

***METHADONE MAINTENANCE
TREATMENT:***

TRANSLATING RESEARCH INTO POLICY

DEPARTMENT OF HEALTH & HUMAN SERVICES

**Public Health Service
National Institutes of Health
National Institute on Drug Abuse
International Program
Room 1B-59
Bethesda, Maryland 20892**

**Revised November 1995
Prepared for American Methadone Treatment Association Conference
National Institute on Drug Abuse International Forum
November 1, 1995**

For the National Institute on Drug Abuse International Visiting Scientists and Technical Exchange Program, this manual was produced by Information Data Systems, Inc., and Birch & Davis Associates, Inc., under NIDA Contract Number NO1DA-3-002.

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The National Institute on Drug Abuse (NIDA) is pleased to make available *Methadone Maintenance Treatment: Translating Research into Policy*, a compilation of research findings based upon the United States' 30 years of clinical experience with methadone maintenance treatment for opioid addiction. The manual summarizes NIDA's methadone maintenance treatment research findings to respond to questions most frequently posed by the international community. While the United States' experience may not translate directly to all countries, health researchers and policy makers can refer to this manual to help evaluate what role methadone maintenance treatment might play in treating drug addictions in their own countries.

Drug abuse and addiction are among the most complex and far-reaching public health problems that place a major burden on a nation's health care system. Our challenge is to use the tools of public health—biomedical and behavioral science—to confront this worldwide problem, working systematically to move from the laboratory into real-life practice settings. We must find ways to ensure that research findings are used in prevention, treatment, and policy settings; it is our wish that this manual will help support that goal.

Alan Leshner, Ph.D.
Director
National Institute on Drug Abuse
National Institutes of Health
U.S. Public Health Service

Acknowledgments

Methadone Maintenance Treatment: Translating Research Into Policy (1995) is an update and revision of *Methadone Maintenance Treatment in the United States: Questions and Answers (1994)*, prepared by the National Institute on Drug Abuse (NIDA) International Visiting Scientists and Technical Exchange Program (INVEST).

The manual relies on the work of numerous NIDA-supported researchers, many of whom volunteered presentation slides and data for inclusion. This second version of the manual includes three new topics—methadone maintenance treatment and the prevention of HIV/AIDS, women and methadone maintenance treatment, and alternative medications. Special thanks go to Dr. David Metzger, Center for Studies of Health, University of Pennsylvania; Dr. Diana Hartel, AIDS Research, Montefiore Medical Center, New York; and Dr. Walter Ling, Chief of the Substance Abuse Program and Director of Addiction Medicine Services, Department of Psychiatry, University of California, Los Angeles, for their work on the additional sections.

Other scientists made significant contributions to this manual through their advice, suggestions for source material, and reviews of the manual in its various stages of development. We greatly appreciate the review efforts and guidance of Dr. James R. Cooper, Associate Director for Medical Affairs, Division of Clinical and Services Research, NIDA; Dr. Harry Haverkos, Director, Office on AIDS, NIDA; Dr. Frank Vocci, Deputy Director, Medications Development Division, NIDA; Ms. Katherine Davenny, Research Epidemiologist, Division of Clinical and Services Research, NIDA; Dr. Richard Needle, Chief, Community Research Branch, Division of Epidemiology and Prevention Research, NIDA; Dr. Michael Dennis, Social and Behavioral Research Center, Research Triangle Institute, North Carolina; Dr. Barry S. Brown, Department of Psychology, University of North Carolina at Wilmington; and Dr. Mary Jeanne Kreek, Professor and Head, Laboratory on the Biology of Addictive Diseases, and Senior Physician, Rockefeller University Hospital, New York.

We would like to reiterate our thanks to Dr. Richard A. Lindblad, former director, International Office, NIDA, who initiated this project, and to Dr. Andrea Barthwell, former medical director, Interventions, Chicago, for her contribution to the first version of this manual. Recognition also goes to Janice L. Sawyer for her editorial and production oversight of the manual and to medical writer Mim Landry for his work in researching, synthesizing, writing, and editing.

M. Patricia Needle, Ph.D.
Acting Director, International Program
National Institute on Drug Abuse
National Institutes of Health
U.S. Public Health Service

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Introduction to the Manual

As societies struggle to combat the growing—and related—problems of drug addiction and human immunodeficiency virus (HIV) infection, there has been increasing interest in methadone maintenance treatment for opioid addictions. This manual reflects the 30 years of clinical experience in the United States treating heroin addicts with methadone. It summarizes methadone maintenance treatment research findings to answer questions most frequently asked by the international community.

History and Evolution of Opioid Addiction Treatment in the United States

Opioid dependency has been observed in the United States since the 1860s, when physicians gave disabled Civil War veterans opioids to relieve pain. Later, middle- and upper-class women became addicted to opioids when physicians prescribed morphine sulfate and laudanum to treat stress or other chronic conditions. These addictions were not viewed as social deviancy, but as an unfortunate side effect of opioid prescription. Early treatment included detoxification, maintenance, or both. Because few patients recovered from their addiction, physicians began using more caution before prescribing narcotics. Addiction next became a problem of lower-class and poor Americans and immigrants. Social attitudes toward addiction began to shift when poor addicts turned to petty crime to help pay for drugs.

Government Efforts to Restrict or Outlaw Treatment Efforts—In 1914, Congress ratified the Harrison Narcotic Act to regulate the manufacture, distribution, and sale of opioids, coca, and their derivatives. In 1919, the law was changed to permit physicians to prescribe narcotics for “legitimate medical purposes” in the course of “professional practice.” However, Federal regulations did not consider addiction a legitimate illness. Both addicts and physicians who prescribed drug maintenance were lawbreakers. By 1923, virtually all clinics were closed. Federal laws continued to restrict and prohibit distribution, sale, and use of opioids and other drugs. By 1970, Congress had passed 55 antinarcotics laws; individual states added their own restrictions.

The Rise of Heroin Addiction—Heroin addiction and its unfortunate usual side effect—drug-related crime—began to increase in large cities after World War II, especially during the 1950s and 1960s. Addiction became an explosive social issue and an expensive and complicated medical and legal problem. Few treatment facilities were available, so addicts turned to the black market to obtain drugs, exposing themselves to street violence, diseases, and infections from contaminated needles, arrests, and incarceration. There were record numbers of arrests for drug-related crimes (such as possession or sale of drugs and robbery), yet overcrowded jails and prisons had no effective medical treatment for addicts in withdrawal. During the mid-1960s, New York and California adopted civil commitment programs in response to the growing numbers of addiction-related crimes. Under these laws, addicts could be involuntarily committed to medical facilities. The programs proved to be enormously expensive with few positive outcomes.

Methadone Maintenance as a Treatment Modality—In 1956, the American Medical Association (AMA) offered to fund a research project to investigate the potential of using medical clinics to dispense narcotics. In 1962, Dr. Vincent P. Dole, a researcher at Rockefeller University and Chair of the Narcotics Committee of the Health Research Council of New York City, received a grant from

the Council to (1) study the scientific, public health, and social ramifications of addiction and (2) establish a research unit to investigate the feasibility of opioid maintenance. Dr. Dole sought out Dr. Marie E. Nyswander, a psychiatrist with extensive experience working with and treating addicts, and Dr. Mary Jeanne Kreek, a clinical investigator who was trained in internal medicine and neuroendocrinology at New York Hospital-Cornell Medical Center.

The team conducted opioid maintenance studies with morphine, heroin, codeine, oxycodone, and meperidine. The results were similar: low doses of the drugs did not maintain patients for long periods; patients were lethargic; and patients did not achieve psychological independence from drugs.

They also studied methadone—a longer-acting narcotic used as an analgesic and to treat addicts withdrawing from heroin—which was different. Once a stable dosage was established, researchers were able to document several key observations: methadone blocks drug craving and allows patients to function normally; methadone tolerance levels do not change over time; methadone appears to be safe and nontoxic; and methadone is long-acting and easy to administer.

Federal Involvement in Methadone Maintenance Treatment Research—As early as 1963—during the Kennedy administration—the President's Advisory Commission on Narcotic and Drug Abuse recommended funding research to determine the effectiveness of using outpatient clinics to dispense narcotics to addicts. During that decade, the National Institute on Mental Health (NIMH) supported the National Association for the Prevention of Addiction and cosponsored annual conferences on methadone maintenance. Researchers obtained Investigational New Drug (IND) status from the Food and Drug Administration (FDA) for methadone by the late 1960s, and patient data were collected from all NIMH-funded methadone treatment programs.

In 1970, White House domestic advisors began to determine whether treatment could reduce drug-related crime, and the White House commissioned 2 groups to provide recommendations for policy and program initiatives that could respond to heroin addiction. The group of drug abuse researchers and treatment professionals recommended a strategy to rapidly expand all treatment options and use methadone maintenance extensively. The recommendation became Federal policy in 1971, when President Nixon established a Special Action Office for Drug Abuse Prevention (SAODAP).

SAODAP worked with the FDA and other federal agencies to publish federal regulations governing the use of methadone. Throughout the 1970s, SAODAP published several monographs that set forth the recommended treatment regimen for methadone maintenance treatment and rehabilitation services.

Evolution of Methadone Maintenance Treatment Practices—Methadone maintenance treatment policies have continued to evolve while new evidence about methadone's efficacy, safety, and long-term effects is uncovered and studied. Significant changes have since occurred in program acceptance policies, treatment options, and dosages.

Criteria for admission to methadone maintenance treatment programs were initially stringent. Current admissions criteria accept patients aged 18 and over, and will admit patients as young as 16 if they (1) have 2 prior attempts at detoxification or nonmethadone maintenance treatment, (2) have parental

consent, or (3) are declared to be emancipated minors. Additionally, there is no upper age limit and pregnant addicts are admitted.

As a result of research by Drs. Dole and Nyswander suggesting that heroin addiction may be a metabolic disease, methadone maintenance treatment for heroin addicts is seen as a corrective—not curative—procedure. Further research has indicated that most patients continue to experience a powerful hunger for drugs after a period of treatment. If they do not reenter treatment at this point, they are likely to relapse in spite of their motivation to remain drug-free.

Studies have shown that patients maintained on methadone doses of at least 50 to 70 milligrams per day adjust to normal lifestyles more easily than patients maintained on lower doses. They also stay in treatment longer and are less susceptible to other drug use. Patients participating in take-home dosage trials have been found to remain in treatment longer and have low levels of illicit drug use.

At present, concern over the spread of HIV/AIDS has led to a preference for modalities that emphasize reducing high-risk behaviors, such as needle-sharing, unsafe sex, exchanging sex for drugs, and other drug use. In addition to being an effective treatment for opioid addiction, methadone maintenance treatment is recognized as effective in reducing HIV-related risk behaviors and associated HIV infection. This has justified decisions by policy and program personnel to expand methadone maintenance treatment for people addicted to opioids.

In 1988, there were about 450 methadone maintenance treatment programs in the United States. As of September 1994, there were approximately 737 U.S. outpatient treatment programs; 1 or 2 new programs are established almost every month.

By 1992, around 115,000 patients nationwide were enrolled in methadone maintenance treatment programs and in 1994, there were roughly 150,000 patients enrolled.

[The above section was adapted from Joseph and Appel, Historical Perspectives and Public Health Issues, in *State Methadone Treatment Guidelines*, Mark W. Parrino, ed. (Rockville, MD: U.S. Public Health Service, 1993).]

Major Research Studies That Examined the Effectiveness of Methadone Maintenance Treatment

NIDA has funded numerous studies that have examined various treatment outcomes of methadone maintenance treatment. Some of these studies were conducted over long periods of time with large groups of patients.

Results from these studies are described in the research highlights sections that accompany the questions and answers in this manual. The following are brief descriptions of large important studies that are repeatedly mentioned throughout this manual.

- **The Drug Abuse Reporting Program (DARP) Studies**—Conducted by researchers at Texas Christian University, the DARP was the first nationwide outcome research on community-based drug programs in the United States. The DARP included 6- and 12-year

follow-up studies based on 44,000 patients applying for and admitted to 4 types of treatment in 52 programs across the United States and Puerto Rico during the years 1969 through 1973. Information about participants was collected at intake, bimonthly, during treatment, and at 6 and 12 years after initial admission. Of the total 4,627 patients interviewed for the 6-year treatment outcome follow-up studies, 1,872 were from methadone maintenance treatment programs (Simpson and Sells, 1982). Of the total 490 patients interviewed later as part of the 12-year follow-up studies, 175 were from methadone maintenance treatment programs (Simpson and Sells, 1990).

- **The Treatment Outcome Prospective Study (TOPS)**—The Research Triangle Institute conducted the first nationwide prospective examination of the nature of treatment, patients, and patient behaviors. The study gathered data before, during, and after treatment in 41 publicly funded programs in 10 selected cities. A total of 11,750 drug abusers who entered treatment in 1979, 1980, and 1981 were interviewed at admission, a month after entry, and at 3-month intervals during treatment. Interviews were also conducted at 3 months, 1 year, 2 years, and 3 to 5 years after discharge from treatment. Most of the pretreatment, during-treatment, and posttreatment comparisons of patients in methadone maintenance treatment focus on 285 male addicts (Hubbard et al., 1989).
- **The Ball and Ross Study (The Methadone Research Project)**—Dr. John Ball and his colleagues at the National Institute on Drug Abuse (NIDA) Addiction Research Center began a study in 1985 regarding the effectiveness and status of methadone maintenance treatment programs in 6 programs in 3 cities—New York, New York; Philadelphia, Pennsylvania; and Baltimore, Maryland. Information was collected at 2 points 1 year apart through interviews with all program staff and 633 male patients, as well as through inspection of more than 2,000 active patient records and observation of clinic operations. For the analyses, patient groups were labeled according to time in treatment: new admissions, moderate stay (6 months to 4.5 years of treatment), and long-term stay (more than 4.5 years) (Ball and Ross, 1991).
- **The UCLA Methadone Study (The Powers and Anglin Studies)**—Extensive interviews were conducted with 933 heroin addicts who entered methadone maintenance treatment programs from 1978 through 1981. Information was collected regarding subjects' drug use and behavior throughout their addiction careers. For the study, subjects were divided into 4 groups: 498 had 1 methadone treatment episode; 287 had 2 methadone treatment episodes; 134 had 3 treatment episodes; and 74 had 4 or more. Subjects were evaluated regarding several measures, including daily narcotics use, arrests, marijuana use, alcohol use, marriage, and employment (Powers and Anglin, 1993).

The Effects of Specific Services on Methadone Maintenance

Research and empirical experience indicate that the provision of a broad range of treatment services results in superior methadone maintenance treatment. Equally important, the efficacy of methadone maintenance treatment is enhanced when treatment services are matched to the specific needs of each patient.

Counseling Services—The goal of counseling services is generally to change patients' behaviors with regard to drug use, illegal activity, family and social relations, and employment status. This often involves the application of rewards and punishment to achieve positive behavioral change (McLellan et al., 1993).

A few studies of the impact of counselors' education and training have not found that these qualifications correlate with patient adjustments and outcomes. Despite controversy, speculation, and expectations regarding differences in roles and attitudes toward rehabilitation among ex-addict counselors, paraprofessional counselors, and professionally trained therapists, there is no proof that one type is more effective, in general, than another.

In a study of 102 patients receiving (1) methadone, (2) methadone plus counseling, or (3) methadone, counseling, and several medical and psychosocial services, the group receiving methadone plus counseling showed improvements over the group without counseling in several areas: decreased illicit drug and alcohol use and decreased legal, family, and psychiatric problems. The third group, which received a broad array of services, demonstrated improvements over all other groups (McLellan et al., 1993).

Psychotherapy—Patients entering methadone maintenance treatment programs are likely to have additional psychiatric impairment. The vast majority of opioid addicts (87 percent) have experienced a diagnosable psychiatric disorder during their lifetime. Major depression has been the most frequently reported problem (54 percent), followed by alcoholism (35 percent), antisocial personality (27 percent), and phobias (16 percent). Heroin addicts first entering treatment are somewhat more likely to report depressive symptoms (29 percent) than patients already stabilized on methadone (20 percent) (Rounsaville et al., 1982).

In a review of studies that evaluated the effectiveness of professional psychotherapy for addicted patients, including patients receiving methadone maintenance, it was noted that: (1) professional psychotherapy can make a valuable contribution to ongoing treatment services; (2) psychotherapy is particularly valuable when it is targeted to that segment of the nonpsychotic and nonsociopathic addict population with moderate to high levels of psychiatric symptoms; and (3) psychotherapy services must be fully integrated into the overall drug treatment program (Woody and O'Brien, 1986; Woody et al., 1985).

Similarly, in a study by Woody et al. (1983), patients were offered random assignments to drug counseling alone or to counseling plus 6 months of either supportive-expressive psychotherapy or cognitive-behavioral psychotherapy. Measures included standardized psychological tests, independent observer ratings, and continuous records of licit and illicit drug use done at baseline and at a 7-month follow-up. All 3 treatment groups showed significant improvement, but patients receiving the additional psychotherapies showed improvement in more areas and to a greater degree than those who received counseling alone and with less use of medication.

Family Therapy—The limited research on family therapy for opiate addicts suggests that addressing the family system of the addict is important, family ties of addicts are fairly extensive, and family members can be engaged in family therapy. However, little controlled research on the effectiveness

of family counseling or therapy in methadone programs is available. Family therapy needs to be conducted by therapists who are trained to work with families.

Drug Monitoring—The testing of body fluids for alcohol and other drugs is a standard aspect of methadone maintenance treatment. Research is inconclusive regarding the effectiveness of drug monitoring.

A study randomly assigned 431 methadone maintenance patients to a monitored or an unmonitored group for 1 year. Monitored subjects continued to provide urine specimens once per week; unmonitored subjects did not. At 4 and 8 months, surprise urine collections were conducted. There was no difference between the groups in the proportion of drug-free specimens at either time (Havassey and Hall, 1981).

In contrast, Anglin and colleagues have more recently demonstrated that urine testing, in combination with legal or other sanctions, is more effective than supervision without testing in reducing daily narcotics use and criminal activity (Anglin, Deshenes, and Speckart, 1987).

Behavioral Therapies—Methadone maintenance clinics are particularly suitable for behavioral approaches, using such treatment elements as methadone dosages, urine tests, take-home privileges, rules and regulations, and treatment plans as positive and negative reinforcers.

Contingency contracting is a behavioral approach that makes take-home medication privileges contingent upon compliance with program requirements and has been demonstrated to increase attendance at counseling sessions and other activities. The use of positive reinforcement is a more effective way to manage addicts than punishment. The method has also been proven to be mildly effective for reducing other drug use such as benzodiazepines among methadone maintenance patients, when money or take-home doses were used as reinforcers for drug-free urine tests. One problem with contingency controls, however, is that the effects of rewards may wear off as they become the norm.

Aversive contingencies in the form of treatment termination threats and methadone dose reductions as negative responses to continuing drug use or other forms of noncompliance with treatment have been effectively used by several researchers to promote improved patient outcomes. However, the ethics of terminating poor treatment performers who are likely to drop out, relapse, and risk HIV infection from injection drug abuse are questionable without further justification. Moreover, methadone dose manipulations imperil the medical and biological basis of maintenance treatment in which a stable dose is imperative for establishing normative functioning. Hence, these coercive disciplinary tactics have recently been criticized by Stitzer and colleagues (1986) and Iguchi (1988) as increasing treatment drop-outs.

Vocational Services—Although methodological problems in the few studies of vocational services confound the results, supported work programs and assistance in job-finding seem to increase employment among methadone maintenance patients and to be desired additions to treatment services. The effect of work on reduced drug use and criminal activity varied considerably. Drop-out rates are generally high in these studies.

Primary Medical Care—Methadone maintenance patients frequently have biomedical problems that need medical attention. Some of these problems will be related to the addiction, and some are general medical problems that have been ignored and may have progressed to a serious level. This, coupled with the risk for coming into contact with HIV, provides a good argument for providing primary medical care in methadone maintenance treatment programs.

Medical complications identified among methadone patients include worsening of illnesses that existed prior to treatment. However, following entry into treatment, health status usually improves with access to medical care, elimination of injections with contaminated needles, and improved quality of life (Lowinson et al., 1992).

Relapse Prevention—There is widespread agreement on the need to increase patients' relapse prevention skills and to provide greater community supports to abstinence. Nonetheless, comparatively little controlled study has been conducted in this area.

Aftercare Services—The terms *aftercare* and *continuing care* describe those services that help patients to maintain a drug-free life in the community after leaving treatment. These services are designed to remove or reduce the posttreatment factors that contribute to relapse and to create or strengthen the factors that reinforce abstinence. The range of services provided in aftercare programs include group counseling, self-help groups, educational and vocational counseling, legal aid, housing assistance, social skills training, and recreational activities.

On the basis of a review of posttreatment factors associated with relapse, Hawkins and Catalano (1985) suggest that aftercare programs should:

- Increase family and other social support for living in the community without dependence on drugs and seek to eliminate patterns of interaction with family and peers that contribute to relapse
- Increase involvement in productive roles in the community, whether in work, school, or the home
- Facilitate involvement in recreational and leisure activities that do not involve the use of drugs
- Help patients to develop and practice a set of specific skills: the skills necessary to become involved in social, productive, and leisure activities in the larger community; the skills to cope with stress and negative emotional states without resorting to drug use as a form of self-medication; and the skills to cope with a slip into drug use without allowing it to become a full-blown relapse

How To Use This Manual

This manual is designed to be used as a quick reference for frequently asked questions about the outcomes of research on methadone maintenance treatment. The manual includes a series of questions about methadone maintenance treatment, followed by Research Highlights that address the questions. Accompanying each question are 1 or more visuals and an explanation of the research that each visual supports. The following is a description of each section of the manual.

Section 1: Questions and Answers Regarding Methadone Maintenance Treatment Research—This section is organized around a series of questions and research answers about or related to methadone and methadone maintenance treatment. Each question addresses a single topic. Following each question and answer is a section called Research Highlights. This section contains several abstracts of research studies that relate to the question and 1 or more visuals to support selected research citations.

Section 2: References—This section presents a list of additional publications that cover clinical and other aspects of methadone maintenance treatment. It includes a bibliography of the materials that were used to develop this manual, presenting complete references for all citations listed in the Research Highlights.

Section 3: Supplemental Articles—This section consists of articles on various aspects of methadone maintenance treatment and research. They may be used as background material or photocopied and used as participant handouts.

Section 4: Commentaries and Camera-Ready Visuals—This section is designed to be used as a stand-alone presentation and supplies camera-ready copies of all the visuals—graphics, charts, and lists—that accompany the questions and answers in Section 1. These may be used to copy onto overhead transparencies or to make 35-mm slides. Alternatively, visuals may be photocopied and distributed as handouts.

Also in this section are commentaries for each visual. The commentaries parallel the research text in Section 1 and are designed to be read verbatim or paraphrased as desired.

Question 1: Is methadone maintenance treatment effective for opioid addiction?

Answer: Yes. Research has demonstrated that methadone maintenance treatment is an effective treatment for heroin addiction when measured by:

- Reductions in the use of illicit drugs
 - Reductions in criminal activity
 - Improvements in social health and productivity
 - Improvements in health conditions
 - Retention in addiction treatment
 - Reductions in needle sharing
 - Reductions in HIV infection rates and transmission
-

Research Highlights

- Drug Abuse Reporting Program (DARP) studies of during-treatment performance in a national sample of methadone maintenance treatment programs found large and statistically significant (1) reductions in drug use and criminality and (2) increases in employment and related productive activities. Patients staying in treatment for longer periods of time showed greater improvements than those who stayed in treatment for shorter periods (Sells and Simpson, 1976; Simpson, 1993).
- In the Treatment Outcome Prospective Study (TOPS), methadone maintenance patients who remained in treatment for at least 3 months experienced dramatic improvements during treatment with regard to daily illicit opioid use, cocaine use, and predatory crime. These improvements persisted for 3 to 5 years following treatment, but at reduced levels (Hubbard et al., 1989).
- In the Powers and Anglin (1993) study of 933 heroin addicts in methadone maintenance treatment programs, during episodes of methadone maintenance, there were (1) decreases in narcotic use, arrests, criminality, and drug dealing; (2) increases in employment and marriage; and (3) modest increases in levels of alcohol and marijuana use. Powers and Anglin also demonstrated that for those patients who relapsed, the improvements gained during treatment were reversed. That is, improvements in such areas as narcotic use, arrest, criminality, drug dealing, and employment diminished during episodes of relapse (Powers and Anglin, 1993).
- In a study of 268 opioid addicts 2.5 years following methadone maintenance treatment: (1) addicts were generally abstinent and psychosocially stable when they left treatment; (2) during the 6-month period following treatment, addicts began to abuse alcohol and other drugs and experience social deterioration; (3) when reentering treatment, 75 percent stayed for more than 6 months and improved steadily in most areas (Kosten, Rounsaville, and Kleber, 1986a).

- In a 2.5-year follow-up study of 150 opioid addicts, participation in methadone maintenance treatment resulted in substantial improvement along several relatively independent dimensions, including medical, social, psychological, legal, and employment problems (Kosten, Rounsaville, and Kleber, 1987).

Patient Status Before and After Methadone Maintenance Treatment—A study by McGlothlin and Anglin (1981a) examined how methadone maintenance treatment affected the percentage of time patients spent incarcerated, using and dealing drugs, unemployed, and involved in crime.

The study examined patients from 3 methadone maintenance treatment programs. Figures 1 through 5 provide the results from all 3 programs, which illustrate that methadone maintenance treatment is effective in improving patients' lives with regard to (1) time using narcotics daily, (2) time unemployed, (3) days involved in crime, (4) time dealing drugs, and (5) time incarcerated.

The left side of each graph describes patient behavior before methadone maintenance treatment, and the right side of each graph depicts patient behavior following methadone maintenance treatment, including behavior of patients who left treatment before the year ended.

Figure 1

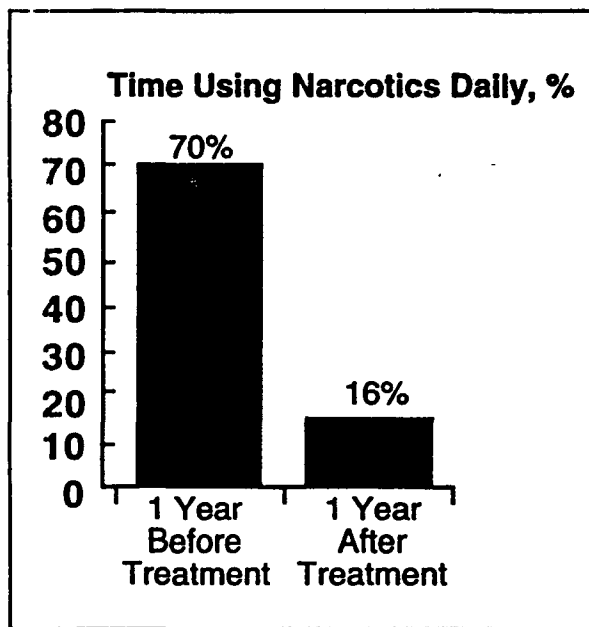


Figure 1 depicts that the percentage of time using narcotics was much greater before methadone maintenance treatment than after.

