling group therapy, and Narcotics Anonymous groups. Those who are not incarcerated but still in contact with the criminal justice system may be legally required to enter treatment in a community setting (351).

With respect to evaluation of prison-based programs, a recent review notes that, "outcome evaluations of prison-based programs also show reductions in criminal recidivism rates and that time in treatment is positively related to increased time until arrest" (351). This review was part of a planned study to evaluate the Federal Bureau of Prisons' drug abuse treatment programs. The evaluation will examine the effectiveness and efficiency of TC programs for substance abusers who are within 18 months of release from prison. This well-designed evaluation will provide valuable information on post-release drug use, criminal behavior, occupational and

social functioning, and mental and physical health. It will also identify client characteristics and treatment components associated with positive outcomes.

**Arrested drug abusers may be** legally required to enter treatment for their abuse. In 1982, almost 30 percent of the clients who entered treatment programs were on probation, parole, or mandatory release (190). Evaluations specific to the legally coerced clients have been conducted. One form of legal coercion was the civil commitment programs of the 1960s. Civil commitment is defined as "a legal procedure that allows narcotics abusers or other drug abusers to be committed to a compulsory drug treatment program, typically involving a residential period and an aftercare period in the community" (12). Three different programs were established in the United States. As Anglin notes, however, although the intent of the enabling legislation and the design were quite similar, actual implementation differed and fell short for some of the programs (12).

Of all three, the California program seemed to have been the most successful. Addicts were admitted to the program and were subsequently released into the community under supervision. Daily narcotics use and property-related crime among the program participants receiving methadone maintenance during the 7 years of the commitment period were reduced by 21.8 and 18.6 percent, respectively (12,192). A comparison group comprised of abusers who were admitted to the program but were discharged because of legal errors reduced their daily use just by 6.8 percent and their criminal activities by 6.7 percent. Thus, there was a threefold improvement in the outcome measures for the program group as compared with those who were not involved in a program (12,13). Further analysis indicated that supervision with objective monitoring (i.e., urine testing) was found to be an important component of civil commitment (192). Leukefeld notes that although civil commitment may reduce IV drug abuse, it should not be considered a panacea. This point reinforces the experts' view that no panaceas exist for the drug problem as a whole. Rather, it seems that a balanced combination of several approaches has the potential to achieve the most benefit.

Another approach, the Treatment Alternative to Street Crime (TASC), has been described as another milestone in linking the criminal justice system and drug abuse treatment (190). These Federally funded and locally administered programs were initiated in 1972. Before Federal funding was withdrawn in 1982, 130 cities in 39 States had TASC projects; by 1987, 18 States had operational TASC programs (62). TASC is a bridging and coordinating mechanism between the criminal justice system and drug abuse treatment that employs an individualized, case management approach. Its function is to "identify, assess, and refer appropriate drug-dependent offenders accused or convicted of non-violent crimes to community-based substance abuse treatment" (62). TASC acts as an alternative or supplement to existing criminal justice sanctions and reports treatment results to the referring justice system component. Those who do not comply or violate regulations are returned to the criminal justice system to continue their legal processes or sanctions (62). Unfortunately, the program does not include comprehensive long-term evaluation. Several evaluations of TASCs have found that the programs provided a less costly alternative to incarceration and that TASC clients remained in community treatment longer than non-TASC clients (192).

A sample of TASC clients were in treatment programs participating in the TOPS study (in a limited number of cities and modalities). Some comparisons were possible between clients involved in TASC and other justice system supervision and voluntarily admitted clients. Multivariate analysis found that, in general, association with the criminal justice system was a significant predictor of retention (149). TASC clients were estimated to stay nearly 2 months longer in residential treatment and 45 days longer in ODF treatment than non-TASC clients. Furthermore, clients referred by the criminal justice system were significantly less likely to report weekly or more frequent use of their primary drug of abuse during the year after treatment. The investigators concluded that reduced criminal activity for criminal justice clients, both during and after treatment, "argues for the use of drug abuse treatment as alternative crime control technique" (149).