Figure 2

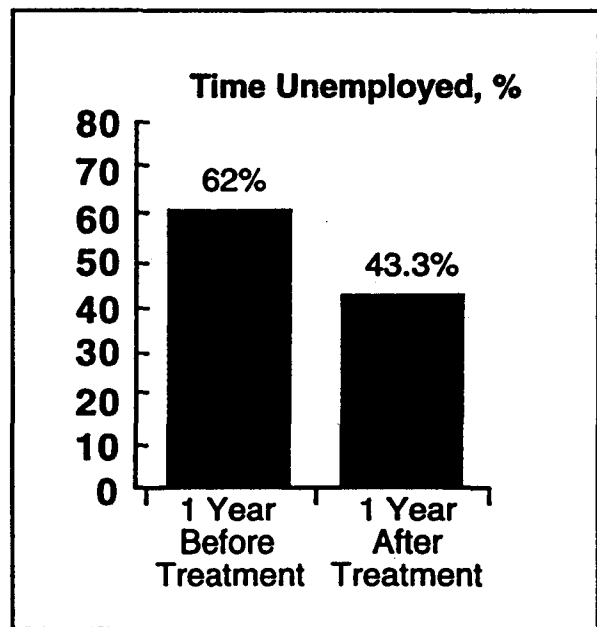


Figure 2 illustrates that the percentage of time unemployed decreased after methadone maintenance treatment.

SECTION 1

**QUESTIONS AND ANSWERS REGARDING METHADONE
MAINTENANCE TREATMENT RESEARCH**

Figure 3

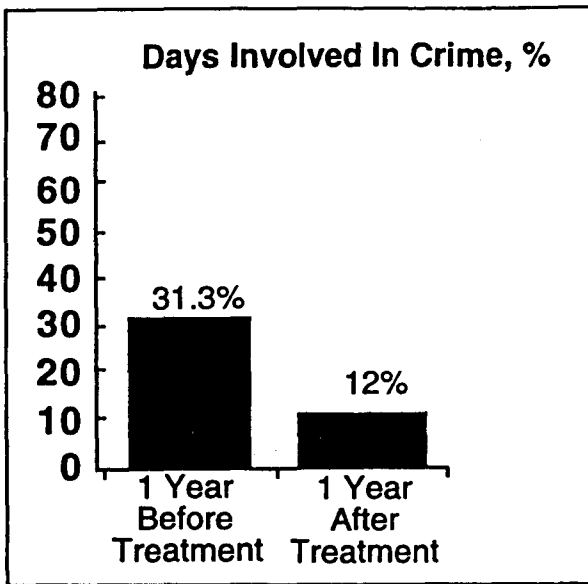


Figure 3 demonstrates that the percentage of days the patient was involved in crime decreased after methadone maintenance treatment.

Figure 4

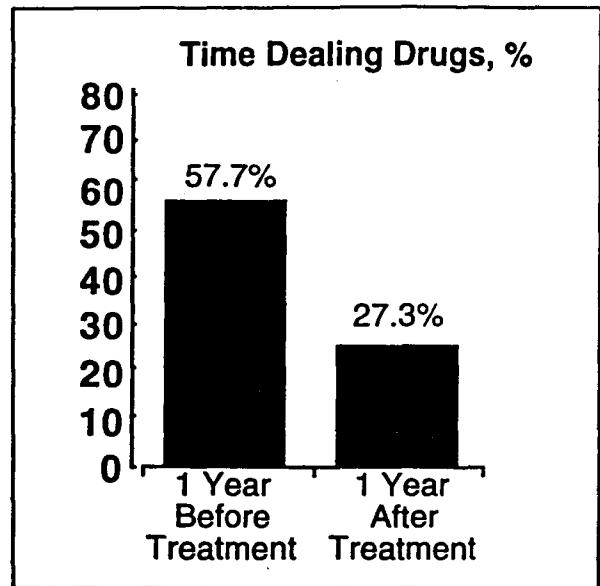


Figure 4 depicts that the percentage of time dealing drugs decreased after methadone maintenance treatment.

Figure 5

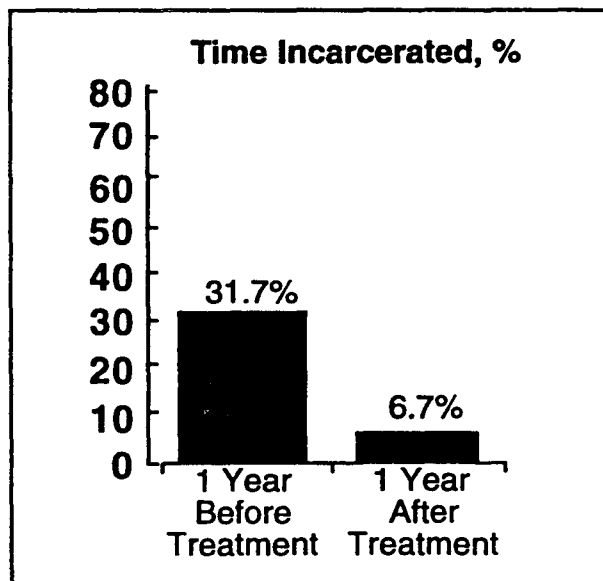


Figure 5 illustrates that the percentage of time incarcerated decreased after methadone maintenance treatment.

The Effects of Heroin and Methadone on Functional State—Figures 6 and 7 illustrate how heroin and methadone have different effects on a patient's functional states and moods: repeated injections of heroin cause multiple cycles of elevation and depression, but methadone promotes a relatively steady state.

Figure 6 depicts a typical day for a heroin addict. Note that the addict generally injects heroin several times each day. Each injection causes an elevation in mood: the user feels "high." This is followed by a rapid decline in mood and functional states: the user no longer feels "high," and may begin to feel sick. At the end of the day, or in the early morning, the user feels quite sick. Overall, a typical day includes several cycles of elevated and depressed mood and functional states.

Figure 6

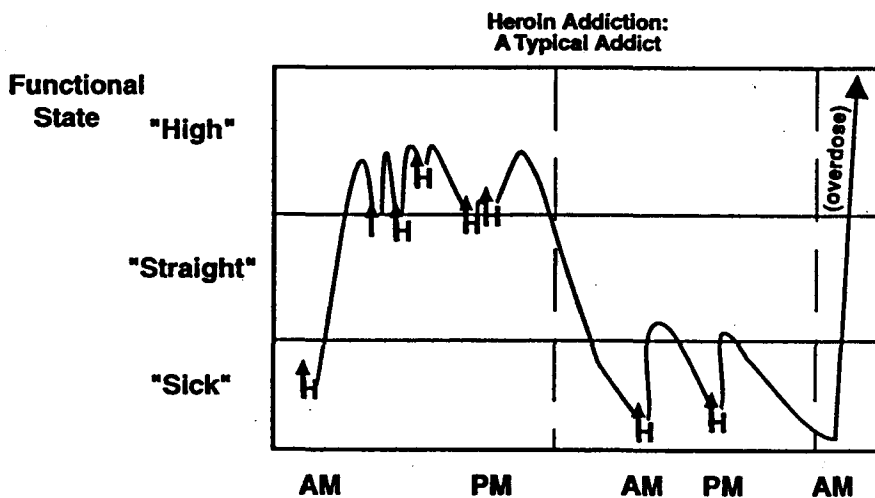
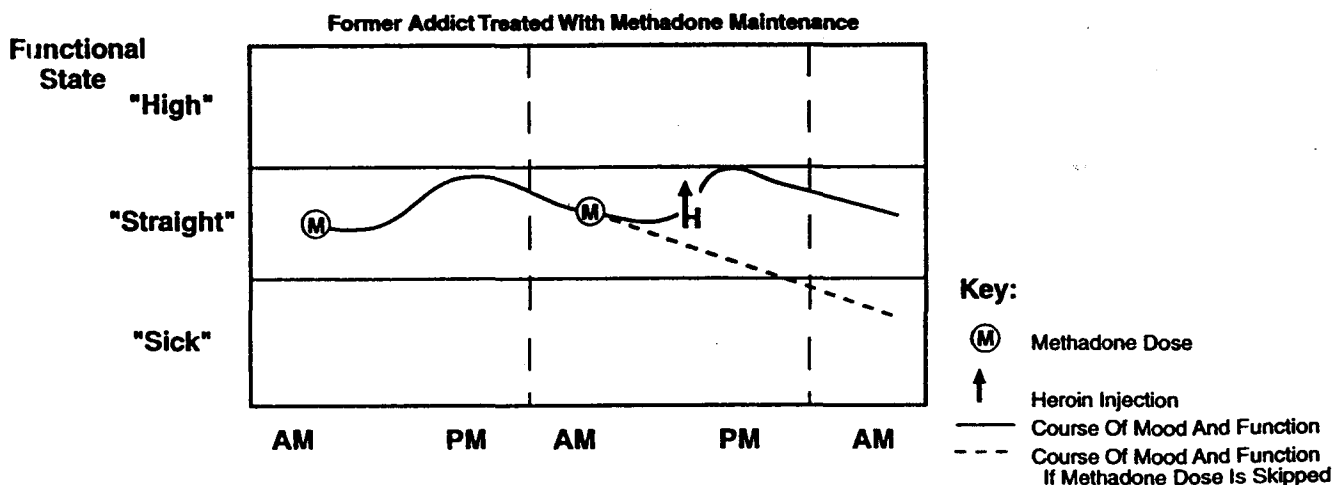


Figure 7

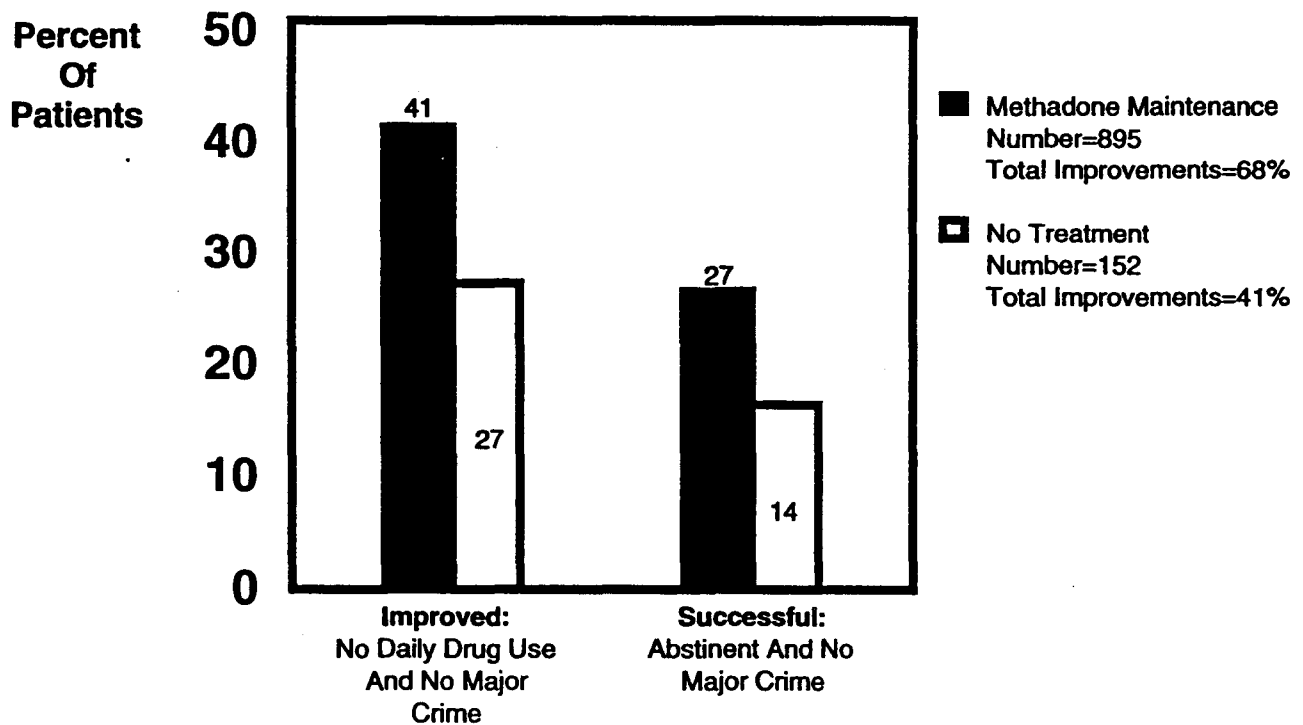


In contrast, Figure 7 above illustrates that a single oral dose of methadone in the morning promotes a relatively steady state of mood and function. This graph also demonstrates that an injection of heroin during methadone maintenance treatment has a less intense effect on mood and function than an injection of heroin in active users who are not in methadone treatment. The dotted line in Figure 7 predicts the course of a patient's mood and function if a dose of methadone is omitted. Dole, Nyswander, and Kreek found that the decline in mood and function is gradual, not steep.

Improvements: Drugs and Crime 1 Year after DARP—The DARP study (Simpson and Sells, 1982) demonstrates that methadone maintenance treatment is effective in reducing 2 problems associated with heroin addiction: illicit drug use and crime. The study compared reductions in illicit drug use and crime by patients who received methadone maintenance treatment and by patients who received no treatment.

Figure 8 shows that during the first year after treatment, 41 percent of methadone maintenance treatment patients were no longer addicted to illicit opioids and were not involved in major crime. Twenty-seven percent who received no treatment were no longer addicted to illicit opioids and were not involved in major crime.

Figure 8



Twenty-seven percent of methadone maintenance treatment patients had not used any illicit drugs and had no arrests or incarcerations during the year after methadone maintenance treatment. In contrast, 14 percent of those not treated reported no illicit drug use or arrests.

Overall, 68 percent of methadone maintenance treatment patients experienced significant improvements regarding illicit drug use and crime. This is in contrast to about 41 percent of those not treated.

The Effect of Methadone Maintenance Treatment Duration on Drug Use and Crime—The DARP study also shows that the longer patients stay in treatment, the more likely they are to remain crime-free.

Figure 9

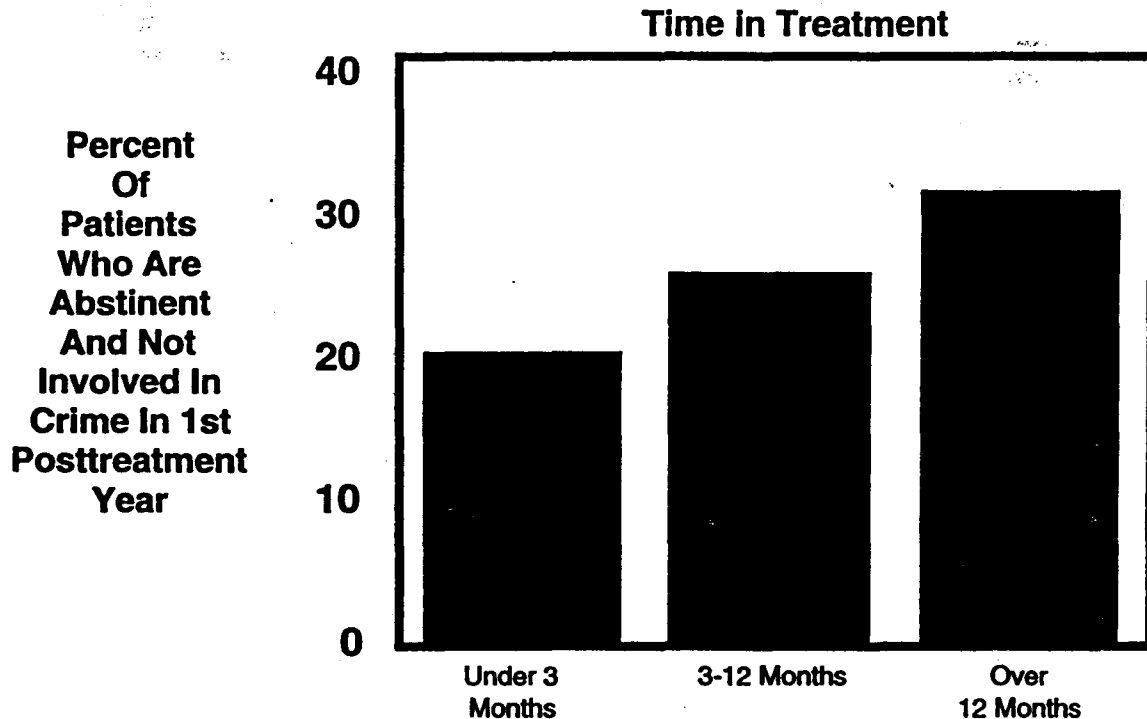


Figure 9 illustrates that there is a relationship between how long patients remain in treatment and how well they function after treatment. In this instance, the length of treatment was associated with abstinence from illicit drug use and an absence of crime. Thirty percent of patients who stayed in treatment for more than 12 months abstained from illicit drug use and criminal activity. Twenty-five percent of patients in treatment from 3 to 12 months stopped using illicit drugs and committing crimes; of those who were in treatment for under 3 months, 20 percent abstained.

Question 2: Does methadone maintenance treatment reduce illicit opioid use?

Answer: Yes. Patients' illicit opioid use declines, often dramatically, during methadone maintenance treatment. However, adequate methadone dosage levels are essential for treatment effectiveness.

Research Highlights

- Condelli and Dunterman (1993) examined a sample of 526 patients admitted to 17 methadone maintenance treatment programs that participated in TOPS. This analysis compared the length of methadone maintenance treatment to heroin use. The average short-term treatment duration was 31 days; long-term, 233 days; and continuous, 725 days. The rate of heroin use was 100 percent before treatment, 39 percent after short-term treatment, 40 percent after long-term treatment, and 17 percent after continuous treatment. This study suggests that longer exposure to methadone maintenance treatment decreases the likelihood of heroin use.
- In the Ball and Ross studies (1991), patients reduced their use of injected heroin 71 percent compared with preadmission levels. Illicit opioid use was directly related to methadone dosage: in patients on doses above 71 milligrams per day, no heroin use was detected, whereas patients on doses below 46 milligrams were 5.16 times more likely to use heroin than those receiving higher doses.
- Ball and colleagues (1988) found that 18.6 percent of 490 patients continuing in methadone maintenance treatment for 6 months to 4.5 years had used heroin within the last 30 days. However, heroin use correlated strongly with dosage level. At doses of 75 milligrams or more per day, ongoing use of heroin ceased altogether. In contrast, 64 percent of patients who were maintained on 10 milligrams or less of methadone per day continued frequent heroin use. A dose of 40 milligrams per day seemed to be the cutoff point for a large decrease in heroin use.
- In a study of 933 heroin addicts participating in methadone maintenance treatment programs comparing behavior during periods on methadone maintenance and off, it was demonstrated that during periods on methadone maintenance, illicit narcotic use significantly decreased and reduction in illicit narcotic use was the most prominent effect among 9 indicators of treatment success (Powers and Anglin, 1993).
- In the DARP study, 44 percent of the 895 patients who entered methadone maintenance treatment reported no daily use of illicit narcotics in the first posttreatment year. This represented a 56 percent decrease from 100 percent daily use in the 2 months before admission (Simpson and Sells, 1982).

- DARP studies of addicts 12 years following admission to treatment showed that illicit opioid use declined progressively over time until year 6, when it stabilized at about 40 percent for “any” use and 25 percent for “daily” use (Simpson, Joe, Lehman, and Sells, 1986).
- In both the DARP and TOPS studies, long treatment duration was the strongest predictor of reduced heroin use among methadone maintenance patients.

Reductions in Illicit Opioid Use During and After Methadone Maintenance Treatment—The DARP and TOPS studies of 2 different groups of heroin addicts were conducted several years apart. Both demonstrated about a 40 percent reduction in illicit opioid use at the end of 1 year after methadone maintenance treatment.

Figure 10

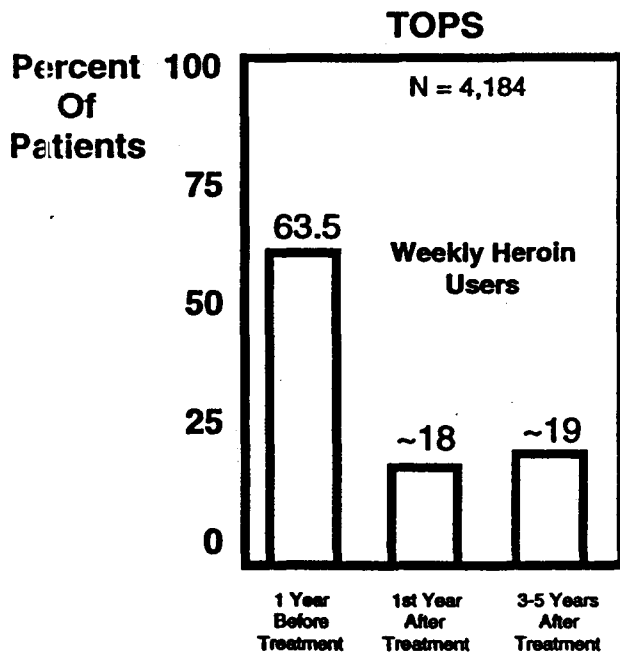


Figure 10 illustrates that in the TOPS study, almost 64 percent of the patients used heroin at least weekly in the year before treatment; however, 18 percent used heroin at least weekly in the year after treatment and about 19 percent continued heroin use weekly 3 to 5 years after treatment (Hubbard et al., 1989).

Figure 11

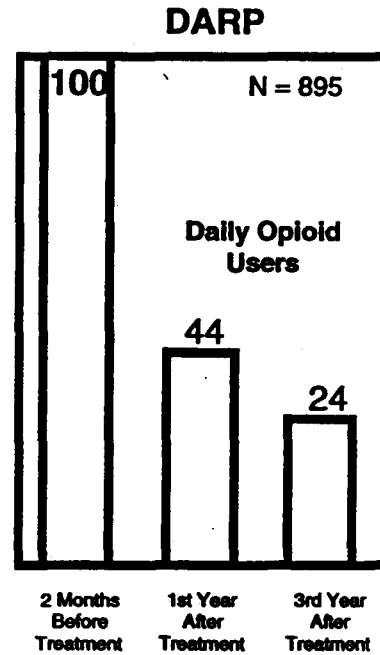


Figure 11 illustrates that in the DARP study, 44 percent of methadone maintenance treatment patients were using heroin daily in the year following treatment and 24 percent were using heroin daily 3 years after treatment. This represents significant reductions from the 100 percent who had been using heroin daily in the 2 months before admission (Simpson and Sells, 1982). Daily illicit opioid use continued to decline steadily for the next 3 years.

DARP: Changes in Illicit Opioid Use: Pretreatment to 12-Year Follow-up—Among patients in the DARP studies, (1) methadone maintenance treatment resulted in a rapid decline in illicit opioid use and (2) this reduction in illicit opioid use remained steady for 12 years (Simpson and Sells, 1990).

Figure 12

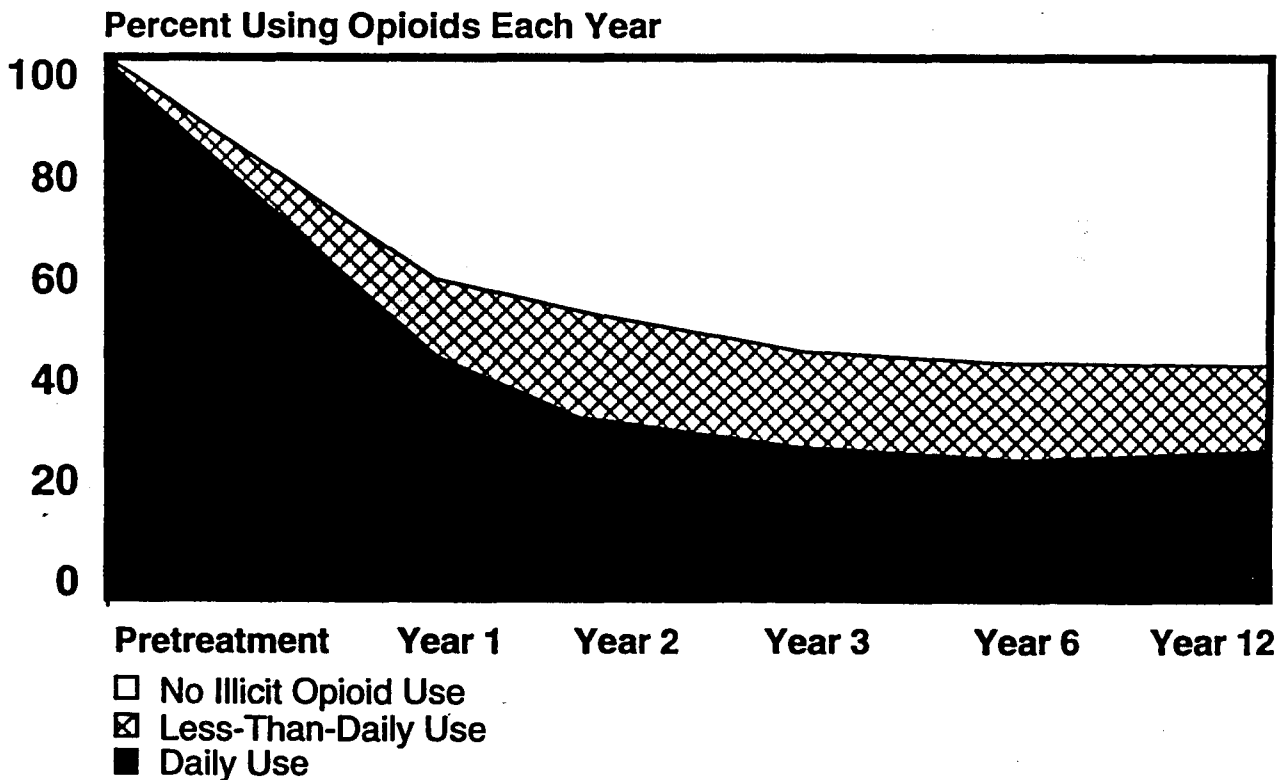


Figure 12 illustrates that improvements among patients who used no illicit opioids and who used opioids less than daily persisted into the 12th year after treatment. About half of those patients treated with methadone maintenance reported no illicit drug use after 12 years. The benefits associated with methadone maintenance treatment seem to improve over time. For example, at the end of 1 year, about half of the subjects reported daily illicit drug use; but by year 12, the proportion using illicit drugs on a daily basis was reduced to about 1 quarter.

Reduction of Heroin Use by Length of Stay in Methadone Maintenance Treatment—The length of stay in methadone maintenance treatment is associated with a reduction in heroin use: longer lengths of stay are associated with greater reductions in heroin use (Ball and Ross, 1991).

Figure 13

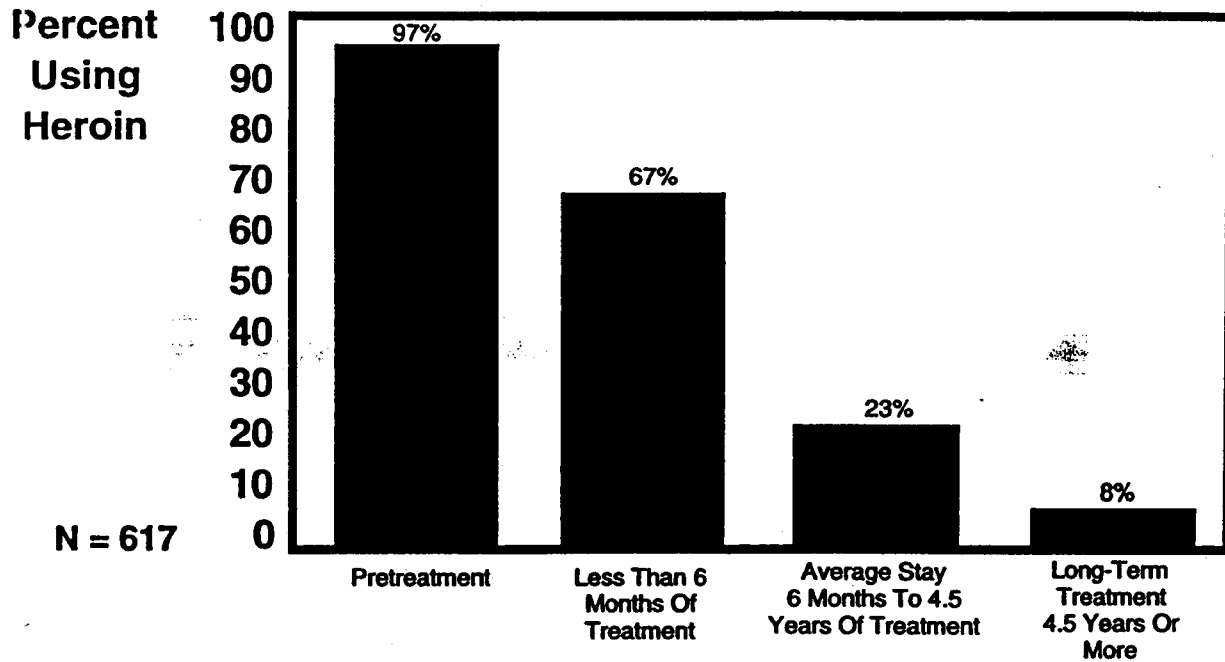


Figure 13 illustrates that the percentage of heroin use among a group of 617 new admissions was nearly 100 percent. Among patients who stayed in treatment for less than 6 months, about 67 percent reported using heroin. Among patients whose average stay in methadone maintenance treatment was one-half year to 4.5 years, about 23 percent reported using heroin. Among patients who remained in treatment more than 4.5 years, about 8 percent reported using heroin.

Question 3: What effect can methadone maintenance treatment have on the use of alcohol and other drugs?

Answer: Research outcomes are mixed regarding the effect of methadone maintenance treatment on the use of illicit drugs other than opioids. That is, some research indicates that methadone maintenance treatment is associated with decreases in the use of alcohol, cocaine, and marijuana; other research indicates increases in the use of these drugs. Importantly, the medication methadone has no direct effect and is not intended to have an effect on rates of alcohol and other drug use. Reductions of alcohol and drug use are the result of the biopsychosocial treatment services included in methadone maintenance treatment. When these services are specifically designed to reduce alcohol and other drug use, such reductions are likely.

Research Highlights

- In the DARP studies, there were reductions in nonopioid drug use (except marijuana) among 895 methadone maintenance patients, comparing the 2-month period before admission and the year following discharge. The reduction in nonopioid use was 13 percent—from 54 percent of patients who reported any use before admission to 41 percent at the 1-year follow-up point (Simpson and Sells, 1982).
- In the 12-year DARP follow-up study, “heavy drinking” was reported by 21 percent of the sample in the month before treatment; it rose to 31 percent during the first year afterward and then declined to 22 percent by year 12. Half the patients reported substituting alcohol for opioids after stopping daily illicit opioid use (Lehman, Barrett, and Simpson, 1990).

Methadone Maintenance Treatment and General Drug Abuse—Among 3 cohorts of new admission patients in methadone maintenance treatment, Ball and Ross (1991) found that the use of all illicit drugs, except marijuana, decreased markedly in relation to time in treatment. These 3 cohorts had been in treatment 6 months, 4.5 years, or more than 4.5 years.

In the TOPS studies, 90 percent of methadone maintenance treatment patients who reported drug use at intake reported a reduction in use during the first 3 months of treatment. For 80 percent, this reduction is large. In the year before treatment, less than 10 percent of methadone maintenance treatment patients were minimal drug users. During treatment, more than 50 percent of the patients were minimal drug users. During the 3 to 5 years after discharge, less than 32.5 percent were minimal drug users (Hubbard et al., 1989).

The Powers and Anglin study (1993) of 933 heroin addicts in methadone maintenance programs demonstrated that during episodes of methadone maintenance treatment, illicit opioid use decreased but alcohol and marijuana levels moderately increased.

Kreek (1991) observed that by 1990, alcoholism was identified in as many as 40 or 50 percent of new admissions to methadone maintenance treatment programs, and cocaine abuse was found in 70 to 90 percent. She also estimated that 20 to 46 percent of patients in effective methadone maintenance treatment programs continue using cocaine and 15 to 20 percent of methadone maintenance treatment patients regularly inject cocaine.

Methadone Maintenance Treatment and Cocaine Use—Among the TOPS studies patients who remained in methadone maintenance treatment at least 3 months, 26.4 percent had used cocaine regularly the year before treatment. This rate fell to 10 percent during the first 3 months of treatment but returned to 16 percent by 3 to 5 years after discharge. Altogether, 40 percent of methadone maintenance treatment patients who regularly used cocaine prior to treatment and stayed in treatment for at least 3 months abstained from cocaine use in the year after treatment (Hubbard et al., 1989).

In the TOPS studies, although 70 percent of heroin abusers had frequently used cocaine the year before treatment, it was the primary drug of choice for only 2 percent of methadone maintenance treatment patients (Hubbard et al., 1989).

In the new admissions group of a 6-program study ($n = 345$), 46.8 percent of 126 patients had used cocaine in the past 30 days. Among the average-stay group (up to 4.5 years in treatment), 27.5 percent still used cocaine; this rate dropped to 17.2 percent among the long-term group of 146 patients who had been in continuous treatment for more than 4.5 years (Ball and Ross, 1991).

Methadone Maintenance and Marijuana Use—Among TOPS subjects, marijuana use was common: 55 percent of methadone maintenance patients who stayed in treatment for 3 months reported regular use in the year before admission. This decreased to 47 percent during the first 3 months of treatment, continued to decline immediately posttreatment, and decreased even more to 36.4 percent in the 3- to 5-year period after discharge. However, marijuana use appeared more resistant to change than other illicit substances (Hubbard et al., 1989). It should be considered that the treatment programs likely did not clinically address marijuana or other drug use.

Ball and Ross (1991) found that marijuana continued to be used quite regularly (an average of 13 to 16 days per month) by high percentages of all patient groups in methadone maintenance treatment: 48.4 percent of the new admissions, 47.7 percent of the average-stay group, and 37.2 percent of the patients in treatment more than 4.5 years.

One study of 132 opioid addicts—with multiple periods of addiction, methadone maintenance treatment, and abstinence during an average of 15 years—examined drug use throughout their addiction career. The most dramatic increases during this time were found for illicit methadone and cocaine. Rates of heroin and marijuana use declined (Hanlon et al., 1990).

In a study of 933 heroin addicts participating in methadone maintenance treatment programs, it was noted that during episodes of methadone maintenance treatment, levels of alcohol and marijuana use modestly increased (Powers and Anglin, 1993).

Methadone Maintenance and the Nonmedical Use of Prescription Drugs—In the TOPS studies, the regular, nonmedical use of psychoactive prescription drugs by methadone maintenance treatment patients during the first posttreatment year decreased by a third from the pretreatment period. Although 30.3 percent of this methadone maintenance group reported a regular, nonmedical use of prescription drugs (i.e., barbiturates, amphetamines, tranquilizers, sedatives, and hypnotics), nonmedical prescription drug use was a primary problem for only 1.9 percent of these opioid addicts at admission (Hubbard et al., 1989).

In the TOPS studies, nonmedical prescription drug use declined during methadone maintenance treatment, increased immediately following discharge, and declined again to 10 percent of patients 3 to 5 years following discharge (Hubbard et al., 1989).

Ball and Ross (1991) found that although the nonmedical use of sedatives other than barbiturates was acknowledged by 31.8 percent of new admissions to methadone maintenance treatment, the percentage of sedative-using patients who had been in treatment for more than 4.5 years was less than half that of the new admission group (14.5 percent).

Methadone Maintenance Treatment and Alcohol and Other Drug Use—In the TOPS studies, improvements in the use of illicit and nonprescription drugs follow a pattern of (1) a dramatic reduction during treatment, (2) a sharp increase immediately after discharge, and (3) a leveling off at an impressively reduced rate for up to 5 years of follow-up contacts (Hubbard et al., 1989).

Figure 14

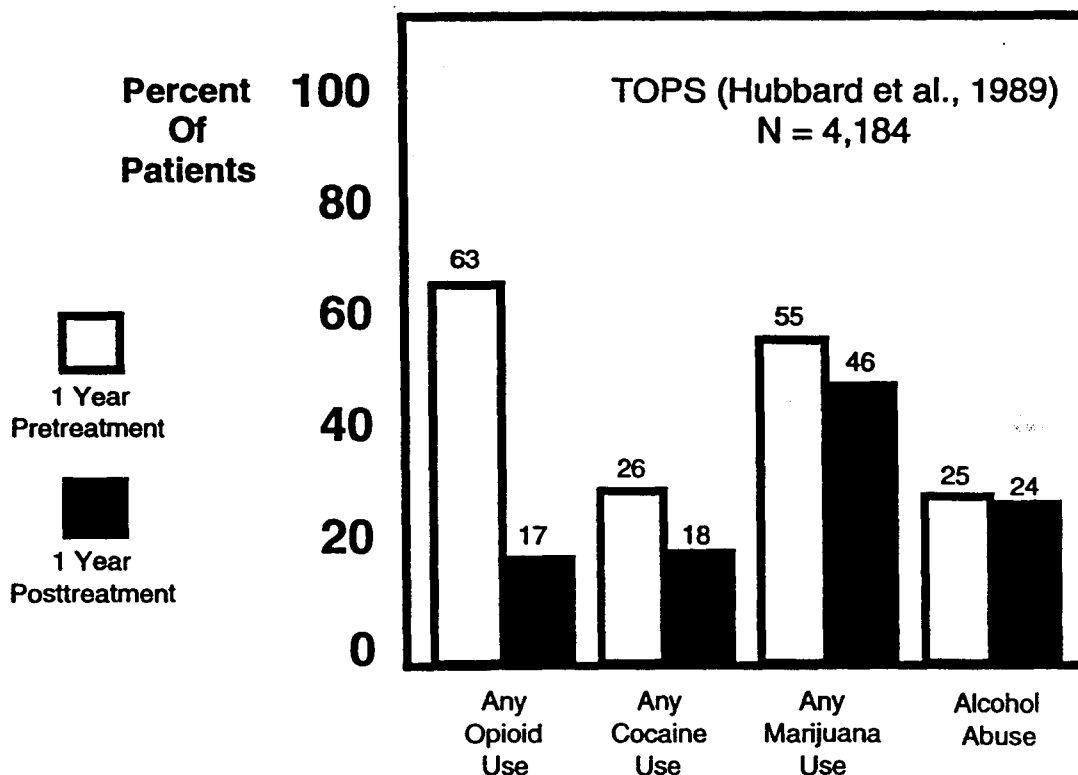


Figure 14 illustrates that as reported by the TOPS study of 4,184 patients, methadone maintenance treatment was associated with reductions in (1) any illicit opioid use, (2) any cocaine use, (3) any marijuana use, and (4) alcohol abuse (the 1-percent reduction noted here is not statistically significant).

“Any opioid use” declined from 63 percent pretreatment to 17 percent 1 year posttreatment. This was the most dramatic decline. “Any cocaine use” declined from 26 percent to 18 percent. “Any marijuana use” declined from 55 percent pretreatment to 46 percent 1 year posttreatment. Alcohol abuse remained almost steady, declining slightly from 25 percent to 24 percent.

Question 4: Does methadone maintenance treatment reduce criminal activity?

Answer: Yes. Patients are less likely to become involved in criminal activity while in methadone maintenance treatment.

- Patients who remain in methadone maintenance treatment for long periods of time are less likely to be involved in criminal activity than patients in treatment for short periods.
 - The availability of methadone maintenance treatment in a community is associated with a decrease in that community's criminal activity, particularly theft.
-

Research Highlights

- In the TOPS studies, 32 percent of the methadone maintenance patients acknowledged committing 1 or more predatory crimes in the year before treatment, but only 10 percent continued these activities during treatment. By 3 to 5 years after leaving treatment, only 16 percent of the patients reported predatory criminal activity—a reduction of one-half the pretreatment level (Hubbard et al., 1989).
- Among the 617 patients studied by Ball and Ross (1991), there was a 70.8 percent decline in crime days within the 4-month methadone maintenance treatment period. This was followed by continuing, but less dramatic, declines in mean crime days among those in treatment for 1 to 3 years. Those in treatment for 6 or more years had the lowest rate of crime-days per year (14.5).
- The Powers and Anglin (1993) retrospective study of 933 heroin addicts demonstrated that rates of criminality, arrests, and drug dealing decreased during episodes of methadone maintenance treatment when compared with addicts not in treatment.
- In a study of 510 addicts who remained in methadone maintenance treatment for 3 months or longer, the average number of days engaged in criminal activity in the last month dropped from 10.8 before treatment to 1.4 while in treatment (Simpson, Joe, Rowan-Szal, and Greener, in press).
- A study of police reports and methadone maintenance treatment program statistics in San Antonio, Texas, revealed that after an increase in serious crime over a 5-year period, (1) the crime rate decreased when there was an increase of heroin users in methadone maintenance treatment and (2) 4 years later, when methadone maintenance treatment funds were lost, the treatment rate decreased and the crime rate increased, especially for theft (Maddux and Desmond, 1979).

The Effects of Methadone Maintenance Treatment on Crime Days—The Ball and Ross study (1991) of 617 patients demonstrated that methadone maintenance treatment is associated with a dramatic decline in the average number of crime days per year.

Figure 15

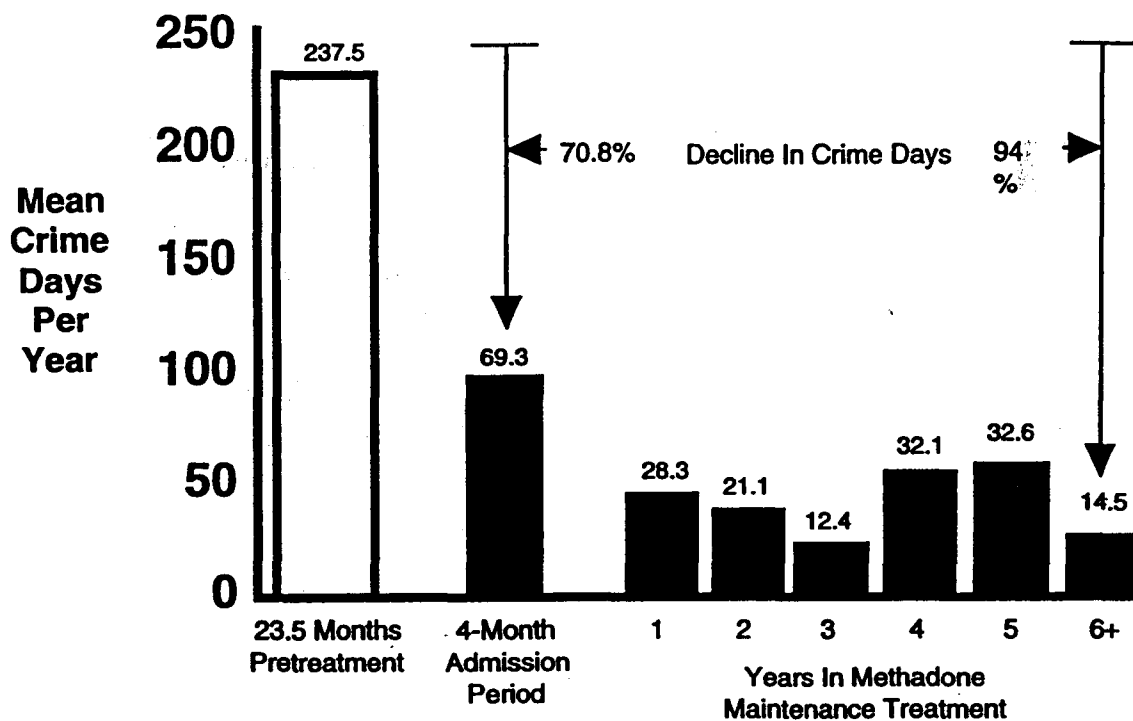


Figure 15 shows that the average number of crime days per year before treatment was 237. During the 4-month initial methadone maintenance treatment, the average number of crime days per year was 69. This represents about a 71-percent decline. This dramatic decline was followed by continuing but less dramatic declines in the average number of crime days among those in methadone maintenance treatment for 1 to 3 years. Patients who remained in methadone maintenance treatment for 6 or more years reported only 14.5 crime days per year, representing a 94-percent decline in average number of crime days.

Crime Before and During Methadone Maintenance Treatment at 6 Programs—Ball and Ross (1991) found a dramatic decline in crime when comparing pretreatment crime days per year with the number of crime days per year after 6 months or more in methadone maintenance treatment.

Figure 16

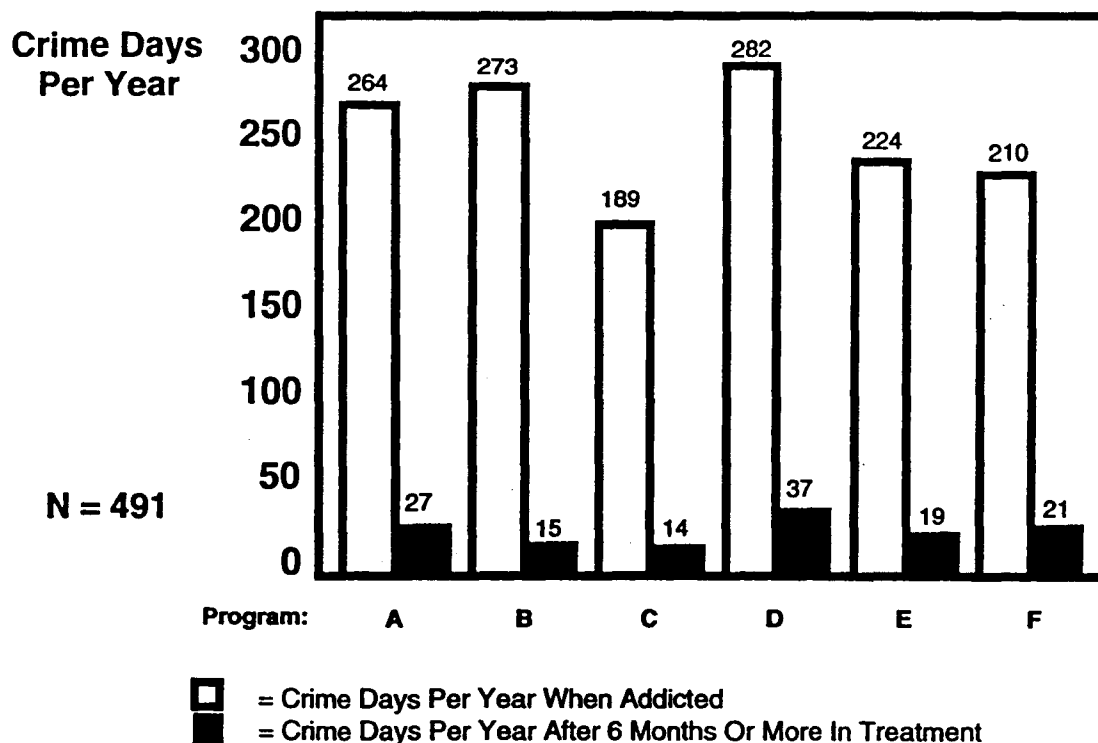


Figure 16 illustrates the average number of crime days reported by patients in 6 methadone maintenance treatment programs. Although there are differences among programs, the dramatic decrease in crime days before and during methadone maintenance treatment occurs for all 6 programs. Crime was reduced by approximately 90 percent in program A, 95 percent in program B, 93 percent in program C, 87 percent in program D, 92 percent in program E, and 90 percent in program F. The average reduction in crime for those in methadone maintenance treatment was just over 91 percent.

The cost benefits of methadone maintenance treatment become obvious when one compares the costs of providing treatment to the social costs that would have occurred if the crime level had continued.

Question 5: Does methadone maintenance treatment improve the likelihood of obtaining and retaining employment?

Answer: Yes. The likelihood of becoming and remaining employed is increased for patients who participate in methadone maintenance treatment.

Research Highlights

- In an early study of 100 chronic heroin users who were admitted to methadone maintenance treatment, the employment rate increased from 21 percent at admission to 65 percent 1 year later (Maddux and McDonald, 1973; Maddux and Desmond, 1979).
- A study of 92 males admitted to methadone maintenance treatment programs during 1971 through 1973 demonstrated that following methadone maintenance treatment, employment increased about 18 percent (Harlow and Anglin, 1984).
- In a 10-year follow-up study, 95 chronic opioid users who spent at least 1 cumulative year in methadone maintenance treatment were compared with 77 chronic opioid users who spent less than 1 cumulative year in methadone maintenance treatment. Those who were on methadone maintenance treatment for more than 1 year had a higher average time employed (mean of 42 months) than those who were in treatment for less than 1 year (mean of 35 months) (Maddux and Desmond, 1992b).
- The Powers and Anglin (1993) study of 933 heroin addicts in methadone maintenance treatment demonstrated that rates of employment (and marriage) increased during treatment.
- Methadone maintenance patients in the TOPS studies had small changes in employment rates during and following treatment compared with pretreatment rates. Although 24 percent of the patients reported full-time employment in the year before admission, this rate did not significantly increase during treatment. It declined abruptly in the 3 months following discharge, improved to 29 percent by year 2, and dropped off again to less than pretreatment rates by years 3 to 5 following treatment (Hubbard et al., 1989).

Changes in Employment During and After Methadone Maintenance Treatment—Figures 17 and 18 illustrate the effects of methadone maintenance treatment on full-time employment as demonstrated by the TOPS and DARP studies. In 1 study, there was little effect; but in the other, methadone maintenance treatment was associated with significant increases in full-time employment.

Figure 17

Figure 18

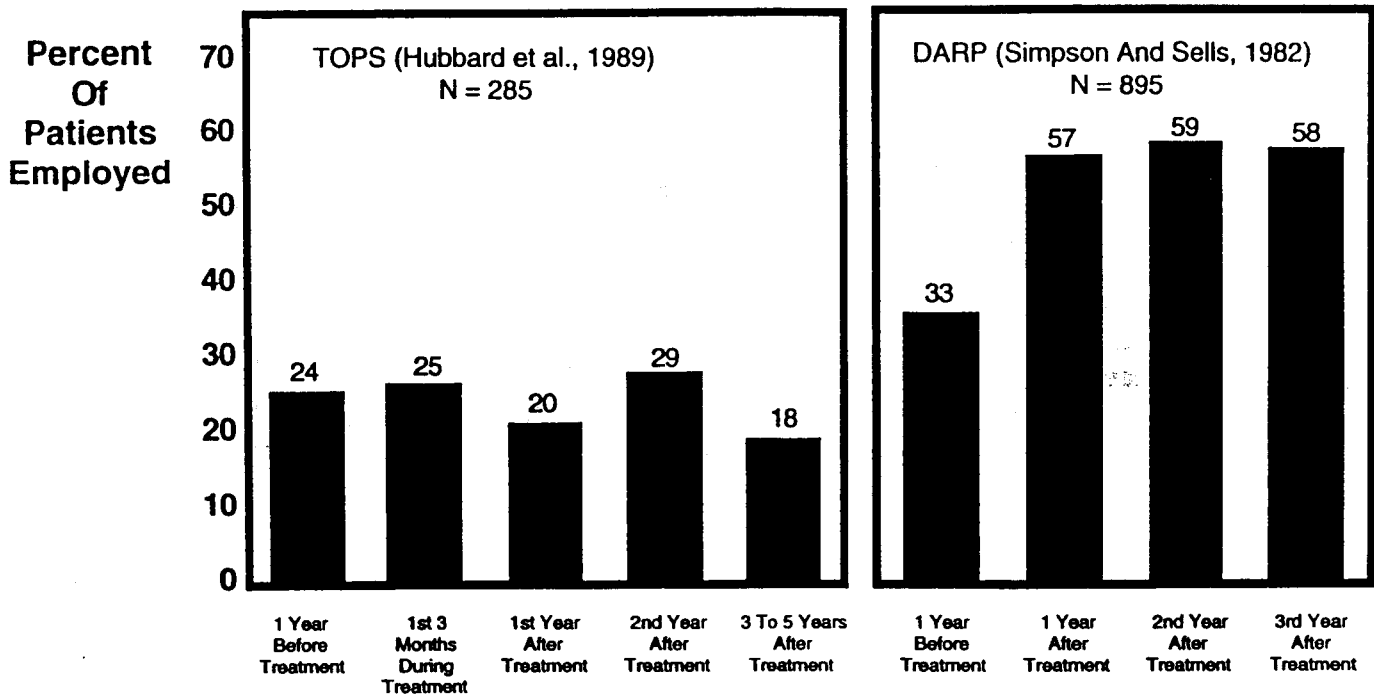


Figure 17 illustrates that patients in the TOPS studies experienced small and inconsistent changes in full-time employment rates during and after treatment (Hubbard et al., 1989). Employment rates were about 24 percent 1 year before treatment, ranged from 20 to 25 percent during the first year after treatment, rose to 29 percent during the second year after treatment, and declined to 18 percent 3 to 5 years after treatment.

In contrast, Figure 18 shows that the DARP studies reported an abrupt increase from 33 percent full-time employment before treatment to nearly 60 percent after treatment (Simpson and Sells, 1982).

Question 6: Does methadone maintenance treatment reduce HIV risk behaviors and the incidence of HIV infection among opioid-dependent injection drug users?

Answer: Yes. The daily, oral administration of adequate dosages of methadone reduces the need for opioid-dependent individuals to inject drugs. By decreasing injection drug use, methadone maintenance treatment helps reduce the spread of diseases that are transmitted through needle-sharing, such as human immunodeficiency virus (HIV) infection and other blood-borne infections.

Research Highlights

- In New Haven, Connecticut, 107 methadone-maintained IDUs and 314 IDUs who were not in treatment were surveyed regarding their risk behaviors. Frequency of injections were found to be 50-65 percent ($p < .001$) higher among the out-of-treatment subjects (Meandzija, et al., 1994).
- A 1993 review of studies related to HIV infection and IDUs concluded that those IDUs who enter high-dosage methadone maintenance treatment before an epidemic of HIV in the local community, and who remain in treatment during the epidemic, are substantially less likely to be infected with HIV (Des Jarlais, Friedman, and Ward, 1993).
- In a 3-year field study of methadone maintenance treatment programs in New York City, New York; Philadelphia, Pennsylvania; and Baltimore, Maryland, treatment was found to be effective in reducing injection drug use and needle sharing by most heroin addicts. Of 388 patients who remained in treatment for 1 year or more, 71 percent had stopped injection drug use. Conversely, 82 percent of patients who left treatment relapsed rapidly to injection drug use (Ball et al., 1988).
- Abdul-Quader et al. (1987) reported that both the frequency of drug injection and the frequency of drug injection in shooting galleries were significantly reduced by the amount of time spent in methadone maintenance treatment.
- Hartel et al. (1988a and 1988b) showed that patients who entered methadone maintenance treatment before 1983 and who remained in treatment for several years had significantly lower rates of AIDS and HIV infection than patients who entered after 1983.
- A study by Serpelloni et al. (1994) examined the effect of methadone maintenance treatment on HIV infection incidence among injection drug users. The study found that the amount of time spent in methadone maintenance treatment was the major determinant in remaining HIV-free, which confirms the effectiveness of long-term programs in reducing the risk of HIV infection. Indeed, the risk of HIV infection increased 1.5 times for every 3 months spent out

of methadone treatment in the last 12 months immediately preceding seroconversion. The study noted that higher daily methadone doses were associated with a reduction in HIV infection.