The TOPS study provided evidence that compared with other clients, those referred by TASC and the criminal justice system tended to be not as

heavily immersed in their abuse careers and to be receiving treatment for the first time. This early interruption of the drug abuse career may account for the positive results that were found from this group. Researchers have suggested that these programs have a great potential to interrupt the abuse cycle and to produce long-term benefits by decreasing both drug use and crime among treated offenders (149,190).

### **Dual Morbidity**

An association exists between psychiatric conditions and drug abuse. Persons with mental illness of virtually all ages and categories have a markedly elevated incidence of serious substance abuse (333). At the same time, there is a growing recognition that clients entering drug abuse treatment have a variety of psychiatric disorders. The prevalence of these dual-diagnosis patients appears to be increasing, perhaps due to better diagnostics (156,175). Kosten reports that opiate abusers with severe drug abuse are more likely to be depressed (175). Among opiate addicts, major depression was most common (54 percent), followed by alcoholism (35 percent), antisocial personality disorders (26.5 percent), and phobias (16 percent). He further notes that the proportion having any lifetime disorder (87 percent) is higher than among alcoholics. For cocaine abusers, Kosten reports a 30-percent prevalence rate of major and minor depression, and a 10- to 20-percent prevalence of bipolar disorders (manic-depression) (175). In general, it seems that the dually diagnosed patient falls along a continuum that ranges from mild psychiatric disorder and mild substance abuse to severe mental illness and a severe substance abuse problem (333).

Research indicates that the coexistence of psychiatric disorders appears to be a strong prognostic factor influencing the outcome of drug abuse treatment and the likelihood of relapse (149,175). This evidence makes it imperative that patients who enter treatment for drug abuse have a psychological assessment. If a co-existing psychiatric condition is diagnosed, then their treatment plan could include appropriate psychiatric care.

### **Polydrug Use**

The increased prevalence of multiple drug abuse by the same individual (polydrug use) constitutes a major problem that carries serious consequences.

Drugs are used concurrently for a variety of reasons. They can be used, for example, to enhance or counteract the effect of the primary drug (as the case with the cocaine-heroin combination) or to serve as a temporary substitute for the drug of choice, which may not be available (149,177). Of particular concern is the increasing practice of injecting a mixture of cocaine and heroin ("speedballing") (24). Other common substances used by heroin and cocaine abusers are alcohol and sedatives, especially benzodiazepines (177).

An indication of the extent of the polydrug abuse problem is provided by data from the TOPS study. An overwhelming majority of clients entering treatment in methadone maintenance, TC, and ODF programs (over 70 percent) abused two or more drugs in the year prior to treatment. In all, 50 to 70 percent of the clients in each treatment modality used alcohol or marijuana in addition to their primary drug of abuse. The analysis of the data concerning drug use patterns indicates a reduction in the severity of drug use after treatment and substantial improvement, mainly accomplished by patients switching to less serious drugs and less complex patterns of use (shifting to alcohol and marijuana and becoming minimal users) (149).

Polydrug abuse complicates treatment, from the stage of detoxification to relapse prevention (177). Moreover, higher rates of psychiatric co-morbidity have been reported among polydrug users, which further exacerbate the problem (177). More research is needed to devise ways to treat this crucial problem. In the absence of "magic bullets," researchers have suggested that a combination of treatment regimens and strategies (from pharmacotherapy and psychotherapy to behavioral techniques) may help increase effectiveness (177,285).

#### Prevention of Relapse

Relapse, defined as the resumption of substance abuse following a period of abstinence, is the rule and not the exception among abusers entering or completing treatment (250). Thus, relapse can be considered to be a major factor contributing to the drug abuse problem. Indeed, without recurrence and relapse, "substance abuse treatment could be limited

to a small subspecialty of medicine that concentrates on detoxification, handled in medical wards, emergency rooms, and outpatient clinics" (250).