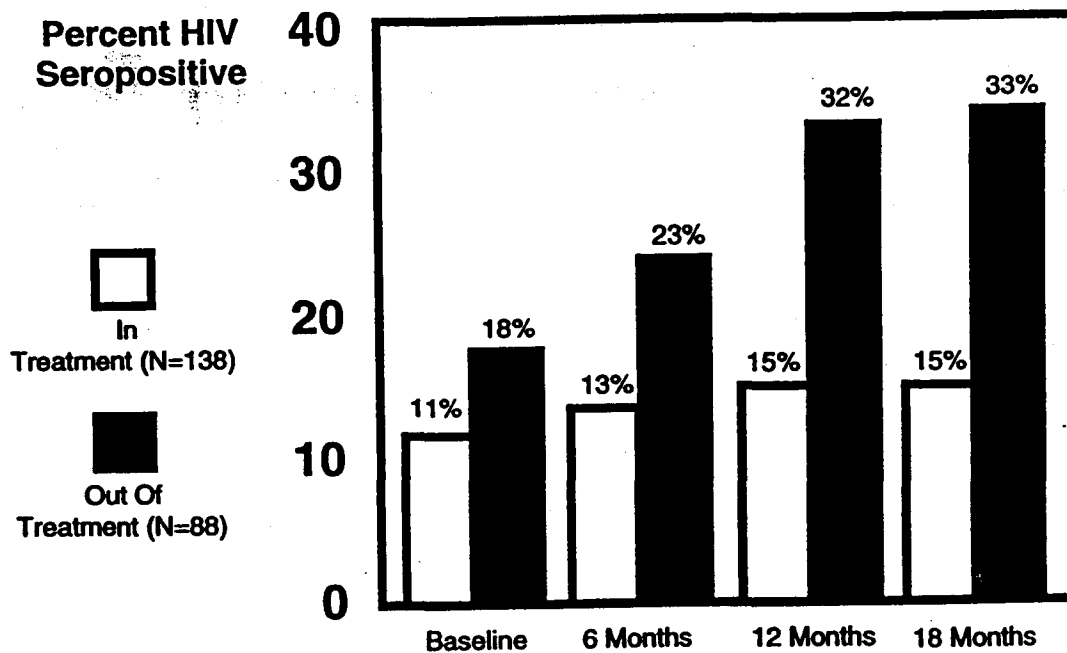
- A study by Weber et al. (1990) examined the role of methadone maintenance treatment in reducing the progression of HIV infection among 297 current and former injection drug users with asymptomatic HIV infection. This study shows that HIV infection progresses significantly more slowly in those who receive methadone maintenance treatment and those who are drug-free than in active injection drug users.
- To study the relationship between methadone maintenance treatment and exposure to HIV, Novick et al. (1990) examined 58 methadone-maintained former heroin addicts in New York City who had used heroin for an average of 10 years prior to participating in methadone maintenance treatment for an average of 17 years. Before methadone maintenance treatment, 91 percent had engaged in needle sharing and 31 percent had made use of “shooting galleries,” places where individuals can purchase and use illicit drugs. The researchers noted that 53 (91 percent) of the patients had 1 or more markers of hepatitis B virus infection, evidence of high-risk practices such as needle sharing. After long-term participation in methadone maintenance, none of the subjects had developed antibodies to HIV. This study suggests that a group of long-term, hard-core heroin addicts in New York City who previously participated in behaviors that placed them at high risk for HIV infection were protected from HIV exposure by avoiding needle use through methadone maintenance treatment.
- In Philadelphia, a longitudinal study of HIV infection and risk behaviors among 152 IDUs in methadone maintenance treatment and 103 out-of-treatment IDUs found significantly lower rates of risk behavior, including needle sharing, injection frequency, shooting gallery use, and visits to crack houses among the methadone-maintained IDUs. While 70 percent of the out-of-treatment cohort reported sharing needles during the 6 months prior to entry into the study, only 30 percent of those in treatment reported sharing needles during this same interval.

At entry into this study, 18 percent of the out-of-treatment subjects and 11 percent of the methadone-maintained clients tested positive for antibodies to HIV. After 18 months of study, 33 percent of the out-of-treatment cohort were infected, while 15 percent of the methadone clients tested positive ($p < 0.01$). The incidence of new infection was strongly associated with the level of participation in methadone treatment. Among those who remained in methadone treatment for the entire 18-month study period, 3.5 percent became infected. Among those who remained out of treatment, 22 percent became infected with HIV (Metzger et al., 1993).

The following 2 visuals—HIV Infection Rates by Methadone Maintenance Treatment Status and Eighteen-Month HIV Seroconversion by Methadone Maintenance Treatment Retention—depict findings from this study.

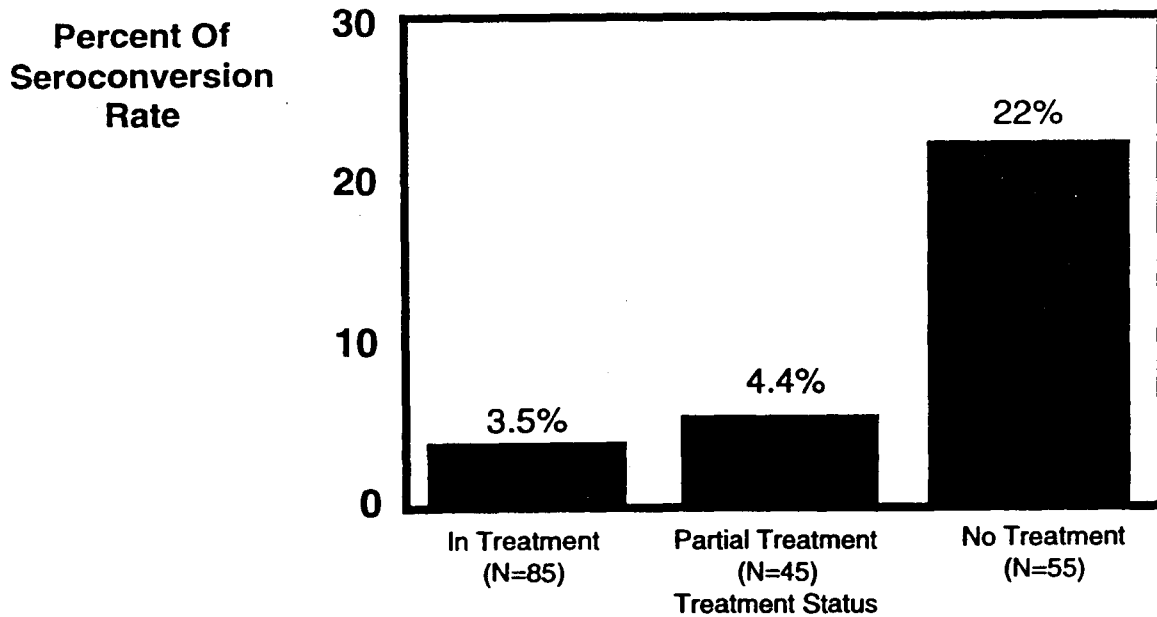
HIV Infection Rates by Methadone Maintenance Treatment Status—Figure 19 shows that at the beginning of this study, 18 percent of the out-of-treatment subjects and 11 percent of the methadone-maintained clients tested positive for antibodies to HIV. After 18 months, nearly twice as many (33 percent) of the out-of-treatment cohort were HIV-positive while only 15 percent of the methadone clients tested positive ($p < .01$). The incidence of new infection was strongly associated with the level of participation in methadone treatment.

Figure 19



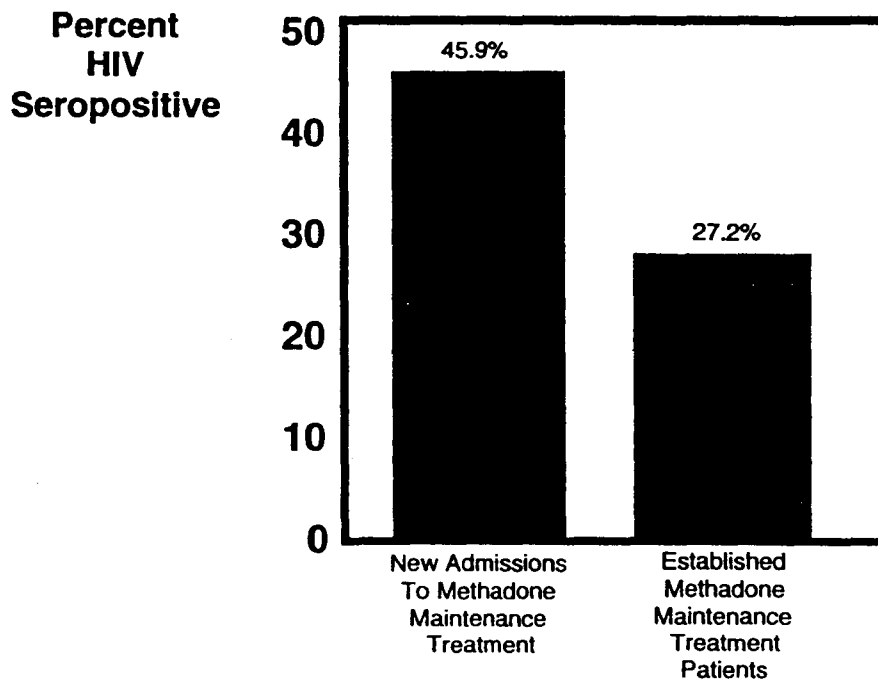
Eighteen-Month HIV Seroconversion by Methadone Maintenance Treatment Retention—Figure 20 shows that among those who remained in methadone maintenance treatment for the entire 18-month study period, 3.5 percent became infected. Among those who remained out of treatment, 22 percent became infected with HIV (Metzger et al., 1993).

Figure 20



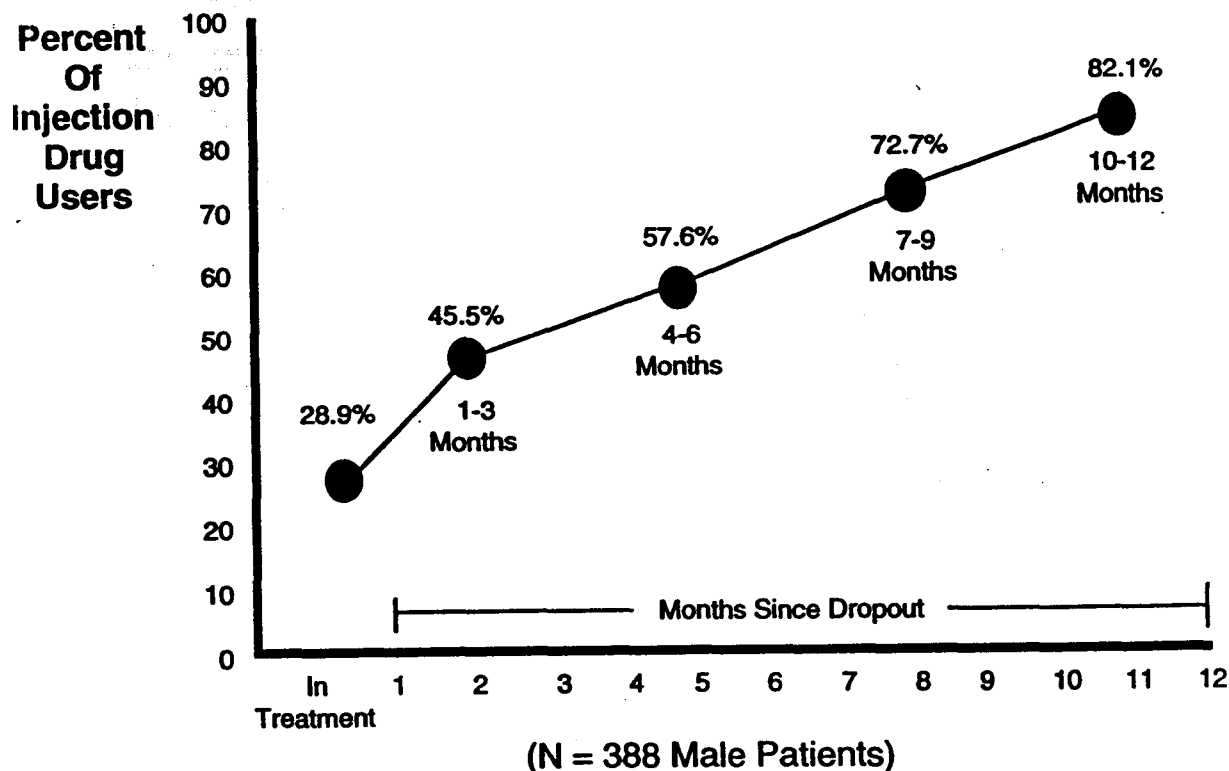
HIV Seropositivity Among New and Established Methadone Maintenance Treatment Patients—Figure 21 illustrates that a survey of 28 methadone maintenance treatment programs in New York City revealed that HIV seropositivity in established patients was 27.2 percent, compared with 45.9 percent in new patients (Truman and Brown, 1989).

Figure 21



Rapid Return to Injection Drug Use Following Premature Termination of Methadone Maintenance Treatment—In a 3-year field study of methadone maintenance treatment programs in New York, New York; Philadelphia, Pennsylvania; and Baltimore, Maryland, methadone maintenance treatment was found to be effective in reducing injection drug use and needle sharing by most heroin addicts. Of 388 patients who remained in treatment for 1 year or more, 71 percent had stopped injection drug use. Conversely, 82 percent of the 105 patients who left treatment relapsed rapidly to injection drug use (Ball et al., 1988). Figure 22 demonstrates that methadone maintenance treatment is associated with reductions in injection drug use and the risks related to HIV infection. When drug users leave methadone maintenance treatment prematurely, they have an increased likelihood of returning to injection drug use.

Figure 22



Question 7: What components of methadone maintenance treatment account for reductions in AIDS risk behaviors?

Answer: Reductions in drug use and related AIDS risk behaviors among methadone maintained individuals have been associated with both physiological and psychosocial factors. Recent studies have confirmed that adequate methadone dose levels are required to achieve significant reductions in opioid abuse. At the same time research has demonstrated that the methadone alone will have at best limited impact. Additional psychosocial support services are needed to maximize the effectiveness of methadone maintenance treatment.

Research Highlights

- A study examining the impact of psychosocial services in methadone treatment (McLellan et al., 1995) found that outcomes were significantly improved for those injection drug users (IDUs) who received services in addition to methadone. In this study, methadone patients were randomly assigned to 1 of 3 groups who received either: (1) methadone alone with no other services, (2) methadone and regular counseling, or (3) methadone with counseling and medical/psychiatric services, employment services, and family therapy. While methadone doses were the same in each group, outcomes were significantly better in the groups who also received psychosocial services. Sixty-nine percent of the methadone-only group had to be "protectively transferred" due to unremitting use of opiates or cocaine, or medical/psychiatric emergencies.
- Hartel et al. (1995) examined the drug use patterns and treatment characteristics of 652 methadone patients receiving treatment from the Montefiore Methadone Treatment Program in New York. The study found that those who were maintained on less than 70 milligrams per day of methadone were 2.1 times ($p < .005$) more likely to be using heroin. It is important to note that the observed effects of higher doses were found even after controlling for the length of time in treatment.

Increased Methadone Maintenance Census and Decreased Hepatitis Cases: New York City, 1971-1973—Reduction of behaviors that put one at risk for HIV infection has the added benefit of reducing the spread of other infections. For example, when methadone maintenance treatment capacity was expanded in New York City, there was a decrease in the reported cases of serum hepatitis.

Figure 23

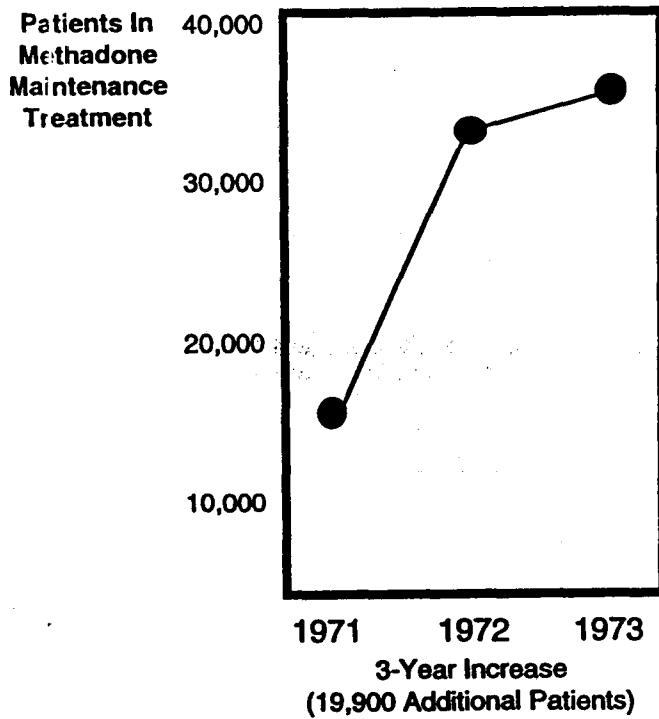


Figure 24

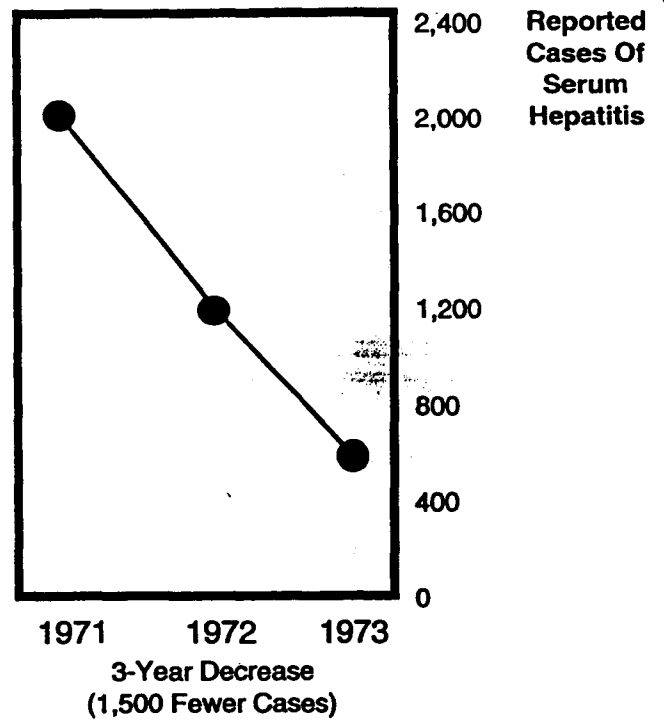


Figure 23 illustrates that during the years 1971 to 1973, the treatment capacity for methadone maintenance increased from about 15,000 to about 35,000.

Figure 24 shows that during that same time, the reported cases of serum hepatitis decreased from about 2,000 to about 600. This represents an approximately 87-percent decrease in reported cases of serum hepatitis from 1971 to 1973.

Question 8: Do risk factors for HIV infection acquisition and transmission differ for women compared to men in methadone maintenance treatment?

Answer: Yes. Despite nearly equal HIV infection rates for men and women in drug treatment, female injection drug users (IDUs) differ from males in the types and contexts of their risk behaviors. While the main HIV infection risk for both men and women IDUs is needle sharing, women frequently support themselves and their addiction habit through sex work and are more likely to have an IDU as a sexual partner. The most common needle sharing context for women is with their sex partners.

In addition, women may transmit HIV infection to their infants *in utero*, during delivery, or through breast-feeding. HIV infection-prevention programs that take these gender differences into account are needed for women in methadone treatment.

Research Highlights

- Patterns of needle sharing are different for males and females. Women tend to share needles in the context of a sexual relationship. This type of needle sharing may be more difficult to change than other types of injection risk behavior because the perception of risk or ability to negotiate safe needle use by women may be limited. In research conducted among 19,716 males and 6,609 females in the National AIDS Demonstration Research (NADR) project addressing street-recruited IDUs, women were more likely than men to share needles with their sex partners. The majority of the participants injected only heroin or heroin in combination with cocaine (Brown & Weissman, 1994).

Research in other countries has shown a tendency of IDU women to share needles with their sex partners. For example, women in Glasgow, Scotland, were “frequently, or habitually, injecting with the used needles and syringes of their partners” (Barnard, 1993).

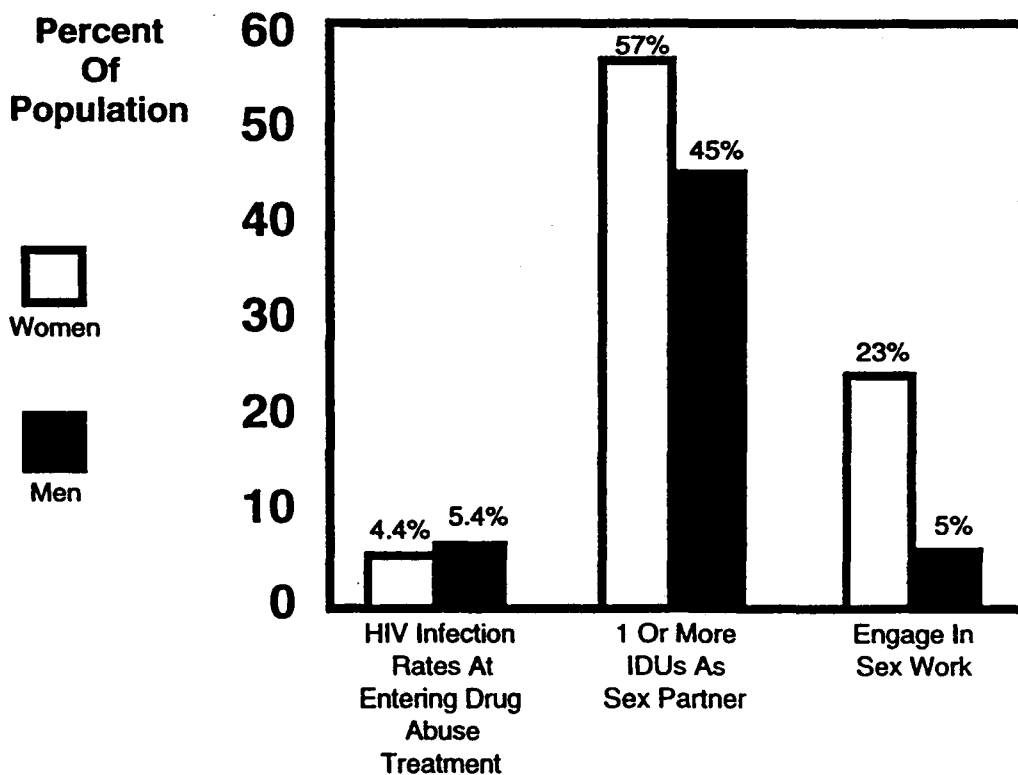
- Sexual risk behavior has been shown to be less likely to change among both male and female IDUs than needle-sharing risk behavior. In addition, women who inject drugs are less likely than men to be in control of safer sex practices, such as condom use. While methadone maintenance treatment may reduce drug use and prostitution or the exchange of sex for drugs, women may be at risk for HIV infection by their habitual sex partners. Female IDUs tend to have drug users as sex partners, even after enrollment in treatment, and are not likely to practice safer sex with these partners. HIV risk reduction programs for women in methadone maintenance treatment must take into account the social and interpersonal context of sexual risk behavior in order to be effective (Finnegan, Davenny, and Hartel, 1993; Hartel, 1994).
- Women with HIV who are maintained on methadone may improve their access to medical care for HIV infection and disease and possibly reduce their chance of transmitting HIV to

infants *in utero*. Zidovudine (AZT) has been shown to reduce the risk of mother-to-infant transmission of HIV infection (Connor et al., 1994). The overall risk of infection without treatment ranges from 14 to 39 percent, depending on the immune status of the mother, the replication rate of the virus, and other factors. This risk may be reduced by as much as 2 to 3 in some subgroups of women administered AZT during pregnancy, while the drug works to reduce the amount of virus available to cross the placenta and infect the developing fetus. Connor's research provides important evidence of (1) AZT's potential for transmission prevention and (2) other factors that improve immune function and decrease viral load. The role of AZT in the prevention of *in utero* transmission of HIV to infants should be considered in the medical management of HIV-positive pregnant women.

- It is likely that some infants are infected during labor and delivery or after delivery through breast-feeding. Careful attention to factors that may place the infant at risk during birth and afterwards are needed to further reduce infant infection. In areas with a high community level of HIV infection among IDUs, methadone programs often incorporate HIV primary health care services into the treatment program through on-site services or linkages to services nearby. These services often include obstetrical care by providers skilled in working with HIV-infected women (Finnegan, Davenny, and Hartel, 1992).

Differences Between Men and Women in HIV Infection Rates and Risk Behaviors—Figure 25 illustrates that overall HIV infection rates are roughly the same for males and females entering drug abuse treatment in the United States: 5.4 percent for males and 4.4 percent for females. These rates

Figure 25



vary greatly (0 to 48 percent) by geographic area, with the highest rates found in urban centers that have the greatest density of IDUs (Allen, Onorato, and Green, 1992).

In research conducted in New York City among 452 methadone-recruited IDUs early in the HIV epidemic, having an IDU as a sex partner was associated with HIV infection status independent of or in addition to injection risk behavior. In this same study, women reported a higher level of sexual risk behavior than men: 57 percent of women compared with 45 percent of men reported 1 or more IDUs as sex partners since 1978. In addition, women were more likely than men to have engaged in sex work: 23 percent of women compared to 5 percent of men (Schoenbaum et al., 1989).

Question 9: Is methadone maintenance treatment effective for women?

Answer: Yes. Since the earliest methadone maintenance treatment programs in the United States, women have been treated successfully with methadone through all phases of their lives, including pregnancy. There is consensus that the major outcomes of the effectiveness of methadone maintenance treatment, especially cessation of illicit drug use and lifestyle stabilization, apply to both men and women. However, there are gender-specific issues that are important to treatment effectiveness for injection-drug-using women, often related to the social status of women.

Compared to men, women are more likely to:

- Have total responsibility for child care
- Have lower socioeconomic status
- Encounter greater barriers to treatment entry, retention in treatment, and economic independence
- Have different psychological, counseling, and vocational training needs
- Have difficulty with transportation to treatment

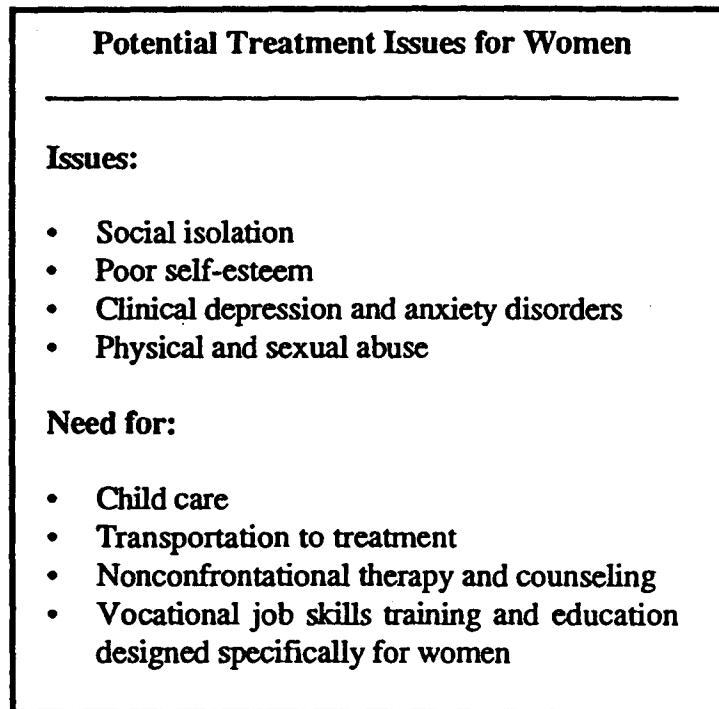
Research Highlights

- In the past, little emphasis was placed on gender-specific biopsychosocial problems in drug treatment. One reason was the predominance of drug-addicted men, estimated in the United States to be 3 males to every female. While mild forms of psychoactive substance use show converging usage rates and patterns for males and females, opioid addiction and other forms of chemical dependency continue to show a male predominance (Kandel, 1992).
- Drug Abuse Reporting Program (DARP) studies showed that 19 to 28 percent of admissions to drug treatment programs from 1969 to 1973 were women. In 12 years of follow-up of 84 females and 91 males in methadone maintenance, there were no differences between men and women in overall reduction of opioid use. Women required more government financial assistance and had lower rates of employment than men. Compared to men, women were more likely to enter treatment for health reasons (Simpson, 1990; Marsh and Simpson, 1986).
- A study of 567 methadone-maintained patients in California found overall shorter duration of time from first entry to first discharge from treatment for women compared to men (Anglin, Hser and Booth, 1987). Factors related to poor retention of women in treatment were likely to be a lack of child care and inadequate social and psychological support from domestic partners and other family members (Rosenbaum, 1981; Murphy and Irwin, 1992).

- Drug-using women are likely to experience clinical depression, anxiety disorders, and low self-esteem to a much greater degree than their male counterparts. Women entering treatment have experienced unique gender-specific life events. In particular, female drug users often have been abused physically, sexually, and emotionally. Experiences of sexual violence, especially during childhood, have profound, lifelong psychological effects and often underlie addiction, complicating successful recovery. Treatment of women in methadone requires awareness of these issues and appropriate counseling. Confrontational styles of therapy and counseling are not effective for most women in treatment (Mondanaro, 1987; Marsh and Miller, 1985; Beschner, Reed and Mondanaro, 1981; Hartel, 1994).

Potential Treatment Issues for Women—Figure 26 delineates key treatment issues derived from the discussion above.

Figure 26



Question 10: Is methadone safe for pregnant women and their infants?

Answer: Yes. Since the early 1970s, methadone maintenance treatment has been used successfully with pregnant women. There is consensus that methadone can be safely administered during pregnancy with little risk to mother and infant. Maintenance on methadone is necessary to prevent relapse to illicit opioid use and thus to maintain optimal health during pregnancy.

Research Highlights

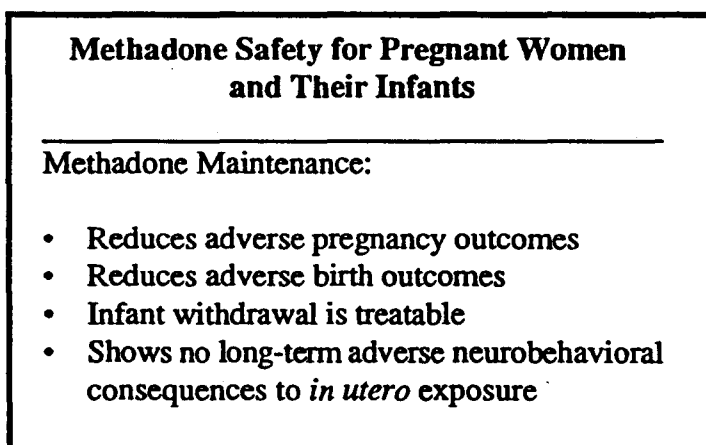
- All drug-using women are considered to be at higher than normal risk for medical and obstetrical complications. Methadone-maintained women show a far greater improvement in obstetrical health than untreated women. Hepatitis types A, B, and C, and other sexually transmitted diseases (STDs); bacterial endocarditis; septicemia; and cellulitis are common among active injection drug users, particularly those who share needles. Women maintained on methadone who have stopped illicit drug use and injection prior to pregnancy are less likely to experience these and other medical complications in pregnancy. Obstetrical complications such as spontaneous abortion, placental insufficiency, and other conditions also occur at a lower rate among methadone-maintained women than among opioid-dependent women not enrolled in treatment. When compared to opioid-addicted women not in treatment, women in methadone maintenance treatment have been observed to maintain better overall health and nutritional status during pregnancy because of stability provided through treatment. In addition, methadone clinics can provide on-site prenatal services or link patients to these services in nearby clinics, coordinating addiction treatment and prenatal care to optimize both (Finnegan, 1991; Kaltenbach, Silverman and Wapner, 1993).
- Some women in methadone maintenance treatment are infected with HIV prior to pregnancy. Treatment programs that link women to appropriate medical care during pregnancy may reduce the burden of illness suffered by HIV-infected women. In a study of 191 methadone-maintained women in a New York City clinic with extensive medical linkages, medical and obstetrical complications did not differ among women with and without HIV infection. HIV infection occurred among 37 percent of women, most of whom were asymptomatic for HIV disease and AIDS prior to pregnancy. Adverse birth outcomes were relatively infrequent and occurred at approximately the same rates as observed in studies of methadone-maintained women prior to the HIV epidemic (Selwyn et al., 1989).
- U.S. research in the 1970s demonstrated that methadone does cross the placenta. Passive exposure to methadone *in utero* may result in neonatal abstinence syndrome among exposed infants. The syndrome varies considerably and depends on a number of factors, including the use of other drugs during pregnancy, anesthesia during delivery, the maturational and nutritional status of the infant, and other aspects of maternal health that may affect the fetal environment. The relationship of maternal methadone dose in the last trimester of pregnancy

has been explored in a number of studies but results have not consistently delineated a dose-response relationship between maternal dose and severity of infant abstinence syndrome. For those neonates experiencing withdrawal, the length and severity of the withdrawal vary greatly; however, pharmacotherapy for neonatal methadone abstinence syndrome is simple and effective. Methadone maintenance treatment affords protection of the fetus from erratic maternal opioid levels and repeated episodes of withdrawal typically seen in users of illicit opioids (Finnegan, 1991).

- The majority of infants exposed to methadone *in utero* are healthy and show fewer adverse outcomes than infants exposed to heroin and other illicit drugs. Methadone maintenance treatment for pregnant women can reduce *in utero* growth retardation and neonatal morbidity and mortality, in comparison to women not in treatment (Finnegan, 1991). Such infants may be smaller at birth than nondrug-exposed infants, but differences tend to disappear over time. A careful review of the major studies of long-term neurobehavioral effects of methadone on exposed infants revealed no methadone-associated adverse effects (Kaltenbach and Finnegan, 1984).

Methadone Safety for Pregnant Women and Their Infants—Figure 27 outlines key points discussed in the research citations above regarding the safety of methadone maintenance treatment for pregnant women.

Figure 27



Question 11: Is it necessary to reduce methadone dose or detoxify women from methadone during pregnancy to protect the fetus?

Answer: No. Women have been safely maintained on stable methadone dosage during pregnancy without adverse long-term effects on their health and the health of their infants. Dosage change in pregnancy must be carefully evaluated on an individual basis. Some women experience lowered blood levels of methadone during pregnancy and may need an increase in dosage. It is important to determine the relapse risk for each woman when considering a dosage change, as women steadily maintained on methadone are more likely to have a healthy pregnancy and infant than women who use alcohol and other drugs. The intermittent periods of withdrawal that typically occur with illicit opioid use and that can adversely affect the fetus do not occur when methadone is individually determined and properly administered.

Research Highlights

- Optimal methadone dosage for pregnant women in methadone maintenance treatment should be based on careful consideration of risks and benefits to both mother and fetus on an individual basis. Individual dose should be evaluated, taking into account the stage of pregnancy, the relapse risk potential of the mother, prepregnancy methadone dose, previous experience with methadone, and history of addiction recovery. When the mother does not relapse to illicit drug use, short-term reductions in maternal dose have been effectively administered during the last stage of pregnancy. However, many women in treatment have been successfully maintained on a constant dose and, in some cases, on an increased dose to keep blood levels stable throughout pregnancy (Finnegan, 1991).
- Some women in treatment experience decreased blood levels of methadone during pregnancy, causing withdrawal symptoms. This decrease in blood levels of methadone during pregnancy can be accounted for by an increased fluid space, a large tissue reservoir that can store methadone, and drug metabolism by both the placenta and the fetus. Pregnant women in treatment with low blood levels of methadone frequently experience a high level of discomfort, withdrawal symptoms, and drug craving and anxiety, and may be at high risk of relapse to opioid use and treatment dropout. Determination of methadone blood levels and possibly raising the methadone dosage to maintain sufficient blood levels may be warranted in such cases but must be carefully evaluated. Dosages should be evaluated in conjunction with ongoing medical monitoring of the pregnancy. Since the greatest risks to maternal and infant health occur when women in treatment relapse to illicit drug use, it is important to promote methadone dosage stability during and after pregnancy to optimize both maternal and child health (Kreek et al., 1974; Pond et al., 1985).

Methadone Dosage Adjustment During Pregnancy—Figure 28 outlines the 3 main considerations regarding dosage for pregnant women in methadone maintenance treatment.

Figure 28

**Methadone Dose Adjustment
During Pregnancy**

- Pregnancy can lower methadone blood levels.
- Lower blood methadone levels can increase relapse risk.
- Dosage levels should be evaluated and individually tailored to reduce risk of relapse and to stabilize both mother and fetus.

Question 12: Is the long-term use of methadone medically safe, and is it well tolerated by patients?

Answer: Yes. Studies of the long-term administration of methadone confirm that it is a medically safe drug. Long-term methadone maintenance treatment at doses of 80 to 120 milligrams per day is not toxic or dangerous to any organ system after continuous treatment for 10 to 14 years in adults and 5 to 7 years in adolescents.

Research Highlights

- Methadone does not cause toxicity (poisoning) or have dangerous biological effects. There appear to be no dangerous or troubling psychological effects from long-term administration (Kreek, 1979; Lowinson et al., 1992).
- Methadone sometimes causes minor side effects such as sweating, constipation, temporary skin rashes, weight gain, water retention, and changes in sleep and appetite (Jaffe and Martin, 1985; Kreek, 1979). These side effects are more likely to occur when the methadone dosages are first being established in a patient, and the side effects generally subside or diminish over time. They can be reduced or eliminated by raising or lowering the methadone doses (Lowinson et al., 1992).
- Methadone prescribed in high doses for a long period of time has no toxic effects and only minimal side effects for adult patients maintained in treatment for up to 14 years and for adolescent patients treated for up to 5 years (Hartel, 1989 and 1990; Kreek, 1978).
- There are no persisting abnormalities directly attributable to methadone in the functioning of 5 organ systems: pulmonary, cardiovascular, renal, ophthalmologic, and liver systems (Kleber and Mezritz, 1989).
- Methadone does not impair psychomotor performance (reaction time, driving ability, intelligence, and attention span), normal functioning, or intellectual capacity (Lowinson et al., 1992).
- Patients maintained on methadone have motor vehicle accidents no more frequently than people not maintained on it (Maddux, Williams, and Ziegler, 1988).
- The most common and enduring complaints, after 6 months to 3 years of continuous methadone treatment, are sweating, constipation, abnormalities in libido and sexual functioning, sleep abnormalities (insomnia and nightmares), and altered appetite (mild anorexia, weight gain) (Kreek, 1979; Jaffe and Martin, 1985). Most of these symptoms can be medically managed (Kreek, 1979).

- Although euphoria and drowsiness, with occasional nausea and vomiting, can occur before tolerance develops, these side effects are most noticeable when doses are being increased too rapidly. Conversely, if a heroin habit has been particularly heavy, initial methadone doses may be too low to prevent the onset of early withdrawal symptoms (Kreek, 1979).
- Life-threatening interactions of methadone with other drugs have not been identified. Drugs found to affect the metabolism of methadone include phenytoin (Dilantin) and rifampin. Opioid antagonists such as naltrexone and naloxone (Trexan and Narcan) and mixed opioid agonist/antagonist drugs such as pentazocine (Talwin) and buprenorphine can cause withdrawal symptoms in methadone patients and should not be prescribed (Kreek, 1978).

Common Side Effects After 6 Months to 3 Years of Methadone Maintenance Treatment—Figure 29 illustrates that methadone maintenance patients, in the early stages of treatment, can experience several minor side effects: sweating, constipation, orgasm abnormalities, alterations of sexual interest, alterations of sleep and appetite, nausea, drowsiness, nervousness, headaches, body aches and pains, and chills. However, the figure also shows that many of these side effects just about disappear with long-term, high-dose methadone maintenance treatment (Kreek, 1979; Jaffe and Martin, 1985; Hartel, 1989 and 1990).

Figure 29

Symptoms And Signs	Intermediate Length Treatment (6 Months Or More; <40->80 mg/d)	Long-Term, High-Dose Treatment (3 Years Or More; 80-120 mg/d)
	Percent	Percent
Increased Sweating	47	48
Constipation	57	17
Libido Abnormalities	26	22
Orgasm Abnormalities	—	14
Sleep Abnormalities (Insomnia)	23	16
Appetite Abnormalities	19	4
Nausea	25	—
Drowsiness	23	—
Nervousness/Tension	21	—
Headaches	12	—
Body Aches And Pains	11	—
Chills	10	—

Question 13: Are there program characteristics associated with the success of methadone maintenance treatment?

Answer: Yes. There are several program characteristics associated with treatment success. These include:

- Comprehensive services
 - Integration of medical, counseling, and administrative services
 - Identification and meeting of patients' treatment needs
 - Establishment of adequate dosing policies
-

Research Highlights

- Ball and Ross (1991) noted wide differences among the 6 methadone maintenance clinics studied with respect to the reduction of injection drug use by patients. Factors that account for treatment success include (1) adequate dosing; (2) participation in programs that had high retention rates, high rates of scheduled attendance, low treatment staff turnover, and a close, consistent, and enduring relationship between staff and patients; (3) an effective treatment director; (4) combined medical, counseling, and administrative services; (5) experienced counselors providing comprehensive counseling services; and (6) staff/patient agreement about the status of patients and their treatment needs.
- A study of 1-year retention rates in the DARP methadone maintenance programs reported that less than half (40 percent) of 2,867 patients admitted to adaptive programs were retained in treatment for 1 year; more than half (54 percent) of 2,113 patients admitted to change-oriented programs were retained in treatment for 1 year (Joe and Simpson, 1975). In this study, the term "adaptive" described programs that focus on the patients' immediate and practical needs over any long-term goal of abstinence; "change-oriented" described programs that focus heavily on resocialization in preparation for later abstinence and provide enhanced structure and intervention into patients' lives (Cole and James, 1975).
- The TOPS study examined a sample of 606 methadone maintenance treatment patients from 21 different clinics to identify treatment process factors related to improved patient retention rates. Results showed higher patient retention rates for programs (1) using organized and professional staff to diagnose problems and define treatment plans, (2) meeting and satisfying the needs perceived as important by clients, and (3) using higher methadone doses (Joe, Simpson, and Hubbard, 1991).
- One study examined a program unit with a policy of "high-level expectation." Central to this policy was a rigid emphasis on abstinence from alcohol and illicit drugs and the necessity of obtaining legitimate employment. Only 54 percent of 63 patients were retained in treatment

for 14 weeks after admission. Higher rates of retention were obtained in other, less demanding units of this program (Jaffe, 1971).

- A 6- to 7-year follow-up study of 347 methadone maintenance treatment patients examined different retention policies: Two programs had a high-dose, long-retention policy in which involuntary termination was used as a last resort. A third program had a low-dose, 2-year retention policy with strict terminations for program violations. Retention rates were longer in the 2 less structured programs (means of 4.3 and 3.2 years) than in the more structured program (mean of 2.2 years) (McGlothlin and Anglin, 1981a).

McGlothlin and Anglin (1981a) concluded that the findings unambiguously demonstrate the benefits of long-term methadone maintenance over the risks of prolonging addiction through the substitution of a licit drug for an illicit one. After 6.6 years, only 1 percent of the patients in the least effective (low-dose, short-term) program remained in continuous methadone maintenance treatment. Furthermore, 90 percent of the discharged patients from this program became readdicted; some were readmitted to treatment. Seventy-five and 71 percent of the discharged patients from the 2 more effective programs did the same.

- One study randomly assigned 69 patients at admission to structured and unstructured treatment groups. Structured groups had limits on illicit drug use that, if exceeded, resulted in withdrawal from methadone. The unstructured groups had no limits on illicit-drug use. At the end of 1 year, 53 percent of the patients in structured groups remained in treatment, but only 30 percent of the patients in unstructured groups remained in treatment (McCarthy and Borders, 1985).
- In a review of previous studies and an analysis of retention rates at a San Antonio, Texas, methadone maintenance treatment program, it has been suggested that required treatment fees have an adverse effect on retention (Maddux et al., 1993).
- A 1988 nationwide telephone survey of a randomized and stratified representative sample of 172 outpatient methadone units found that relatively high methadone dosage levels and patient participation in dosage decisions are related to higher retention rates (D'Aunno and Vaughn, 1992).
- According to Kreek (1991), adequate staff numbers, training, and concern for patient needs and high staff stability (low staff turnover) are associated with improved patient outcomes (Center for Substance Abuse Treatment, 1993).

The Effects of Dosage on Methadone Maintenance Treatment—Research regarding methadone dosage levels clearly establishes that low average doses are inappropriate in methadone maintenance treatment. No single level is effective for all patients, although NIDA-supported research has suggested that the minimum effective dosage for most methadone maintenance patients is 60 milligrams per day. The specific dosage for a patient cannot be arbitrarily determined since patients metabolize methadone at different rates. In addition, the appropriate dosage may change over time or in response to specific situations such as pregnancy or the use of other medications. Overall,

methadone dosage should be based on the patient's individual needs, the goals of treatment, and the progress in treatment.

An Institute of Medicine panel concluded that methadone dosages need to be clinically monitored and individually optimized; but in general, most methadone maintenance patients have substantially better responses when maintained at the higher rather than lower end of the dosage ranges currently being prescribed (30 to 100 milligrams per day) (Gerstein and Harwood, 1990).

In a summary of research regarding methadone dosage levels conducted through 1981, Brown, Watters, and Iglehart (1982-83) noted that methadone given at the higher end of the dosage range was consistently associated with better treatment retention and treatment outcome. They concluded that daily dosage levels of 50 to 60 milligrams seem to be the lower limit for optimal program retention and positive outcome.

In the Ball and Ross studies (1991), illicit opioid use was directly related to methadone dosage levels: In methadone maintenance patients on dosages above 71 milligrams per day, no heroin use was detected. But methadone maintenance patients on dosages below 46 milligrams were 5.16 times more likely to use heroin than those on higher dosages.

Ball and colleagues (1988) found that 18.6 percent of 490 patients who were in methadone maintenance treatment for 6 months to 4.5 years used heroin within the last 30 days, but use correlated strongly with methadone dosage level. At doses of 75 milligrams per day and above, the continuing use of heroin stopped altogether. In contrast, 64 percent of patients maintained on 10 milligrams per day or less continued frequent heroin use. A dose of 40 milligrams per day seemed to be the cutoff point for a large decrease in heroin use.

In a review of 24 methadone maintenance treatment programs throughout the nation, the United States General Accounting Office concluded that "60 milligrams of methadone is the lowest effective dose to stop heroin use, and low-dose maintenance (20 to 40 milligrams) is inappropriate" (United States General Accounting Office, 1990).

In the Ball and Ross study (1991), the dosage level of methadone was inversely related to continuing heroin use. That is, the higher the dosage, the less likely that heroin use continues. Dosage level, however, was not associated with such other patient outcomes as the continuing use of any illicit opioids or cocaine, cocaine use alone, intravenous drug use, or criminal activity.

Despite recent attention to the importance of adequate methadone dosages, a large-scale survey of methadone maintenance treatment programs conducted by D'Aunno and Vaughn (1992) found that 50 percent of patients nationwide receive suboptimum methadone doses that are inadequate to prevent most patients from some level of continued illicit opioid drug use.

In an exhaustive review of 22 studies that compared the effects of different methadone dosages on such outcomes as patient retention, continuing illicit opioid use, and symptoms, Hargreaves (1983) concluded that daily methadone doses of 100 milligrams were superior to 50 milligrams during the

first 5 to 10 months of methadone maintenance treatment for a sizeable subgroup (10 to 30 percent) of opioid addicts.

In a study of 2,400 patients enrolled in methadone maintenance over a 15-year period, those patients maintained on a daily dose of 60 milligrams or more had longer retention in treatment; less use of heroin and other drugs, including cocaine; and a lower incidence of HIV infection and AIDS (Hartel, Selwyn, and Schoenbaum, 1988a and 1988b).

In a multiclinic study of 12 Veterans Administration hospitals, methadone maintenance treatment patients were assigned to 2 dosage levels of methadone: 50 milligrams and 100 milligrams. The percentage of patients retained for 10 months was higher in the 100-milligram group (52 percent) than in the 50-milligram group (42 percent), but the difference was not statistically significant (Ling et al., 1976).

In a study of 63 methadone maintenance treatment patients randomly assigned at admission to 2 groups, with mean doses of approximately 100 milligrams and 36 milligrams, the percentage retained at 14 weeks was slightly higher for the 100-milligram group (58 percent) than for the 36-milligram group (50 percent), but the difference was not statistically significant (Jaffe, 1971).

Studies that examined the relationship between methadone maintenance treatment dosage and retention suggest that, although many patients will continue in treatment on methadone doses of less than 50 milligrams, some patients need higher doses. In a review of 5 well-designed dose-retention studies, 3 found statistically nonsignificant trends toward increased retention with higher doses, and 2 did not (Maddux et al., 1993).

In a study of 180 methadone maintenance treatment patients randomly assigned at admission to 3 groups that received doses of 30 milligrams, 50 milligrams, and 100 milligrams, the percentages retained for 53 weeks were: 45 percent of the 30-milligram group, 55 percent of the 50-milligram group, and 35 percent of the 100-milligram group. The 100-milligram group had the lowest retention rate, but the differences were not statistically significant (Garbutt and Goldstein, 1972).

A study of 120 methadone maintenance treatment patients randomly assigned at admission to 3 groups who, after stabilization on 80 milligrams, had their doses established at 40 milligrams, 80 milligrams, and 160 milligrams revealed the percentages retained for 27 weeks: (1) 60 percent of the 40-milligram group, (2) 75 percent of the 80-milligram group, and (3) 73 percent of the 160-milligram group. The 2 higher-dose groups had somewhat higher retention rates than the 40-milligram group, but the differences were not statistically significant (Goldstein and Judson, 1973).

One study paired 52 methadone maintenance treatment patients who had been in treatment for a mean of 10 months and were stabilized on a daily dose of 100 milligrams. One of each pair had a gradual dose reduction to 50 milligrams, and the other remained at 100 milligrams. At the end of the 5-month dose-reduction period, 69 percent of the 100-milligram group and 65 percent of the 50-milligram group remained in treatment (Berry and Kuhn, 1973). This small difference was not statistically significant, and it suggests that the gradual reduction of a 100-milligram dose to 50 milligrams might not adversely affect retention.

A study of 322 methadone maintenance treatment patients receiving an average daily dose of 30 milligrams demonstrated a high drop-out rate. Only 17 percent of the sample remained in treatment at the end of 6 months, and only 10 percent remained by the end of a year. Moreover, patients who dropped out within the first 30 days had the same drug-using behavior as they did before treatment (Craig, 1980).

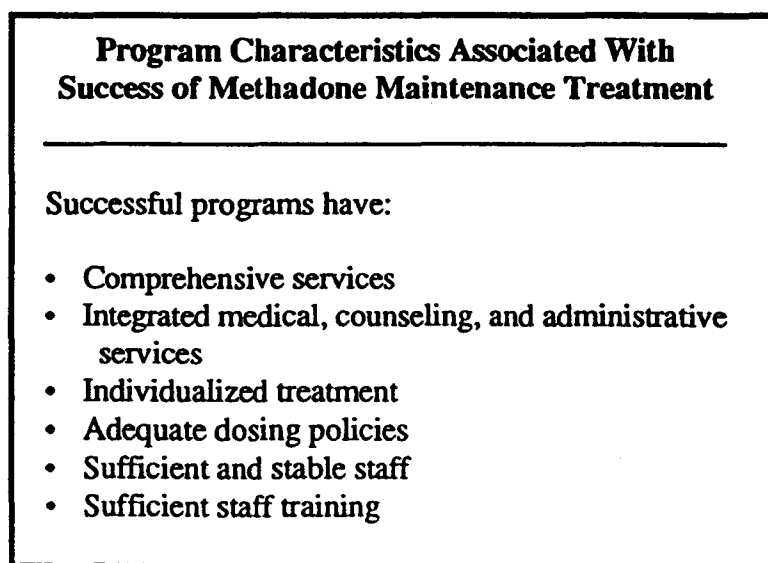
Methadone doses should not be rapidly increased or decreased—or used in contingency management—since such changes tend to disrupt the normalization of physiological function achieved by steady dose treatment. If the stabilized methadone dose/plasma levels are disrupted, drug hunger and drug-seeking behaviors are likely to reappear (Kreek, 1991; Kreek, 1992).

The Need for Comprehensive Services in Methadone Maintenance Treatment—In a study of 351 daily or weekly heroin users who were admitted to 1 of 17 publicly funded methadone maintenance treatment programs, nearly all (85 percent) reported having difficulty in at least 1 of the following problem areas: medical or physical; mental health or emotional; family or friends; police or legal; job, work, or school; and financial or money. Nearly half (44 percent) reported having difficulties in more than 3 of these areas (Condelli, 1993).

A growing body of research indicates that providing a broad range of psychosocial services results in improved efficacy of methadone maintenance treatment over treatment with methadone alone.

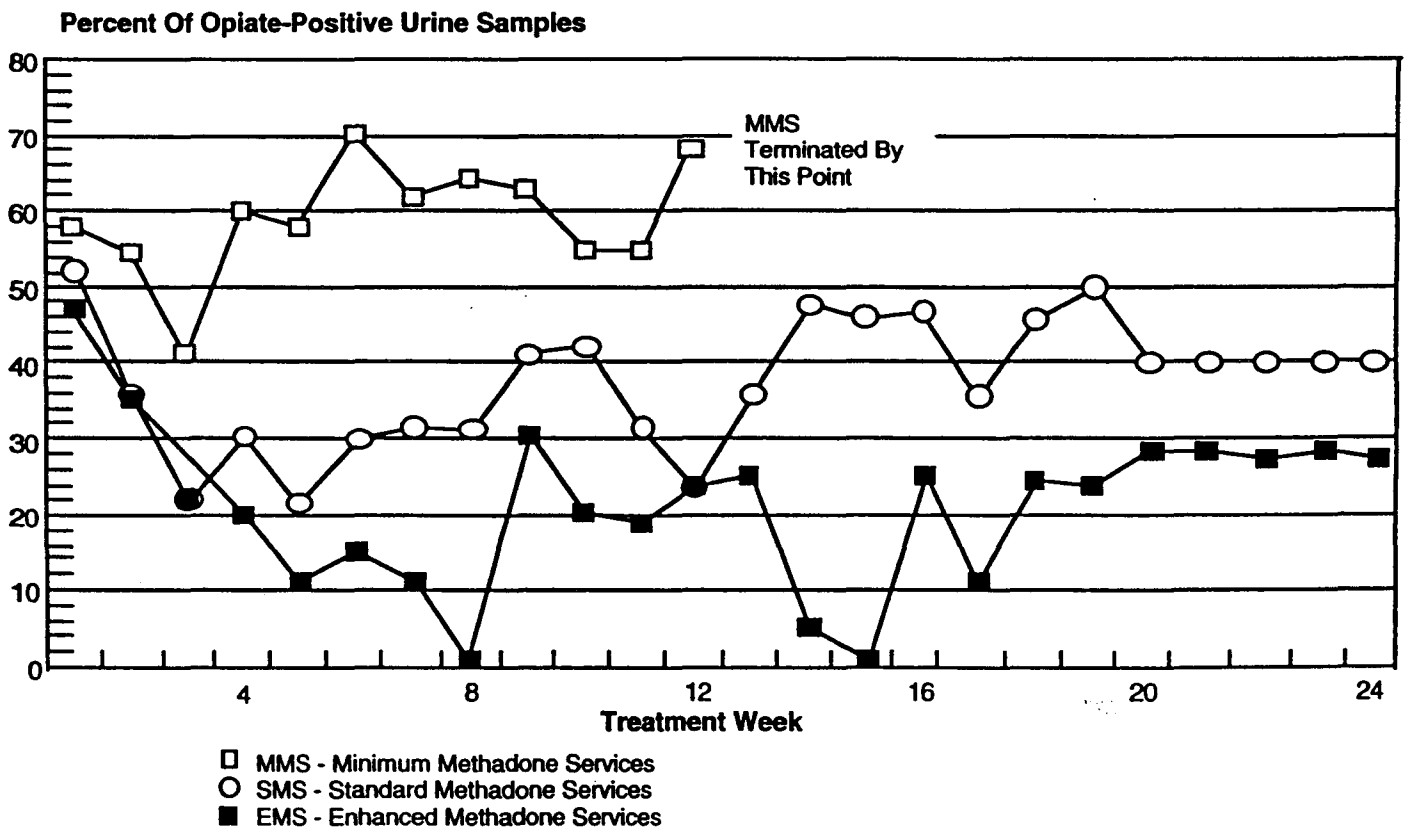
Program Characteristics Associated with Success of Methadone Maintenance Treatment—Other program characteristics that appear to improve treatment success include having sufficient staff, low staff turnover and high staff stability, sufficient staff training, and close and enduring relationships between staff and patients. Figure 30 lists the program characteristics identified by numerous research studies that contribute to methadone maintenance treatment success (McLellan et al., 1993; Ball and Ross, 1991; Joe, Simpson, and Hubbard, 1991).