Relapse to drug use is a complex, dynamic process that may involve several stages from the initial slip to readdiction (129,367). Several theoretical models based on genetic and metabolic or social learning theories have been proposed to explain relapse (129,367). Although the research in this area is not extremely advanced, partly because of methodological impediments, factors associated with relapse have been identified. The prevalence of a psychiatric disorder is a strong predictor of relapse, along with socially related parameters, such as commitment and motivation on the patient's part, the existence of social support networks and employment opportunities. Another category of relapse predictors includes variables associated with "cue reactivity." Relapse can be triggered by responses to environmental cues that act as "reminders." These are situations that over the course of the abuse career have been strongly associated with drug use. Conditioned cues may range from being in areas where drugs were purchased and being with drug-using friends to viewing money, white powder, or any item ever associated with drug use. Depending on the abuser, then, almost anything can produce drug use memories, strong urges, and cravings that might lead to drug-seeking behavior, even years after a successful treatment episode (58,232).

Because drug abuse is a chronic relapsing disorder, it should be regarded in a similar fashion as other chronic diseases (e.g., diabetes, arthritis, bipolar disorders, or chronic depression) (149,191,233,250). The pattern of relapse and remission resembles the nature of chronic diseases' patterns of remission and flare-up periods. As with many chronic conditions, no cure exists to eradicate the causes of drug abuse or the problem once it surfaces. The recognition that there is no perfect treatment for drug abuse has important implications for drug abuse treatment objectives. Two distinct yet interrelated objectives of drug abuse treatment are 1) the amelioration or reduction of symptoms (e.g., drug use) and 2) the prolongation of symptom-free intervals (e.g., maintenance of the desired behavior changes).

There is a growing consensus that relapse prevention techniques ought to be incorporated into the existing treatment system and taught to clients (129,149,233). Preliminary results from experimental studies have been promising (202,206,232). Nevertheless, more research is essential to gain a better understanding of the process of relapse and to identify which techniques are most suitable for particular patients. This knowledge could increase both the effectiveness and the efficiency of treatment. Relapse prevention becomes even more important in view of the cocaine surge because of cocaine's powerful reinforcing properties and the current lack of any pharmacologic treatment (58).

From both the treatment and policy perspectives, it is encouraging that many of the factors associated with relapse are environmentally influenced and thus amenable to various degrees of control. Therefore, interventions targeted to change these factors might play a significant role in reducing the demand for drugs, either by totally preventing relapse for some individuals or by considerably prolonging drug-free intervals for others. In both cases, society and the individual gain.

### **Aftercare Services**

One dimension of relapse prevention is the provision of aftercare services. Aftercare can be conceptualized as long-term treatment or extended care similar to the management of other chronic conditions, such as bipolar disorders (manic depression). The most vulnerable time for relapse is during the first 3 months after leaving treatment, when the former abuser no longer has the protected environment of the treatment program (191). The purpose of aftercare services is to facilitate the treated abuser's integration into society. Provision of aftercare is based on the assumption that "continuing assistance following treatment can remove or reduce posttreatment factors which are associated with relapse, or strengthen those posttreatment factors which are associated with maintenance of sobriety" (140). This is accomplished by keeping contact with the treated individual and helping drug abusers make major life changes and cope with the personal, family, social, and professional challenges that they face during the recovery process. Model programs

for aftercare treatment have been devised based on followup meetings, training sessions, drug-free social and community activities, vocationally focus strategies, social support strategies, and development of support systems through former abusers (140,378).

The empirical evidence is encouraging that aftercare services may reduce relapse rates (2,140,250,378). In a randomized trial of newly recovering opiate addicts who had been assigned to an experimental aftercare program and a control situation, McAuliffe found that the "intervention significantly reduced the probability and extent of relapse, helped unemployed subjects find work, and reduced self-reported criminality" (202). Clearly, more research is needed to formally evaluate a variety of such programs and to identify the most effective elements of their services.

TOPS data indicate that few clients from any treatment modalities received any type of aftercare services (149). It seems that scarce resources and more urgent competing needs have led to poor development of these services (378). Experts in the field agree that the current knowledge of relapse prevention that includes aftercare needs to be integrated into existing treatment packages (149,191). Aftercare programs can also take the form of consortia serving clients from multiple treatment facilities (140).

Given the potential that both relapse prevention and aftercare services hold for strengthening treatment's effectiveness and efficiency, the existing lack of applied research necessary for implementation is a severe stumbling block to further progress.

### *Future Research*

It is apparent that much more can be done to increase treatment's effectiveness and efficiency. The conference "What Works: An International Perspective on Drug Abuse Treatment and Prevention Research," held in October 1989, identified major issues likely to lead to the achievement of these goals (195). One suggestion dealt with ways to increase the dissemination and use of information that has already been gathered on drug abuse treatment. Such suggestions included creating the environment

for technology transfer and creating ways to facilitate the diffusion of tested and established knowledge.

With respect to a future research agenda, the proposed topics emphasized research that would produce knowledge to improve treatment effectiveness and efficiency. Such research areas include the natural history of drug abuse (stages and process of recovery) among different sub-populations and the possible effectiveness of patient-program and patient-staff matching schemes. More researches clearly needed on the process of treatment, to understand why some treatment works, which elements make it work, what does not work, and, most importantly, to identify those treatment components that are effective for various groups. Research is also lacking on staff turnover, staff attitudes, program flexibility about treatment options, contact between staff and patients, and family involvement in treatment (241a).

Research on relapse prevention and aftercare also holds great importance. Moreover, there is a need to evaluate for different groups the safety, efficacy, and effectiveness of new techniques and alternative treatment methods (e.g., behavioral techniques such as contingency management and conditioning, acupuncture, and hypnosis). More information is also needed on those who do not seek treatment and the way they recover and on better techniques to attract and retain clients in treatment (195). Finally, the technology of conducting randomized studies in the field of drug abuse needs to be strengthened.

The Drug Abuse Treatment Outcome Study (DATOS), the third national study on treatment effectiveness following DARP and TOPS, is expected to address some of the areas previously identified as needing further research (322). Differential subgroup analyses will be performed, variables related to treatment retention and outcome will be examined, and treatment effectiveness will be compared with the drug use patterns of those who received no treatment. Further research will examine the prevalence of behaviors associated with the spread of HIV and investigate the effectiveness of treatment interventions designed to reduce these high-risk behaviors.

DATOS is being funded by NIDA and implemented by the Research Triangle Institute. The investigation will cover an estimated 20,000 clients enrolled in approximately 50 treatment programs (322). Five modalities will be included in the investigation: short- and long-term methadone maintenance, short and long-term TCs, and ODF treatment. The goal is to determine treatment effectiveness according to the illicit drug(s) used type of treatment, and the degree of client impairment. An additional goal is to examine the process of treatment, especially as it relates to treatment outcome. Although a relatively short followup is planned (6 months), it is anticipated that longer followup studies will evolve from this data set.

Large national studies and smaller-scale studies are equally important in drug abuse treatment research. Although they may overlap, national and smaller-scale studies are able to address different kind of questions. Collective knowledge derived from both types of studies might provide answers to a variety of issues and strengthen drug abuse treatment.

## **SUMMARY AND POLICY IMPLICATIONS**

Research has demonstrated that drug users are a heterogeneous group with multiple problems (78,149,271). The three major treatment modalities, which have changed little over the past 20 years, tend to attract clients with different sociodemographic and other personal characteristics and, therefore, serve diverse client types (149). Methadone maintenance, if properly implemented, can dramatically reduce illicit opiate use. High proportions of successful outcomes have also been observed among TC clients. These substantial improvements, however, are clouded by the low retention record of TCs. Many of the people attending ODF programs have also reduced their drug use and some of its consequences.

This chapter reviewed the evidence of drug abuse treatment effectiveness in general. Chapter 5 addresses the specific question of drug abuse treatment and implications for HIV spread. Treatment for drug abuse has the potential to

interrupt transmission of HIV infection by decreasing the frequency of drug use, especially IV drug use. These decreases imply reductions in sharing injection equipment, the primary vehicle of HIV transmission among IV drug users. Although methadone curtails heroin use, the lack of an effective and fast-acting treatment for cocaine may have dire consequences for those at risk.