Figure 30



Role of Psychological Services in Reducing Illicit Opioid Use—In a recent study, 102 patients were divided into 3 groups: (1) minimum methadone maintenance treatment services (methadone alone), (2) standard methadone maintenance treatment services (methadone plus counseling), and (3) enhanced methadone maintenance treatment services (methadone, counseling, and on-site medical, psychiatric, employment, and family therapy services). At 24 weeks, methadone alone resulted in minimal improvements; methadone plus counseling resulted in significant improvements over methadone alone; and enhanced methadone services, including a broad range of psychosocial services plus methadone, had the best outcomes of all (McLellan et al., 1993). Figure 31 shows that patients receiving the most comprehensive array of treatment services were the most likely to have opioid-free urine tests for the 24 weeks of the study. Patients receiving minimal services were the most likely to have urine tests that were positive for illicit opioids. Note: these patients were removed from participation in the study because of drug use and psychiatric difficulties (additional treatment services were made available).

Figure 31



Question 14: Are there patient characteristics associated with the success of methadone maintenance treatment?

Answer: Yes. Patient characteristics associated with treatment success include:

- Age
 - Age of first heroin use
 - Overall drug-use history
 - Severity and duration of drug use
 - Emotional health
 - Psychiatric health
 - Social health
 - Vocational stability
 - Criminal history
-

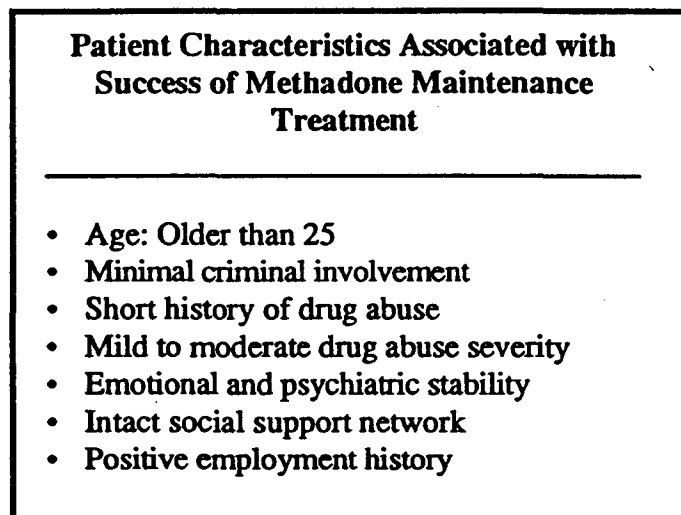
Research Highlights

- For methadone maintenance treatment patients in the DARP studies, the most important predictors of posttreatment outcomes were (1) preadmission criminality and (2) measurements of crime, drug use, and employment during treatment. Of all the patient characteristics, chronic criminality is the strongest predictor of unfavorable posttreatment outcomes (Simpson and Sells, 1982).
 - Ball and Ross's work (1991) supports the finding that a younger age at the onset of heroin use is associated with poorer treatment outcomes. Overall, however, these studies note that patient characteristics had less impact on outcomes than program variables.
 - Anglin and Hser (1990) note that better psychosocial adjustment predicts superior treatment outcomes. Psychosocial adjustment was described as an intact marriage, a job, a shorter history of drug abuse, lower levels of psychiatric dysfunction, and minimal or no criminal history.
 - In a study of 351 daily or weekly heroin users who were admitted to 1 of 17 publicly funded methadone maintenance treatment programs, it was noted that patients who were older than 25 years of age and patients who abstained from daily marijuana use during the year before admission were retained for longer periods (Condelli, 1993).
 - Rounsaville (1982) assessed 123 opioid addicts who were followed for 6 months after admission and found that outcome was predicted by the behavior examined: greater pretreatment criminality predicts criminal activity following discharge. Conversely, pretreatment employment predicts posttreatment employment. This study found that patients who abuse alcohol, are unemployed, are dually diagnosed, manifest psychopathology, and engage in criminality have poor outcomes.
-

- In a review of 113 studies that attempted to evaluate the relationship of patient characteristics to retention and other outcomes (reported from 1971 to 1983), it was noted that patient characteristics probably accounted for only 25 percent to 45 percent of the variance in retention (McLellan, 1983).

Patient Characteristics Associated with Success in Methadone Maintenance Treatment—Overall, patients who demonstrate emotional, psychological, and social well-being generally experience greater treatment success than patients who have emotional, psychological, and social problems. Several studies have noted that certain patient characteristics, listed in Figure 32, are associated with success in methadone maintenance treatment (McLellan, 1983; Simpson and Sells, 1982; Ball and Ross, 1991; Anglin and Hser, 1990).

Figure 32



Question 15: Are there cost benefits to methadone maintenance treatment?

Answer: Yes. Research has demonstrated that methadone maintenance treatment is beneficial to society, cost-effective, and pays for itself in basic economic terms.

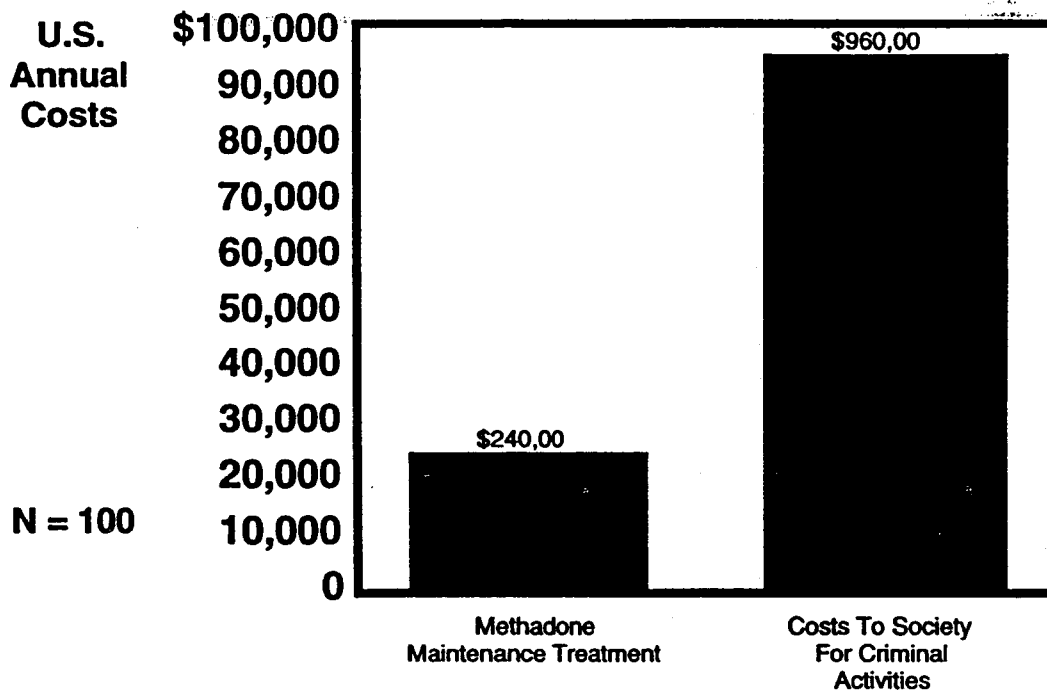
There are benefits associated with methadone maintenance treatment that are difficult to measure in economic terms. These include a lower risk of HIV transmission, decreased overall health costs, fewer demands on social services, improved health for pregnant women addicts and their children, decreased criminality, safer communities, increased social productivity, and improved parenting.

Research Highlights

- The most comprehensive examination of economic benefits and costs was performed on data from the TOPS. After examining the average cost of a methadone maintenance treatment day, detailed measurements of criminal activity rates, and the cost to society of various crimes, the study yielded a final benefit-to-cost ratio of 4 to 1 (Harwood et al., 1988).
- Rufener, Rachal, and Cruz (1977) studied the cost-effectiveness of methadone maintenance (and other treatment modalities) and determined a benefit-to-cost ratio of 4.4 to 1.
- McGlothlin and Anglin (1981b), using data from low-dose programs, compared patients who left methadone maintenance treatment when a community clinic was closed in Bakersfield, California, with patients in another community's program that remained open. For men, the ratio of crime-related economic benefits to treatment costs was 1.7:1 over a 2-year period. Additionally, the continuous treatment group reported significantly higher rates of employment than those who had been closed out of treatment, although the factor was not formally assessed in the study.
- Methadone maintenance treatment, when implemented at sufficient resource levels, provides individual and social benefits for at least several years that are substantially higher than the cost of delivering this treatment. The daily benefits equal the daily costs in virtually every case, even among those who continue drug use at a reduced level (Gerstein and Harwood, 1990).
- There are many more costs to society associated with active heroin use (Rufener, Rachal, and Cruz, 1977). These include medical costs, law enforcement costs, judicial system costs, corrections costs, nondrug crime costs, drug traffic control, drug abuse prevention costs, reduced housing stock costs, absenteeism costs, and unemployment costs, and drug-related deaths. Thus, when all costs to society are considered, methadone maintenance treatment is extremely cost-effective and beneficial to society.

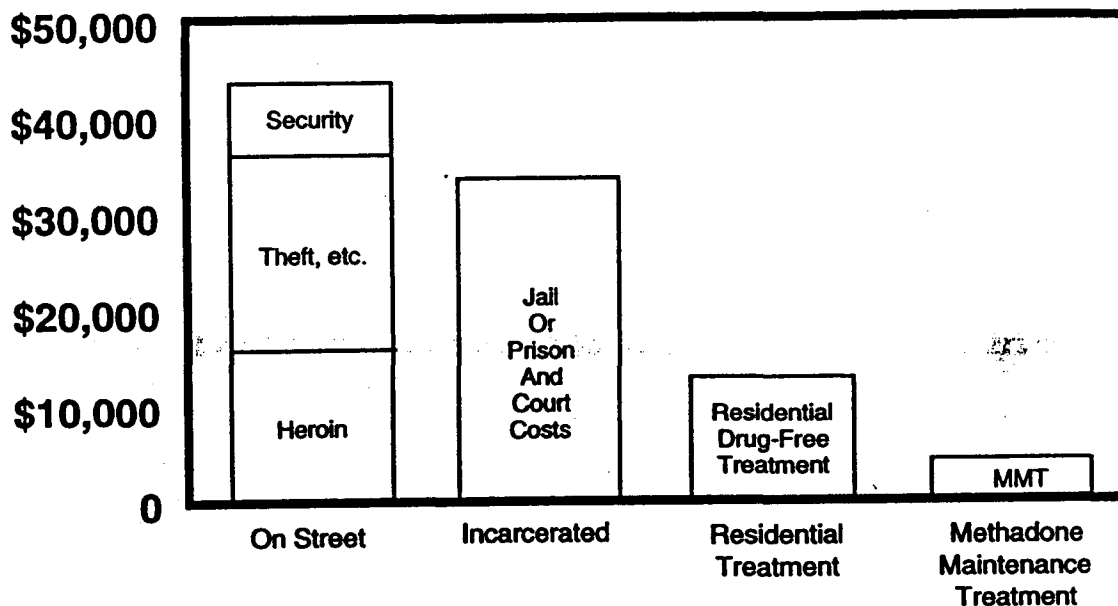
Comparison of Treatment and Societal Costs of Active Heroin Addiction—A study of the cost benefits of methadone maintenance treatment showed that the costs to society of the criminal activities related to active heroin use can run as high as 4 times more than the costs for methadone maintenance treatment (Harwood et al., 1988). Figure 33 demonstrates that cost-benefit relationship. For example, if the approximate annual cost for providing methadone maintenance treatment is \$2,400 per person, it would cost about \$240,000 to provide treatment for 100 patients for 1 year. In contrast, the annual costs to society related to the criminal activities of 100 active heroin addicts not in treatment would exceed \$960,000.

Figure 33



Average Costs per Year for 1 Heroin Addict—As Figure 34 illustrates, the cost of active heroin use for 1 addict for a year was about \$43,000 in 1991. This includes the cost of the heroin, the loss of property related to theft and burglary, and the costs of security measures to combat such crimes (Dole and Des Jarlais, 1991).

Figure 34



Through the New York State Department of Substance Abuse Services, NIDA researchers have estimated the yearly cost to maintain an opioid addict in New York: untreated and on the street (\$43,000), in prison (\$34,000), in a residential drug-free program (\$11,000), and in methadone maintenance treatment (\$2,400) (New York State Committee of Methadone Program Administrators, 1991).

Question 16: What are the retention rates for methadone maintenance treatment?

Answer: Research suggests that about one-third of the patients who participate in methadone maintenance treatment programs remain for at least 1 year after admission (Hubbard et al., 1989).

Research Highlights

- Only 38 percent of the new patient group (total 126) in the Ball and Ross studies of 6 methadone maintenance treatment programs (1991) remained in treatment after a year; 63 percent of the moderate-stay group (total 345) were still in treatment a year later; and 84 percent of the long-term patients (total 146) continued their methadone maintenance treatment for another year.
- In a study of 311 admissions to 3 methadone maintenance treatment programs during 1990 and 1991, 24 percent dropped out within 60 days. The significant predictors of retention were social stability (being married, employed, and having few prior arrests); previous treatment experience; high dosage levels; and motivation for treatment (Simpson and Joe, 1993).

Variations in Methadone Maintenance Treatment Retention Rates—In the early years of methadone maintenance treatment, high retention rates for 1 year or longer were generally reported. In subsequent years, lower retention rates were generally reported. Although wide variation in retention rates for methadone maintenance treatment has been reported, there has been a historical decrease in retention.

Early Studies

- Eighty-nine percent of 1,230 patients admitted to methadone maintenance treatment in New York City from 1964 to 1968 were retained in treatment for 1 year or longer (Gearing, 1974).
- Seventy-eight percent of 1,008 male patients admitted to methadone maintenance treatment in New York City from 1965 through 1969 were retained in treatment for 2 years (Babst, Ellis, and Schmeidler, 1976).
- A 1973 study noted that 78 percent of 100 patients consecutively admitted to methadone maintenance treatment in San Antonio, Texas, were retained in treatment for 1 year (Maddux and McDonald, 1973; Maddux and Desmond, 1979).
- Forty-seven percent of a group of 288 patients admitted to methadone maintenance treatment in 1973 and 1974 at 12 Veterans Administration hospitals were retained for 10 months (Ling et al., 1976). However, the percentage retained for 10 months among the 12 hospitals varied from 18 percent to 77 percent.

Recent Studies

- In an analysis of retention rates at a San Antonio, Texas methadone maintenance treatment program, the 1-year retention rate decreased from 74 percent in 1970 to 36 percent in 1988 (Maddux et al., 1993).
- In a study of 351 daily or weekly heroin users who were admitted to 1 of 17 publicly funded methadone treatment programs, predictors of retention in methadone maintenance treatment programs included (1) positive patient evaluations of the quality of social services received during the first month after admission (e.g., family, legal, educational, employment, financial services); (2) positive patient ratings of how easily accessible the program was; and (3) participation in programs that informed patients of their methadone dosage levels (Condelli, 1993).
- In a review of several studies regarding fees for treatment, it was noted that requiring treatment fees may impair treatment aspects by (1) inhibiting entry into methadone maintenance treatment, (2) causing a premature termination of treatment, and (3) reducing retention on methadone maintenance treatment (Maddux, 1993).

Methadone Maintenance and Relapse—In the DARP studies, 36 percent of methadone maintenance treatment patients relapsed to daily illicit opioid use, and 38 percent returned to treatment within the first year after discharge (Simpson and Sells, 1982).

DARP studies found that 27 percent of individuals who received methadone maintenance treatment relapsed to daily illicit opioid use within the first 3 months after treatment and that 44 percent relapsed within 36 months. Over a 12-year follow-up period, three-fourths relapsed 1 or more times. By the 12th year after methadone maintenance treatment admission, however, only 25 percent were still addicted to illicit opioids (Joe, Chastain, Marsh, and Simpson, 1990).

Opioid addicts in the 12-year DARP follow-up studies averaged more than 6 methadone maintenance treatment program admissions during their addiction careers (Marsh, Joe, Simpson, and Lehman, 1990). (Their addiction careers averaged about 10 years.)

In a 2.5-year follow-up study of 268 opioid addicts, it was demonstrated that (1) drug abuse treatment was generally associated with increased abstinence, (2) life crises and depression were significant risk factors for continuing drug abuse, and (3) further addiction treatment improved these risk factors (Kosten, Rounsaville, and Kleber, 1986a).

In a review of studies, it was found that methadone maintenance treatment patients had less than a 50-percent chance of remaining abstinent in the community for as long as 3 years (Hargreaves, 1983).

In the TOPS studies, the number of prior methadone maintenance treatment episodes is a strong predictor of another relapse and treatment episode. In two substudies, 50 and 60 percent of those who remained in treatment for at least 3 months reported a treatment readmission in the years after

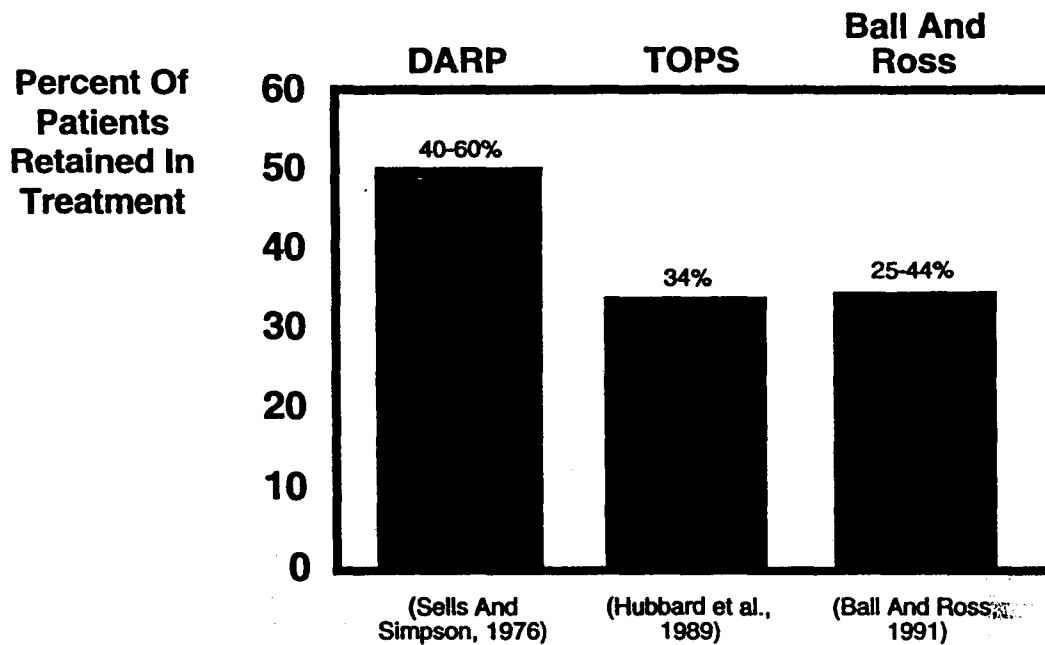
the current episode. Older patients and married patients were more likely to be readmitted to treatment (Hubbard et al., 1989).

Of 105 patients followed in the community by Ball and Ross (1991) after leaving methadone maintenance treatment between 1 month and a year or more earlier, a total of 2-thirds (67.6 percent) relapsed to injection drug use.

A study by Davoli et al. (1993) examined the risk factors associated with overdose deaths from illicit drugs among patients at methadone maintenance treatment programs. Subjects who left treatment had a higher overdose death rate than did those still in treatment. The risk was particularly elevated during the first 12 months after leaving treatment. This study suggests the importance of retention and demonstrates that, for some patients, leaving methadone maintenance treatment prematurely can be fatal.

One-Year Treatment Retention Rates for 3 Large Studies—Figure 35 illustrates the 1-year retention rates in 3 methadone maintenance treatment studies.

Figure 35

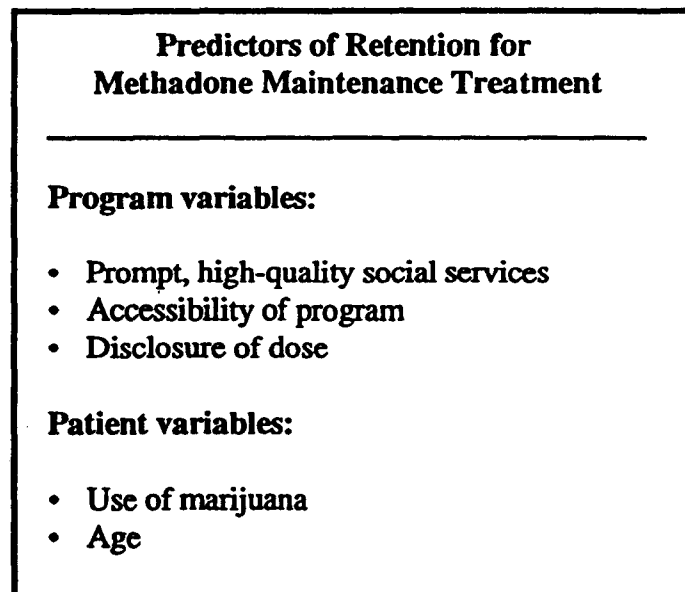


DARP data on 3 cohorts of patients who were admitted to methadone maintenance treatment in 1969 to 1971, 1971 to 1972, and 1972 to 1973 indicate 1-year retention rates of 60 percent, 51 percent, and 40 percent, respectively (Sells and Simpson, 1976).

In the TOPS studies, about 34 percent of 2,698 patients admitted to 17 methadone maintenance treatment clinics in 1979 and 1980 were retained for more than 1 year (Hubbard et al., 1989).

Predictors of Retention for Methadone Maintenance Treatment—In the TOPS study, patient self-report ratings of the quality (not the number) of social services received during the first month of methadone maintenance treatment were a strong predictor of retention (Condelli and Dunteman, 1993). The study suggests that methadone maintenance treatment programs should provide patients with high-quality social services as soon as possible after admission in order to promote retention. The study found that 3 program and 2 patient variables predicted retention. Figure 36 below lists these variables.

Figure 36



The patient's daily use of marijuana during the year before admission to methadone maintenance treatment may relate to an "amotivational syndrome" that can accompany heavy marijuana use, especially in combination with depressants. The study also noted that patients who were 25 years of age or younger were more likely than older patients to drop out of methadone maintenance treatment programs, possibly because they lacked the motivation, maturity, and life goals that often characterize older patients.

Question 17: Is mandated methadone maintenance treatment as effective as voluntary treatment?

Answer: Yes. Mandated methadone maintenance treatment (being forced to attend treatment by the criminal justice system) is as effective as voluntary treatment.

Research Highlights

- A study examined the relationship between length of stay in methadone maintenance treatment and referral by legal and nonlegal sources of 2,200 patients. It was determined that patients who are legally referred to methadone maintenance treatment stay in treatment longer than, and do at least as well as, those who seek treatment voluntarily (Collins and Allison, 1983).
- In a study of 121 male veterans in a 90-day Veterans Administration drug rehabilitation program, court-referred and voluntary patients were compared. Objective and subjective measures both indicate that the court-referred patient is potentially as responsive to methadone maintenance treatment as the voluntary patient. Sixty-two percent of the court-referred patients were judged to have a good prognosis compared with 58 percent of the voluntary patients (McLellan and Druley, 1977).
- A 7-year follow-up of 3 male samples of methadone maintenance treatment admissions in 1971 to 1973 was conducted. These groups included (1) a random sample of 100 patients, (2) a sample of 136 patients who had a minimum of 30 months remaining on civil addict parole status at the time of admission, and (3) a matched sample of 136 patients not on parole. The addition of parole supervision with urine testing resulted in only marginal improvements in behavior over that attributable to methadone maintenance treatment alone; however, the parole status did significantly reduce the length of intervals of daily heroin use both before and after admission (Anglin, McGlothlin, and Speckart, 1981).

Mandated Methadone Maintenance Treatment and 3 Treatment Outcomes—Patients who are legally coerced into methadone maintenance treatment experience treatment success at about the same rate as patients who voluntarily participate in treatment.

A study by Anglin et al. (1990) examined patients who were mandated to treatment and those who entered voluntarily. One group was forced to participate in methadone maintenance treatment (high coercion). A second group (not represented on Figures 37 through 39) had moderate legal pressure to participate in methadone maintenance treatment (medium coercion). A third group had mild legal pressure to participate in methadone maintenance treatment (low coercion).

Figures 37, 38, and 39 compare the behaviors of individuals in the high coercion group and those in the low coercion group for 3 treatment outcomes: time employed (Figure 36), daily narcotics use (Figure 37), and criminal involvement (Figure 38). As the figures illustrate, patients who are coerced

into treatment achieve these treatment outcomes at about the same rate as patients who voluntarily participate in methadone maintenance treatment (Anglin, Brecht, and Maddahian, 1990).

Figure 37

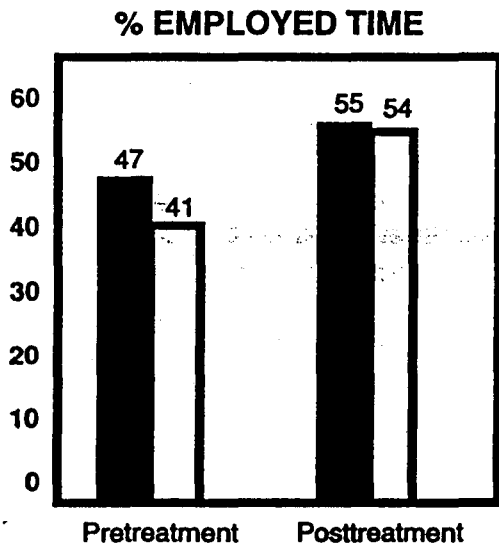


Figure 38

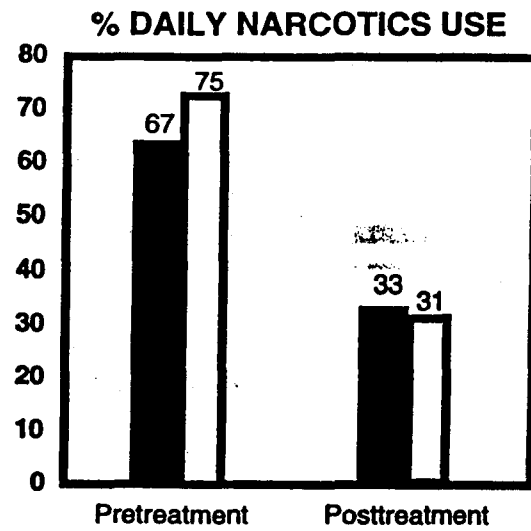
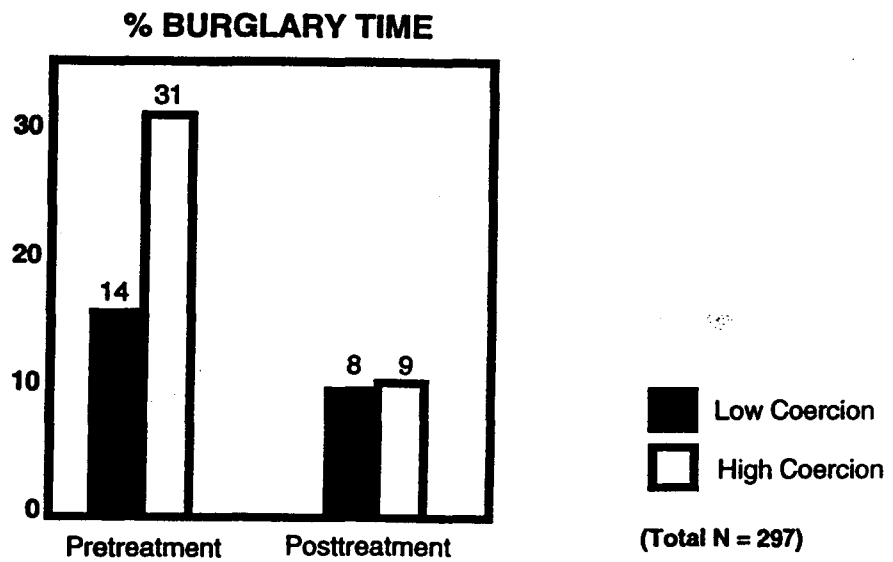


Figure 39



Question 18: In addition to methadone, are there any other medications used for opioid substitution in the United States?

Answer: Yes, there are 2 alternatives to methadone: L-alpha-acetyl-methadol (LAAM) and buprenorphine. LAAM is a long-acting synthetic opioid similar to methadone in its clinical effect, but with a slower onset and longer duration of action. It was approved for opioid substitution and maintenance in the United States in July 1993.

Buprenorphine—still under study and not yet approved for use in the United States for opioid addiction treatment—has properties of both opioid agonists and antagonists. Opioid agonists exert heroin-like analgesic properties; opioid antagonists—such as naloxone (Narcan) and naltrexone (Trexan)—reverse heroin-like symptoms and the effects of heroin. In the United States, buprenorphine for opioid addiction treatment is considered experimental, but is undergoing extensive research.

(The answers to questions 19 and 20 present more detail on LAAM and buprenorphine.)

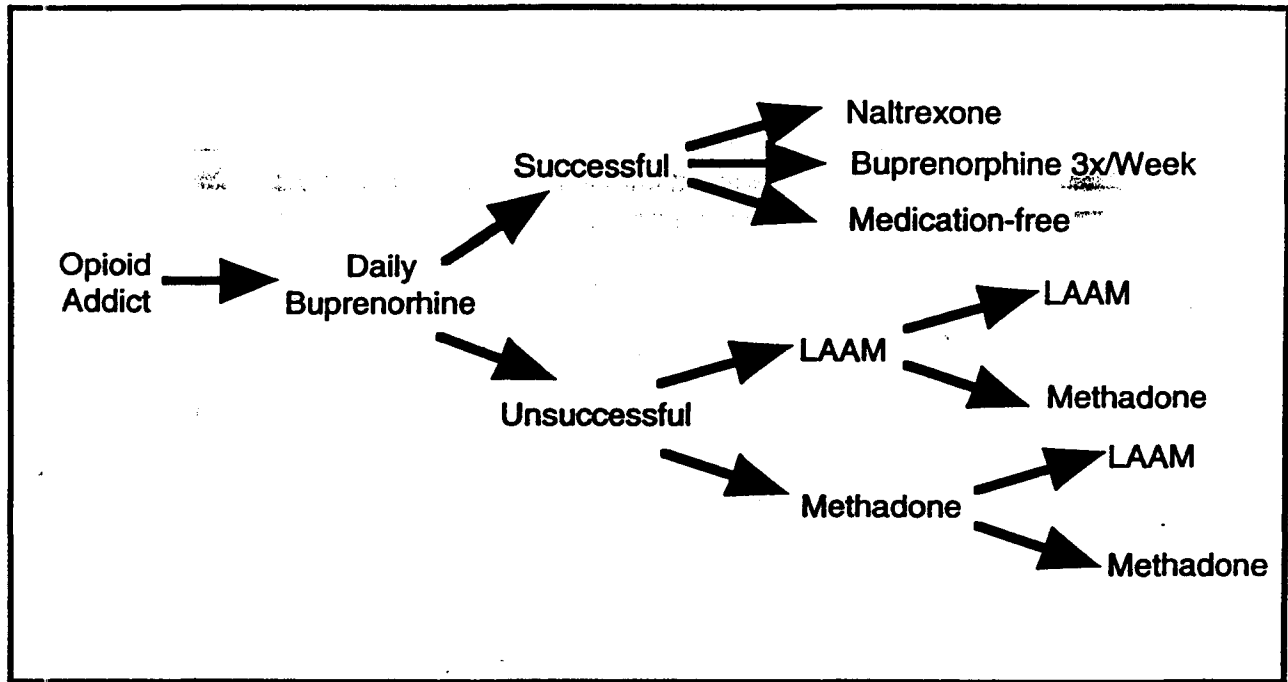
Research Highlights

- The initial clinical work on LAAM was done by Fraser and Isbell at the Addiction Research Center in Lexington, Kentucky, in the late 1940s and early 1950s. In a series of studies involving 59 male former addicts, these investigators showed that LAAM produced typical morphine-like effects that can relieve opioid abstinence symptoms and cross-substitute for morphine in morphine-dependent subjects. They also showed LAAM's delayed onset and long duration of action, up to 72 hours after a single dose (Fraser and Isbell, 1952).
- Buprenorphine remains an investigational pharmacotherapy for opioid dependence in the United States. Its potential benefit for treatment of opioid addicts was first noted by Jasinski and colleagues, who demonstrated that daily doses of 8 milligrams buprenorphine taken sublingually blocked the effects of subsequently administered morphine. They also showed that the buprenorphine did not induce significant physical dependence (Jasinski et al., 1978).

Treatment Modality Selection Decision Tree for Buprenorphine, LAAM, or Methadone—Figure 40 presents a decision tree for selecting a treatment modality based on a sequential pharmacological intervention. An opioid addict would first be treated with daily doses of buprenorphine. If the daily buprenorphine treatment were successful, treatment could progress to 1 of 3 choices: reducing buprenorphine to 3 doses per week; changing to naltrexone; or ending medication.

If the daily buprenorphine treatment were unsuccessful, treatment could progress to 1 of 2 choices: LAAM or methadone. From there treatment could (1) continue with LAAM or methadone, (2) change from LAAM to methadone, or (3) change from methadone to LAAM.

Figure 40



The decision tree is not meant to be an inflexible prescription of a treatment model and does not imply that one treatment is superior to or more appropriate than another. Rather it is offered as a guide for clinical decision-making and suggests the wide range of treatment options available to clinicians.

Question 19: What are the clinical benefits of LAAM?

Answer: L-alpha-acetyl-methadol (LAAM), a potent opioid with a longer duration of action than methadone, can suppress opioid withdrawal for up to 72 hours. Steady-state blood levels are achieved in about 2 weeks. Because LAAM is administered 3 times per week, LAAM maintenance programs require less paperwork and record keeping and are able to serve more patients than methadone maintenance programs. Further, because of LAAM's slow onset of action and absence of euphoria/rush following oral administration, it is unlikely that LAAM will be diverted to illegal use.

Research on both LAAM and methadone maintenance treatment provides comparable results regarding patients' reported clinic attendance, opioid withdrawal symptoms, illicit drug use, employment status, and criminal activity. Both treatments are similar regarding overall effectiveness and medical safety; however, LAAM is less sedating than methadone.

Any patient suitable for methadone maintenance treatment can be treated with LAAM although it may be especially appealing to patients who have difficulty attending programs on a daily basis, find methadone's duration of action too short (due to rapid metabolism), find methadone too sedating, or who reject methadone because of its stigmatization.

Research Highlights

- Jaffe, Senay, and colleagues, in the late 1960s and early 1970s, were the first to use LAAM in an opioid treatment setting. They randomly assigned methadone-maintained and opioid addicts to LAAM or to continued methadone maintenance. In the sample of 89 LAAM-maintained patients, they noted no significant differences from the methadone-maintained patients in illicit opioid use, treatment retention, and side effects (Jaffe, Senay et al., 1969, 1970, 1971, 1972).
- Levine, Zaks, and colleagues also provided data on the efficacy and safety of LAAM in clinical populations. In an open comparison of methadone to LAAM, patients on 80 milligrams of LAAM 3 times per week submitted the same number of opioid-positive urine samples as those on 100 milligrams of methadone daily. At doses below 80 milligrams of LAAM 3 times per week, abstinence symptoms emerged before 72 hours had elapsed. LAAM side effects were rare and mild in these samples. The investigators further demonstrated that LAAM maintenance at doses above 50 milligrams given 3 times per week blocked the effects of subsequent 25-milligram intravenous heroin challenges for up to 72 hours (Levine, Zaks et al., 1976).

Several large-scale clinical studies supplied the primary data supporting the approval of LAAM: the Veterans Administration (VA) Cooperative study, the Special Action Office for

Drug Abuse Prevention (SAODAP) Cooperative study, the Goldstein Cohort study, the Whysner Phase III study, and the Labeling Assessment study. The first group of studies were performed in the early to mid-1970s, while the labeling study began in 1992.

- The VA Cooperative study, a pivotal study for Federal Drug Administration (FDA) approval, compared LAAM to methadone in a double-blind, 40-week trial at 12 VA Hospitals. Four-hundred thirty male patients were randomly assigned to receive 50 milligrams of methadone daily, 100 milligrams of methadone daily, or 80 milligrams of LAAM 3 times per week (a placebo was given on nondrug days). Forty-two percent of the sample completed 40 weeks of treatment. Sixty-nine percent of the LAAM group terminated early, compared to 58 percent in the low-dose and 48 percent in the high-dose methadone groups.

In the last 8 weeks of the study, LAAM patients used significantly less illicit opioids than either group of methadone patients, as evidenced by urine toxicology. Indirect measures of efficacy (retention, self-report of illicit opioid use, and staff global assessments) showed that LAAM and high-dose methadone were equivalent and both were either superior to or no different from low-dose methadone. Early termination, most of which occurred in the beginning weeks and appeared to be related to the slow induction schedule, was higher among LAAM patients than with either of the methadone groups (Ling, Charuvastra, and Kaim, 1976).

- The SAODAP Cooperative study assessed the feasibility of transferring patients from methadone to LAAM. Six hundred thirty-six male patients from 16 methadone maintenance clinics who had been stabilized on methadone for at least 3 months, were randomly assigned either to receive LAAM on a dose equivalent to the methadone dose at which they had been stabilized, or to continue receiving methadone at the same dose. LAAM doses were adjusted according to individual need and physician assessment. Forty-nine percent of the sample completed the 40 week trial, with 60 percent of subjects dropping from the LAAM group compared to 39 percent of subjects from the methadone group.

Rates of opioid-positive urine toxicologies did not differ between the 2 groups, but staff global assessments rated the LAAM patients superior on 4 out of 8 parameters: employment/education, drug abuse, psychiatric problems, and overall adjustment. At the completion of this study, subjects were offered the option of extending the assessment period from 40 to 80 weeks; of those subjects remaining at 40 weeks, 96 percent of the LAAM patients opted to continue LAAM maintenance compared to 80 percent of the methadone patients continuing methadone. Thus, LAAM proved to be an acceptable pharmacotherapy. No serious adverse events were reported but 2 deaths did occur, both unrelated to LAAM (Ling, Klett, and Gillis, 1980; Ling, Blakis, Holmes, et al., 1980).

- The Goldstein Cohort study, which employed a more rapid induction schedule than the VA study, emphasized safety outcomes as reflected by qualitative/descriptive and laboratory measurement, including quarterly EKGs. One hundred sixty-nine male heroin addicts were treated for 12 months in 1 cohort and 108 males were treated for 26 weeks in another. Laboratory evaluations were performed monthly and analyzed for longitudinal changes.

Individual patient data were evaluated for progressive changes during treatment in terms of time in treatment, dose level, and heroin use. Median retention was 10 months for the first cohort and 23 weeks for the other. There were no significant abnormal laboratory findings regarding chronic LAAM treatment (Judson and Goldstein, 1979).

- Forty-seven investigators participated in the Whysner study, which involved 5 separate protocols designed to establish LAAM induction, transfer from methadone, and maintenance dosing regimens. A total of 2,129 patients were enrolled, 450 opioid addicts and 1,679 methadone-maintenance patients. The first 3 protocols were open-label; the fourth and fifth incorporated a double-blind phase prior to entering an open-label maintenance phase. All patients received LAAM on Monday, Wednesday, and Friday. For the first 2 protocols, methadone maintenance patients were transferred to LAAM at 1.2 to 1.3 times their daily methadone dose. Opioid addicts started on 30 milligrams of LAAM, with 5- to 10-milligram increases to a target dose of 80 milligrams of LAAM 3 times per week.

In the third study, transfer schedules included gradual decreases in methadone dose with concurrent gradual dose increases in LAAM. The fourth and fifth protocols inducted street addicts to LAAM utilizing different induction schedules and a double-blind medication administration phase. In all, 0.4 percent of the LAAM patients in the study discontinued due to adverse reactions; another 1.7 percent were terminated due to side effects, 0.9 percent due to feeling over-medicated during induction or transfer, and 0.2 percent due to other, unspecified LAAM-related reasons. Overall, 63 percent of LAAM patients were retained for the entire study period (Whysner, Thomas, Ling, and Charuvastra, 1979).

- The Labeling Assessment Study was designed to address the adequacy of the proposed language for product labeling while evaluating the safety of LAAM administration in a large number of patients in the clinical environment of the 1990's. Six hundred twenty-three patients, one-third female, were enrolled between June and November 1992 in 26 methadone maintenance clinics not having any previous experience with LAAM. Patients were either transferred to LAAM from methadone maintenance or entered LAAM treatment directly from street heroin use with or without a period of methadone stabilization.

Six incidents were judged to be "probably related" to LAAM: 3 skin rashes, 2 cases of exacerbated asthma, and a histamine reaction. The remaining events were considered "possibly related" or "unrelated" to LAAM and included such things as mixed-drug overdose, cellulitis, pneumonia, and injuries from an auto accident. Dropouts and discontinuations were comparable to those seen in previous studies (Fudala, Montgomery, Herbert, Mojsiak, Rosenberg, Vocci, 1994).

- In addition, 959 patients have been treated with LAAM in 8 Southern California fee-for-service methadone clinics. There was no cost difference between methadone and LAAM maintenance in these settings, and many patients self-selected LAAM for the 3-times-per-week dosing schedule. Patients receiving LAAM decreased illicit opioid use in a magnitude comparable to those receiving methadone. Patients transferring from methadone performed equally to those entering LAAM treatment from street heroin use. Two reasons given by

patients for preferring LAAM over methadone were the need to attend the clinic less often and the perception that LAAM suppressed abstinence symptoms better.

A substantial number of patients reported that if LAAM became unavailable, they would rather detoxify or return to heroin use than transfer to methadone maintenance. Two patients died and 2 others experienced severe medical complications due to illicit drug and alcohol use early in LAAM treatment, underscoring the need for adequate patient education on the delayed onset of LAAM's opioid effect (Tennant, Rawson, and Pumphrey, 1986).

Clinical and Provider Benefits of LAAM—Figure 41 lists some of the benefits of treating opioid addicts with LAAM rather than methadone maintenance. Unlike the daily dosing schedule for methadone, patients take LAAM 3 times a week. This reduces patient visits to the clinic, eliminates the need for weekend take-home medication and weekend staff at clinics, and reduces paperwork for each client.

Figure 41

- | Client and Provider Benefits of LAAM |
|---|
| <ul style="list-style-type: none">• Three-times-per-week clinic visits• No take-home medication preparation• Less weekend staffing• Less paperwork• Less clinic crowding• Attracts new patients who are opposed to methadone• Less potential for street diversion |

Question 20: What are the clinical benefits of buprenorphine?

Answer: Buprenorphine, still being studied for use in the United States, has the ability to suppress opioid withdrawal, retain patients in treatment, and decrease illicit opioid use. It has a high safety profile with regard to overdose, produces only a mild degree of physical dependence following prolonged administration, and is associated with mild withdrawal following abrupt cessation. Thus, buprenorphine can be discontinued with relative ease.

Patients receiving buprenorphine can be either (1) discontinued without significant withdrawal, (2) maintained, or (3) transferred to opioid antagonist treatment, such as naltrexone. Patients with a higher level of physical dependence and whose needs cannot be met by buprenorphine can be transferred to an opioid agonist, such as methadone or LAAM.

With regard to the potential for buprenorphine abuse, NIDA is testing a buprenorphine-naloxone combination tablet that can eliminate or greatly reduce the abuse potential of buprenorphine. When the combination tablet is taken sublingually, as prescribed, only a little naloxone is absorbed, so the patient essentially gets just the buprenorphine effect. However, if the tablet is dissolved and injected, the naloxone will antagonize the buprenorphine, resulting in a range of reactions, including blockade of opioid effects and precipitation of an immediate withdrawal. In this way, the combination gives the therapeutic benefit but greatly reduces opportunities for abuse by injection.

Research with the combination tablet is currently being conducted at the Los Angeles Addiction Treatment Research Center (LAATRC). A larger, multicenter study is being planned and should get underway in late 1995 with LAATRC, NIDA, and the VA.

Research Highlights

- Mello and Mendelson showed that buprenorphine suppresses heroin self-administration by opioid-dependent primates and humans (Mello and Mendelson, 1980, 1982, 1983).
- Johnson, Jaffe, and Fudala, in a study of 162 opioid addicts who were randomly assigned either 8 milligrams per day of buprenorphine, or 20 or 60 milligrams per day of methadone, found that the 8-milligram buprenorphine dose was significantly more effective than 20 milligrams of methadone in retaining patients in treatment and in reducing opioid use. It was not significantly different from 60 milligrams of methadone on the same measures (Johnson, Jaffe, and Fudala, 1992).
- Strain and colleagues randomly assigned 164 opioid addicts in a double-blind/double-dummy (placebo) flexible-dose comparison of buprenorphine and methadone. The mean daily dosages were 8.9 milligrams per day of buprenorphine and 54.1 milligrams per day of

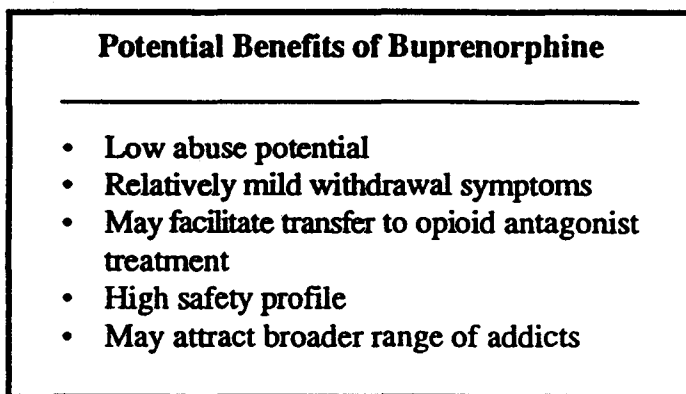
methadone. Fifty-six percent of each group completed the 16-week study. No differences were observed between the groups with respect to illicit opioid use and retention in treatment (Strain et al., 1994).

- In a year-long study at the LAATRC of 225 opioid addicts, the participants were given either 8 milligrams of buprenorphine (sublingually), or 30 or 80 milligrams of methadone. Effects of the 8 milligrams of buprenorphine and 30 milligrams of methadone on patients were comparable, but neither dose was as effective as 80 milligrams of methadone (Ling, Wesson, Charuvastra, and Klett, manuscript submitted).
- Findings from a subsequent dose-ranging study at the LAATRC suggest that the median doses of buprenorphine for adequate clinical stabilization may be in the 12- to 16-milligram range (Compton, Ling, Charuvastra, and Wesson, in press).
- A NIDA-sponsored, 12-site LAATRC/VA/NIDA multicenter study compared doses of 1, 4, 8, and 16 milligrams of buprenorphine in 631 patients. The primary comparison between the 8-milligram and the 1-milligram groups shows that the 8-milligram group used less illicit opioids and remained in treatment longer. (Ling, Wesson, Klett, et al., manuscript in preparation).
- A 1995 feasibility study of a buprenorphine/naloxone combination tablet is being conducted at LAATRC in preparation for a large-scale, multicenter trial. The main study will investigate the safety, efficacy, and potential for abuse of the combined buprenorphine-naloxone tablet formulation (Ling and Bridge, unpublished data).

Potential Benefits of Buprenorphine

Research on buprenorphine has shown that it has the potential to be a feasible alternative to methadone maintenance treatment. Potential benefits of buprenorphine treatment are outlined in Figure 42.

Figure 42



SECTION 2

REFERENCES

References

This section contains a listing of reference materials that provide further clinical information about methadone maintenance treatment and a bibliography of books, articles, and studies used to develop Section 1 of this manual.

Clinical Information and Treatment Guidelines

Below is a list of 13 publications that address more clinical aspects of methadone maintenance and other drug abuse treatment. United States residents can obtain these publications from the National Clearinghouse for Alcohol and Drug Information, NCADI, P.O. Box 2345, Rockville, MD, 20852, telephone 1 (800) 729-6686 or fax (301) 468-6433. If international inquirers need assistance in obtaining any of the publications, please contact INVEST, 8737 Colesville Road, Suite 500, Silver Spring, Maryland, 20910, U.S.A., telephone (301) 608-9500, fax (301) 565-3012.

State Methadone Treatment Guidelines

Treatment Improvement Protocol (TIP) Series, No. 1

Mark Parrino, Consensus Panel Chair

Rockville, Maryland: Center for Substance Abuse Treatment, 1994

Assessment and Treatment of Cocaine-Abusing Methadone-Maintained Patients

Treatment Improvement Protocol (TIP) Series, No. 10

Rockville, Maryland: Center for Substance Abuse Treatment, 1994

LAAM in the Treatment of Opiate Addiction

Treatment Improvement Protocol (TIP) Series, No. 10

Rockville, Maryland: Center for Substance Abuse Treatment, 1994

Treatment of Opiate Addiction With Methadone: A Counselor Manual

Technical Assistance Publication Series, No. 7

Rockville, Maryland: Center for Substance Abuse Treatment, 1994

Approval and Monitoring of Narcotic Treatment Programs: A Guide on the Role of Federal and State Agencies

Technical Assistance Publication Series, No. 12

Rockville, Maryland: Center for Substance Abuse Treatment, 1994

An Annotated Bibliography of Recent Empirical Research in Methadone Treatment Programs

Rockville, Maryland: National Institute on Drug Abuse, 1991

Improving Drug Abuse Treatment

R. W. Pickens, C. G. Leukefeld, and C.R. Schuster (Eds.)
NIDA Research Monograph Series, No. 106
Rockville, Maryland: National Institute on Drug Abuse, 1991

NIDA Notes

Volume 9, Number 4
November/December 1994
Rockville, Maryland: National Institute on Drug Abuse

Discovery of Novel Opioid Medications

NIDA Research Monograph Series, No. 147
Rockville, Maryland: National Institute on Drug Abuse, 1995

Problems of Drug Dependence

NIDA Research Monograph Series, No. 8
Rockville, Maryland: National Institute on Drug Abuse, 1976

Problems of Drug Dependence

NIDA Research Monograph Series, No. 27
Rockville, Maryland: National Institute on Drug Abuse, 1980

A Multicenter, Labeling Assessment Study of Levo-Alpha-Acetylmethadol (LAAM) for the Maintenance Treatment of Opioid Addicts

NIDA Research Monograph Series, No. 141
Rockville, Maryland: National Institute on Drug Abuse, 1994

Treating Drug Problems, Volume 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems

Institute of Medicine
Washington, DC: National Academy Press, 1990

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SECTION 3

SUPPLEMENTAL ARTICLES

METHADONE MAINTENANCE

Joyce H. Lowinson, MD, Ira J. Marion, MA, Herman Joseph, MA, and Vincent P. Dole, MD

INTRODUCTION

Methadone maintenance as a treatment modality for opiate addiction and the events leading to its development are chronicled in this chapter. In the field of medicine, the use of medications as maintenance for the control or suppression of chronic illness and metabolic deficiencies is not unusual. Although opiate addiction is generally recognized as a chronic disease, many would apply different standards to its treatment.

In 1972, the United States Food and Drug Administration approved the use of methadone hydrochloride for the treatment of narcotic addiction (19). Until 1985, when naltrexone hydrochloride received the same approval, methadone remained the only drug approved for such use. Worldwide, it remains the major modality for the treatment of opioid dependency. It has been researched thoroughly and evaluated carefully for more than two decades (5). Methadone maintenance treatment does not represent a radical departure from previous approaches used to help addicted persons. Despite its proved effectiveness, it remains a controversial approach among substance abuse treatment providers, public officials, policymakers, the medical profession, and the public at large (11). This controversy has persisted for more than two decades and has particular importance, at present, because of the relationship between the epidemic of human immunodeficiency virus (HIV)-related illnesses and intravenous drug abuse. Recent studies have suggested that methadone treatment has had a significant impact on the rate of HIV infection of patients in continuous treatment and that it is also a critical focal point for risk reduction and patient education, as well as counseling, testing, and treatment for HIV disorders (5).

Despite the continued controversy that appears to be rooted in ideologic premises and impervious to the scientific evidence that abounds, almost every nation with a significant narcotics addiction problem has adopted methadone maintenance as the major treatment modality. About 200,000 people are currently in treatment throughout the world, of whom more than half are treated in the United States. However, not a single protocol for the use of methadone is followed consistently, and this, coupled with the persistent ideologic issues, has resulted in "methadone programs" and "clinics" of varying quality and methods. It is therefore im-

portant to differentiate between the appropriate clinical use of methadone hydrochloride in maintenance treatment and that on "methadone programs" (64). Despite these differences, methadone maintenance treatment programs have remained an important part of health and human services for a population that is generally disenfranchised, difficult to treat, and, now, at risk for HIV infection. However, these programs have endured and succeeded despite controversy, inadequate funding, and a lack of public and community support, thus helping tens of thousands of former heroin addicts to live normal and productive lives.

HISTORICAL PERSPECTIVE

The Harrison Act, a revenue law passed to honor the United States' international commitment to the 1912 Hague convention to control narcotics, made the sale or transfer of all narcotic drugs a matter of record and subject to taxes and fees. At that time, many patent and prescription medications contained narcotic drugs, including heroin and morphine, and addiction was not uncommon (12). Physicians, faced with persons addicted to narcotic drugs, prescribed them. However, the United States Treasury Department viewed addiction as a criminal and moral problem rather than a medical concern. The Harrison Act was used as the legal basis to systematically prosecute these physicians, in a series of cases known as the "Doctor Cases" (see Chapter 1 in this volume). Most significant among these cases was Linder vs. the United States, because it established that physicians could provide "good faith" treatment for addicts (24). Despite this favorable decision, physicians continued to be harassed and increasingly often refused to treat narcotic addicts.