The last few years have witnessed an evolution of new treatment programs and variations in the traditional treatments. Twenty-eight-day residential programs have become the most common form of treatment, and self-help groups, such as Narcotics Anonymous, have become prevalent. Intermediate levels of care, such as day-care, evening care, or half-way houses are becoming increasingly important (203). Linkages between self-help groups and methadone maintenance as an adjunct or aftercare service to long-term stabilized clients have been developed (231). There are TCs with planned treatment durations of 3 or 6 months. ODF programs have been tailored to treat cocaine abuse treatment (204,241). Although formal evaluations of these entities are not yet available, research is currently being conducted that may shed some light on the efficacy, effectiveness, and perhaps cost-effectiveness of the new approaches to drug abuse treatment.

Across all modalities in TOPS, of the clients who spent at least 3 months in treatment, 40 to 50 percent of regular (weekly or more frequent use) heroin and cocaine users stopped use completely 1 year after treatment, and an additional 30 percent reduced their use (149). Drug abuse and criminal activity consistently decreased. Dramatic improvements occurred during treatment, with some degree of deterioration immediately after and stabilization in the following years. Improvement was maintained up to five years after treatment (149).

Drug abuse treatment is intended mainly for people who are drug depended. Natural history studies have shown that some people may discontinue drug use without any formal type of treatment. Overall, it appears that the process of phasing out drugs is a function of a wide range of factors. These factors may be previous treatment episodes,

criminal justice system involvement, critical life events, such as confrontation from family and friends, religious involvement, and other social conditions.

Drug abuse has been described as a "final common pathway, where genetics, psychological factors, or social environment might get you there, but once you're there, you're there" (167). Low retention in treatment and relapse have consistently hampered treatment efforts. Retention rates vary among modalities. An estimated 80 to 85 percent of entrants have dropped out of traditional TCs before 1 year, whereas a reported 60 percent of ODF clients have dropped out, transferred, or completed treatment by the third month (79,150). Methadone programs have experienced lower dropout rates, with a range of 15 to 45 percent for a 2-year period. Methadone dosage has influenced retention (low doses are associated with lower retention) (130,257,258).

Relapse to drug use is a major characteristic of drug abusers. As the DARP study showed, 75 percent of the followup sample relapsed one or more times over 12 years (267). Total abstinence may be hard to achieve, often requiring multiple treatment episodes (149,267). DARP data indicated that over 10 years, opiate abusers averaged 6 treatment episodes. Approximately 60 percent of those leaving treatment had another treatment episode in the subsequent 6 years (157,201). Similarly, almost 33 percent of TOPS clients returned to drug treatment in the year after leaving the program (149).

Even for those who cannot achieve total and permanent abstinence, treatment may be beneficial. In the TOPS study, all outcome measures dramatically improved during treatment. The long-term analysis of the DARP sample showed that more than 58 percent of all abusers in recovery at year 12 had quit while they were in a treatment program (267). Each treatment episode may lead to a drug-free interval in the drug-abuse career. Thus, treatment may initiate, facilitate, and accelerate the recovery process. The DARP analysis also demonstrated that the longer the duration of abstinence, the more likely the recovering abuser will continue being abstinent. Findings from research in a related area, nicotine

abuse and smoking cessation, provide further support to the above conclusions (118).

Drug abuse is clearly a condition of multiple dimensions both in its etiology and in its expressed outcomes and consequences. Drug abuse treatment performs well in many drug abusers but cannot affect all behavioral dimensions. "The major modalities have had more limited success in rebuilding the lives of drug abusers and reintegrating them into society" than reducing drug use (149). The interplay of factors beyond the reach of treatment (e.g., personal and social environment) may undermine recovering abusers' efforts to stay drug-free and become productive members of the society.

Confronting and treating drug abuse is a very difficult and demanding task. To sustain any behavior

change requires a major commitment. Even relatively benign behavioral changes (e.g., exercise, weight loss) attempted by healthy and stable individuals may take time and several attempts to achieve improvement. A proportion may reach their goals and be able to maintain their desired behaviors (e.g., permanently quitting smoking), but others experience short periods of improved behavior followed by relapses into old behavior patterns.

In summary, different interventions seem to work for different groups of drug-abusing clients. Overcoming drug abuse may require multiple treatments and the provision of relapse prevention and aftercare services. Treatment for drug abuse is not a panacea. Rather it is an integral component of a long and committed effort to recover from drug abuse.