By 1918, clinics dispensing morphine and other drugs were established in 14 cities in an effort either to maintain or to withdraw addicts from addictive drugs. The two most famous of these clinics were in New York City and Shreveport, Louisiana. By 1923, however, the active campaign by the United States government ended this form of clinical intervention until methadone maintenance treatment research began in the mid-1960s (13).

Once the U.S. narcotics clinics were closed, treatment for addiction became largely unavailable until 1935, when the United States Public Health Service established a hospital for

this purpose in Lexington, Kentucky. This facility and another in Fort Worth, Texas, which opened in 1938, operated much like a prison, treating both involuntary criminal and volunteer addicts. They remained the only two public facilities treating addiction until the mid-1950s, when Riverside Hospital opened in New York City. Treatment consisted of detoxification and with a goal of abstinence. However, a follow-up study of patients discharged from Riverside showed that more than 90% relapsed to heroin use (1).

The first renewed attempt of organized medicine to advocate treatment and medical research for narcotics addiction came in 1955 when the New York Academy of Medicine strongly objected to Federal regulations that "prohibited physicians from prescribing a narcotic drug to keep comfortable a confirmed addict who refuses withdrawal, but who might, under regulated dosage, lead a useful life and later might agree to withdrawal" (55). The Academy report observed that the early morphine maintenance clinics opened after World War I were closed in 1923, not because they had failed, but because their goals were not in accordance with the prevailing philosophy of a punitive approach to the so-called "criminal problem." This report led to a renewed debate on narcotic maintenance at a time when the number of young heroin addicts in urban ghettos was increasing and concern over rising overdose deaths and drug-related crime was escalating. As a result, a position paper was generated by the Joint Committee of the American Bar Association and the American Medical Association in 1959, calling for a softening of penalties and the establishment of an experimental outpatient clinic for the treatment of drug addicts (9).

In 1962, the Medical Society of the County of New York recognized the need for systematic clinical investigation of medical maintenance treatment programs and ruled that "physicians who participate in a properly controlled and supervised clinical research project for addicts on a non-institutional basis would be deemed to be practicing ethical medicine (9). By 1963, the available treatment for narcotics addicts in New York City, where half of the nation's addicts lived, consisted of detoxification in Manhattan General Hospital and Metropolitan Hospital. Also that year, New York's first therapeutic community (Daytop Lodge) opened on Staten Island, New York, modeled on the Synanon program that had been operating in California since 1958. This program used a "self-help" concept that had its origins in Alcoholics Anonymous. Synanon and Daytop used reformed addicts as counselors and role models and evolved treatment principles of encounter groups, peer support, and therapy, and stressed total abstinence from drugs. However, the modern therapeutic community has developed into a far more sophisticated model, using the best techniques from many different approaches (see Chapter 34 in this volume).

With the medical and legal professions calling for a reevaluation of American narcotics policies, the climate became more favorable for a maintenance approach to treating addiction in outpatient clinics. In 1963, the New York Academy of Medicine recommended again that clinics be established in affiliation with hospitals to dispense narcotics to

addicts. The same year, President Kennedy's Advisory Committee on Narcotic and Drug Abuse made similar recommendations (9). At that time, heroin-related mortality was the leading cause of death for young adults between the ages of 15 and 35. Serum hepatitis cases related to injection of narcotics with contaminated needles were increasing markedly. A record number of addicts were being arrested for drug-related crimes (possession, sale of narcotics, property crimes) and jails were becoming overcrowded (38).

THE DEVELOPMENT OF METHADONE MAINTENANCE TREATMENT

In 1963, in response to the growing concern over the spread of heroin addiction, the New York City Health Research Council, viewing narcotic addiction as a chronic illness, recommended research in this area. Rockefeller Institute (now University) took up the challenge and asked Dr. Vincent Dole, a senior physician and researcher, to undertake research in this area. Dr. Marie Nyswander, a psychiatrist with extensive experience in narcotic addiction, joined him in this endeavor. As a result of her experience in Lexington, Kentucky, and in her private psychoanalytic practice in New York City, Dr. Nyswander became convinced that traditional psychiatric approaches alone could not help addicts to discontinue their use of narcotics. In fact, it was observed that "a careful search of the literature failed to disclose a single report in which withdrawal of drug and psychotherapy has enabled a significant fraction of the patients to return to the community and to live as normal individuals" (60). Recognizing that relapse in most cases was related to persistent or recurring craving, Dole and Nyswander theorized that control of this craving would be an important first step. Since their primary goal was rehabilitation rather than abstinence, this opened the door to the use of a narcotic medication as a means of controlling drug use and thereby making an addict accessible to rehabilitation. To test their theory, they admitted six "hard-core" heroin addicts to the hospital at Rockefeller Institute. An initial attempt to stabilize them on morphine proved unsuccessful because the patients alternated between being "high" and being "sick." Then, because its duration of action was longer, methadone was tried. Dole and Nyswander observed, in addition, that methadone administered in sufficiently high doses could be given orally once daily. As a result, mood swings were eliminated and patients could function normally. A daily maintenance dose of 80 to 120 mg produced a pharmacologic cross-tolerance, or "blockade", so that patients would not feel any narcotic or euphoric effects if they were to self-administer a normal dose of a short-acting narcotic (e.g., 25 mg of heroin). Finally, methadone appeared to be safe and nontoxic, with only minimal side effects. For Dole and Nyswander, the question was "whether a narcotic medicine prescribed by a physician as part of a treatment program could assist in the return of addicts to normal society" (16).

With the support of Dr. Ray Trussel, the New York City Commission of Hospitals opened a pilot program with 120 patients conducted at Manhattan General Hospital, which

later became affiliated with the Beth Israel Medical Center (48). In 1967, 107 patients remained in treatment, of whom 71% were employed in steady jobs, attending school, or both. Dole and Nyswander stated: "To date we have seen no indication to remove the blockade from any patient in the treatment program since all of them are still in the process of rehabilitation and no patient has been limited by intolerance of the medication" (16). The support of the Columbia University School of Public Health was enlisted to conduct an independent evaluation of the project. With Dr. Frances Rowe Gearing as chairperson, these evaluations continued for the first 10 years of methadone maintenance treatment and yielded consistently positive outcomes for the entire period of time. Criteria were: (a) a decrease in antisocial behavior measured by arrest and/or incarceration; (b) an increase in social productivity measured by employment and/or schooling or vocational training; (c) clinical impression of freedom from heroin "hunger" confirmed by negative urine specimens after stabilization on methadone; and (d) a recognition of, and willingness to accept help for, psychiatric and other problems, including those related to excessive use of alcohol or other drugs. Based on these evaluations, further expansion of the program was recommended (22). Methadone maintenance treatment programs were opened in many urban areas throughout the United States. Reports of their success were published in the medical literature. Annual methadone conferences at Rockefeller University were held, giving an opportunity for in-depth discussion of this new modality. Some of the programs followed the protocol described by Dole and Nyswander (15) in their article "A Medical Treatment for Diacetyl-morphine (Heroin) Addiction" and applied the concept of narcotic blockade described by Dole, Nyswander, and Kreek (16). Others used methadone medication but developed programs with divergent goals and objectives including abstinence, low-dose therapy, and combinations of residential, outpatient, mental health, and other modalities (26,37). In 1971, President Nixon appointed Dr. Jerome Jaffe to lead the White House Special Action Office for Drug Abuse Prevention (SAODAP). Dr. Jaffe, by expanding the methadone treatment system, played a major role in stemming the rise of heroin addiction in the United States.

By 1969 there were 2,000 patients enrolled in methadone maintenance programs in New York City alone, and 10,000 applicants were awaiting admission. The New York Academy of Medicine termed the situation a crisis. Although they recognized that treatment of heroin addiction with methadone substituted one addiction for another and might be a lifelong affair, they felt that "no other regimen currently available offers as much to the chronic addict" (55a). Legislators in New York State responded by appropriating \$10 million for the establishment of additional methadone maintenance programs. In 1970 the Bureau of Narcotics and Dangerous Drugs (BNDD), in a joint statement with the Food and Drug Administration (FDA), approved the use of methadone as an investigational drug for "experimental" maintenance programs and interdicted further research except in accordance

with guidelines to be promulgated by regulations. Emphasis continued to focus on eventual abstinence.

THE USE OF METHADONE AS A MEDICATION

Methadone is a synthetic narcotic analgesic compound developed in Germany at the end of World War II (27). After the war, it was studied at Lexington, Kentucky, and was found to have effects similar to those of morphine but longer in duration. These initial studies led to the use of methadone for analgesia and for withdrawal treatment of heroin addiction. Although methadone continues to be used for these purposes, its unique pharmacologic properties lend themselves to its use for maintenance (35,36).

As a maintenance medication, methadone has distinct advantages. When administered in adequate oral doses, a single dose in a stabilized patient lasts between 24 and 36 hours, without creating euphoria, sedation, or analgesia. Therefore, the patient can function normally and can perform any mental or physical tasks without impairment. Patients continue to experience normal physical pain and emotional reactions. Most importantly, methadone relieves the persistent narcotic craving or hunger that is believed to be the major reason for relapse.

Narcotic cross-tolerance, or "blockade", is another important property of the medication. In sufficient doses, methadone "blocks" the narcotic effects of normal street doses of short-acting narcotics such as heroin and can lessen the likelihood of overdose, should the drugs be self-administered. Because tolerance to methadone remains steady, patients can be maintained indefinitely (e.g., in some cases more than 20 years) on the same dose.

Finally, methadone is a medically safe treatment medication, with minimal side effects (26,37,43). Much has been said about the importance of appropriate and adequate dosages of methadone. Since its early development, many practitioners have deviated from the original Dole-Nyswander protocol with the desire to conduct research to determine the most effective approach to treatment and detoxication. However, others, because of preconceived notions that abstinence was an achievable goal for the majority of addicts and because lower doses were less toxic, believed that less diversion would occur if doses were lower and that it would be easier to withdraw patients from methadone. Patients, themselves, continued to resist adequate dosages based on mythologies that methadone "rots the bones", decreases libido, and is more difficult to "kick" than heroin (25,61).

Nevertheless, scientific knowledge is now available to suggest that the original dosage protocol works best and that low doses are appropriate for only a limited number of patients. A series of large-scale studies has emerged showing that patients maintained on doses of 60 mg/day or more had better treatment outcomes than those maintained on lower doses. Hartel reports data based on 2400 patients enrolled over a 15-year period. She observed that those patients maintained on a daily dose of 60 mg or more had longer retention in treatment, less use of heroin and other drugs, including

cocaine, and a lower incidence of HIV infection and AIDS. The effectiveness of methadone was even greater for patients on a 70 mg dose and was still more pronounced for patients on 80 mg/day or more (31-33). Ball and Ross (5) reported on a 3-year study of six methadone programs in three North-eastern cities. They showed that patients reduced their use of intravenous heroin by 71% when compared with the preadmission level. Most importantly, this study revealed that opiate use was directly related to methadone dose levels. In patients on doses above 71 mg/day, no heroin use was detected, whereas those patients on doses below 46 mg were 5.16 times more likely to use heroin than those receiving higher doses (5). Similar results were found by Caplehorn and Bell (10), who reported on methadone treatment doses in Australia and found that patients on higher doses remained in treatment longer. Finally, in a review of 24 methadone treatment programs throughout the nation, the United States General Accounting Office (64) concluded that "sixty milligrams of methadone is the lowest effective dose to stop heroin use and low dose maintenance (20 to 40 milligrams) is inappropriate."

Kreek (43,46) used blood plasma levels to establish doses and stated that whatever method is used, methadone dosages should never be used for social rewards or punishment (43,46). Also, all doses must be determined individually, because of differences in metabolism, body weight, and maintenance of appropriate methadone blood levels throughout the 24-hour period.

These studies confirm that dosages below 60 mg appear inadequate for most patients. This is especially important at the beginning of treatment, when patients may experiment with heroin to test the effectiveness of the medication. These studies also confirm that medical decisions should not be based on public biases but on scientific knowledge and clinical evaluation. Low doses of methadone are rarely therapeutic; in fact, they prevent the effective treatment of narcotic addiction.

Physicians in Austria and Sweden have been determining methadone dose by measuring plasma levels of methadone at peak (2 to 4 hours) and at 24 hours after dosing, attempting to raise the methadone dose until a stable plasma level is reached (7). This method is often used in maintenance programs. It is important to refine this technology in methadone treatment so that dose levels have a scientific as well as a clinical basis.

When stabilizing a patient on methadone, it is important to consider the patient's tolerance for narcotics. By carefully adjusting the dose of methadone during the induction phase, its narcotic properties can be minimized. The initial dose should be adequate to avoid or minimize withdrawal symptoms without producing sedation. An initial daily dose of 30 to 40 mg should be sufficient to obtain the necessary balance between withdrawal and narcotic symptoms. In no case should the initial day's dose of methadone exceed 40 mg. Once the initial dose and tolerance have been established, stabilization can be achieved through gradual increases of 10 mg every 2

to 3 days until the maintenance dose is reached. If patients are entering treatment from an institution where they have been drug-free, the initial dose should be no more than 20 mg. Stabilization can then be achieved by following the preceding schedule. Tolerance to the narcotic properties of methadone (sedation, analgesia) develop within a period of about 4 to 6 weeks. However, tolerance to the autonomic effects, most commonly constipation and sweating, develops at slower rates. Therefore, it is important to monitor the stabilization process carefully to minimize narcotic effects and withdrawal symptoms (26,30).

Kreek has demonstrated that methadone prescribed in high doses on a long-term basis has no toxic effects and minimal side effects for adult patients maintained in treatment for up to 14 years and for adolescent patients treated for up to 5 years (33,44). Medical complications identified among methadone patients include worsening of illnesses that existed prior to treatment. Methadone patients can develop illnesses such as chronic hypertension, diabetes, alcoholism and multiple substance abuse, HIV infection and acquired immune deficiency syndrome (AIDS), chronic liver disease and cirrhosis, asthma, tuberculosis, syphilis, endocarditis, and other infectious diseases. However, following entry into treatment, health status usually improves with access to medical care, elimination of injections with contaminated needles, and improved quality of life.

As noted previously, the major side effects during methadone maintenance treatment occur during the initial stabilization process. Although these effects are minor and usually subside over time, they can also be reduced or eliminated by an appropriate dose adjustment. In addition to constipation and sweating, the most frequently reported side effects are transient skin rash, weight gain, and water retention. Some of these are complicated by coexisting alcoholism, multiple substance abuse, smoking, advanced age, and lifestyle (47). Life-threatening interactions of methadone with other drugs have not been identified. Drugs found to affect the metabolism of methadone include phenytoin (Dilantin) and rifampin. Antagonists and agonist/antagonist drugs such as pentazocine (Talwin) and buprenorphine can cause withdrawal symptoms in methadone patients and should not be prescribed (44).

Methadone maintenance, itself, does not impair the normal functioning of patients. Psychomotor performance tests that measure skills such as reaction time, driving ability, intelligence, attention span and other important abilities were administered to methadone patients, volunteers, and normal college students with no drug history. In general, the performance of methadone patients did not differ from those of normal volunteers or college students. It should be noted that studies of patients' driving records in both Texas and New York found that the driving records of methadone patients did not differ significantly from those of the driving population at large (4). On the Wechsler Adult Intelligence Scale (WAIS), the mean IQ of methadone patients at the time of entry into treatment was slightly above the general popula-

tion. Ten years later, the same patients showed higher scores, possibly due to improved quality of life. Based on these studies, it can be concluded that methadone maintenance does not impair normal functioning or intellectual capacity (28,54,8,29,2).

METHADONE PROGRAMS

Methadone maintenance programs are controlled and regulated by Federal and state agencies to an extent not found in any other form of medical treatment. In many states, the original Dole-Nyswander protocol has been altered to make abstinence the priority. In 1972, in order to establish minimal standards and quality, the FDA promulgated regulations governing the use of methadone; the Drug Enforcement Administration (DEA) oversees the security and dispensing of the medication. These minimum standards regulate admissions, staffing patterns, record keeping, treatment planning, service provision, storage, facility standards, frequency of visits and of urine testing, and dose limitations. Some states interdict altogether the practice of methadone maintenance. Some place a ceiling on the maximum dose, making it impossible to produce a narcotic blockade or to remove narcotic craving. Some prohibit take-home medication, and others place a limit on time in treatment before a patient must be withdrawn from methadone. Such restrictions present physicians with serious dilemmas. Instead of being able to rely on their professional judgment and clinical experience, they are often forced to make medical decisions that are independent of the needs of the patients. The consequence of those factors is a reduced effectiveness of this treatment modality.

For admission to methadone treatment, Federal standards mandate a minimum of 1 year of addiction to opiates as well as current evidence of addiction, although they allow for exceptions such as recent discharge from a chronic care institution or prison. The minimum age for admission is 18 (under 18 with parental or legal guardian consent). Applicants under age 18 must have at least two prior documented treatment episodes, either short-term detoxification or drug-free treatment, before they can be considered for methadone maintenance. Pregnant women are routinely accepted for methadone treatment and can now be admitted without a 1-year addiction history because it is recognized that methadone maintenance treatment greatly improves the pregnancy outcome for the woman and her unborn child (see Chapter 49 in this volume). Applicants with major medical conditions such as AIDS are eligible and should be routinely accepted for methadone treatment (59).

In the United States, methadone treatment has evolved into three phases during the past two decades. The first phase consists of a stabilization period that can last for about 3 months, during which patients adjust to the medication, receive their first annual physical examination, and are oriented to program regulations, expectations, routines, and services offered. Treatment planning begins with a thorough psychosocial history and assessment. Emergency situations and en-

titlements are addressed. Referrals are made to appropriate medical and social service agencies. New patients must report to the program daily (6 or 7 days per week) during this initial period. During the second phase, the treatment plan is reviewed and revised if necessary. This often involves implementing vocational goals such as job training or employment and providing ongoing medical and mental health treatment. For patients with serious medical problems such as HIV infection/AIDS or those with serious alcohol or multiple drug problems, this phase of treatment can be extended as long as necessary. Many patients profit relatively quickly from the relevant services that are provided and are able to improve family relationships, find employment, attend school, and function productively. During this phase patients may receive take-home medication, depending on their progress and adjustment to treatment. The third and final phase of treatment consists of continued methadone maintenance but a minimum of other services. These patients most often are employed and no longer require the intensive services provided in other phases but still require ongoing methadone maintenance. They continue to submit urine specimens for drug screening and ingest a dose of methadone under observation of a nurse, and they can consult with program staff if necessary. Many patients visit only once a week at this time. However, several experimental projects are currently operating that allow patients to visit even less frequently.

The modern urban methadone treatment program is a full-scale medical and human service agency attempting to address major social and medical problems using a variety of techniques. During the past decade, patient characteristics have changed markedly due to increases in HIV infection among intravenous drug abusers, the epidemic of cocaine and crack, and homelessness (see Chapter 66 in this volume). These problems and their sequelae require methadone providers to create and improve services to meet these needs. These programs require expanded and more sophisticated physical facilities for an expanding population, better trained staff, and greater funding. However, public funding has not kept pace with program needs, and a pervasive recession at the time of this writing does not allow for much hope in this area. However, providing primary care to substance abusers treated in methadone maintenance clinics could reduce the demand placed on emergency rooms and the need for hospitalization and thereby drastically cut the overall cost of their care.

Methadone maintenance treatment programs can be established in a variety of health care and social service settings. Whether located in a hospital, a primary care clinic, or a social service agency, methadone programs should be organized and managed to ensure optimal outcomes for patients in an environment conducive to health, safety, and good treatment.

In organizing and operating a program, concerns about how space is allocated and used can be critical to operations. Clinics operating in cramped or inadequate quarters cannot provide the kind of care or privacy needed for physical examinations or effective counseling and casework.

A quality program should have clear, cogent, consistent, and humanistic policies and procedures that are known and understood by both patients and staff. There should be a multidisciplinary approach that is flexible in order to provide individualized treatment planning and implementation based on assessed patient needs (49,50).

A well-organized methadone maintenance treatment program must have enough space to allow staff to function in a professional manner consistent with good medical and mental health standards. Most states require programs to meet some degree of facility standards, and the Federal government requires that facilities receiving Federal funds provide unrestricted access for disabled persons. Over and above the minimum Federal and state standards, programs should provide a clean, safe, and attractive environment, friendly, cheerful, and accommodating.

Although it is difficult to estimate the optimal size of an adequate program, between 15 and 20 square feet for each patient in treatment should be allotted, based on a patient census of 300.

Each clinic should be organized around the services it provides, and services should flow into each other easily. There must be a methadone dispensing area that is easily accessible to the patients it will serve. Ideally, a nurses' station or dispensing area is constructed adjacent to a comfortable patient waiting area. The nurses' station should be well-lighted and should allow for easy communication between nurse/dispenser and patient, as this interaction is the most frequent contact the patient has with staff. It allows the nurse to assess the patient and note any changes in appearance and demeanor, as well as to ensure that the patient ingests his/her medication. Generally, the medication is stored in a safe equipped for this purpose (the DEA currently requires a General Services Administration (GSA) Class 5) within or adjacent to the nurses' station.

With the current concern about HIV infection and other health issues, the waiting room can be used to impart information about the program and its services, HIV education, prenatal care, and parenting skills as well as other important information. Through the creative use of videotapes that can run continuously while patients are waiting, a clinic can impart important information to its patients. Because patients often bring young children with them to the clinic, the area should be safe for young children and out of sight of the actual dispensing area.

The medical suite should be organized to ensure privacy and encourage patients to meet with the physician and other medical staff. The examination room must be well-equipped and comfortable and there should be an adjacent office for staff to consult with patients. This area, as well as the entire clinic, should be equipped with adequate air exchange to prevent, as much as possible, airborne infections. Ultraviolet lighting can also be helpful. Patient records should be stored in a secure area but should be easily accessible to those who must use them frequently. Programs should also provide offices for individual staff members, rooms to hold patient groups and staff meetings, and a staff lounge.

The space should encourage patients to meet with staff ensure privacy, and provide access to the services the program provides. This can best be accomplished by eliminating barriers between the patient and staff areas and by establishing an effective communications system that allows staff to communicate freely with each other whenever necessary.

Appropriate bathrooms are crucial, as programs must collect urine specimens from patients frequently to clinically monitor whether patients continue to take methadone and remain free from other drugs. The bathrooms should also be clean and neat and allow for privacy. Usually, clinics turn off the hot water in patient bathrooms to prevent the warming of urine specimens brought from elsewhere. The bathrooms should also be located where staff can monitor use.

Clinics should be decorated in a friendly and inviting style to prevent a drab and institutional look. Bulletin boards should be hung in the waiting area and elsewhere to provide current information to patients.

Where space and funding allows, programs can experiment with recreation areas, classrooms, skills training (such as typing or word processing), or other methods to prevent patients from congregating directly outside the clinic or in the neighboring community.

Programs with clear, cogent policies, procedures, goals, and objectives that are familiar to both staff and patients and consistent with state of the art knowledge will provide the best outcomes. Programs must be operated humanistically but with clear rules against violence or threats of violence. Patients must see the clinic site as distinct from the hostile environments where they formerly used heroin and understand that different rules apply inside the clinic. However, the methods used to communicate these basics and the program's policies and procedures often can facilitate making the distinction.

The dispensing of methadone is an important aspect of the treatment process, and the relationship between the patient and the nurse is very important. Program directors should endeavor to make this a therapeutic process. Therefore, the collection of clinic fees, urine specimens, or other clinic matters should be handled apart from the dispensing process to allow patients to view the dispensing of methadone in a therapeutic manner.

Because patient motivation is high upon entry into treatment, it is important that the entire treatment team engage the patient early. The medical history, physical examination, laboratory tests, psychosocial history, and medical, mental health, and social assessments should be accomplished during the first weeks of treatment. Most important in this process is staff-patient contact and the initial orientation. The initial physician-patient contact gives the doctor an opportunity to establish a relationship of trust, to explain the effectiveness and pharmacology of methadone, and to treat acute medical problems. Patients must come to see methadone as a medication and not a drug and to understand how it is used, its effects, and its side effects, how the maintenance dose will be achieved, how to request a dosage change, and how to store methadone safely, if take-home doses are dispensed. Patients

must understand how the program functions and be introduced to the program staff. The patient should participate in the development of an individualized treatment plan and clearly understand the goals and objectives the program has for his/her treatment and what the program expects. Most treatment plans are based on a triage concept, dealing with critical needs first. Housing, financial assistance, health care, and pending court cases are of primary importance. Later, vocational and educational goals can be pursued. Patients should know the services to which they are entitled, what services are provided at the program and, if necessary, by referral to cooperating agencies.

Despite the poor prognosis indicated in early studies (14,63), many patients who progress well desire to withdraw from methadone after a successful period of maintenance. Programs must advise patients of the benefits and risks of tapering the dose and provide service and support for those who elect to undergo withdrawal. Service should continue after zero dose is achieved and should involve individual, family, and group treatment. Because craving may invariably return, the patient should be provided with tools and support in this area, including possible return to maintenance treatment without delay, if this becomes necessary.

Some methadone treatment programs have taken advantage of the fact that patients visit regularly and remain in treatment to offer needed services that are usually difficult to obtain. This model, "one-stop shopping", provides HIV-related services, services for children and families (see Chapter 59 in this volume), services for pregnant and postpartum women (see Chapter 49 in this volume), vocational and educational services, primary medical care, mental health services, and an array of substance abuse treatment services to deal with those who continue to abuse drugs and/or alcohol. Counseling and casework, relapse prevention techniques, Twelve Step and other self-help groups, and other modalities are offered to patients with these problems.

A methadone maintenance treatment program is a complex system of health care and service delivery that requires careful organization and a great many skills to operate. Clearly, health concerns dictate a sanitary environment. Medical and psychiatric care, nursing, counseling, casework, finance, public and community relations, pharmacy, administration, medical records management, clerical, housekeeping, security, communications systems, safety, biohazard disposal, and other skills and disciplines must all play a role in a successful and well-run program.

METHADONE TREATMENT AND THE HIV INFECTION

Several studies have confirmed that continuous methadone treatment is associated with a reduced risk of contracting HIV and may prevent infection of those patients not yet exposed to the virus. Infection rates among intravenous drug abusers in New York are estimated at 50%. Yet, studies in New York and Sweden examined patients in continuous treatment during the years when HIV exposure increased

markedly (1983 was the pivotal year when HIV infection rates soared in both New York and Sweden). Infection rates for these groups of patients were extremely low (3% in Sweden; less than 10% in New York) compared with those for newly admitted patients and active addicts, leading investigators in these locations to conclude that continuous methadone treatment was associated with reduced risk of contracting HIV (31,7). A study of 58 long-term socially rehabilitated patients showed that all were seronegative for HIV. These patients were enrolled in treatment for more than 16 years and were maintained on a median dose of 60 mg/day (range 5 to 100 mg/day). Prior to entry into treatment, these patients had used heroin by injection for an average of 10.3 years and engaged in high-risk behavior for contracting HIV, including sharing needles and "works", using "shooting galleries," and having unprotected sexual contacts. Successful methadone treatment was the major factor associated with the absence of HIV infection (58). Because of the relationship among HIV infection, AIDS, and methadone treatment, many programs have developed research and service delivery systems to deal with the high numbers of infected patients. Staff with special training in HIV spectrum disease provide risk reduction education, distribute condoms, and assist with referrals to infectious disease clinics. Primary medical care, including T cell monitoring and prescriptions for zidovudine (AZT) and other HIV medications, is provided along with prophylaxis for *Pneumocystis carinii* (PCP) pneumonia and other opportunistic infections. An increase in tuberculosis, especially treatment-resistant tuberculosis, among this group has resulted in TB case management projects and the provision of medications for prophylaxis and treatment (14a,42). Some hospitals have developed specific methadone programs for HIV infection. At St. Clare's Hospital in New York City, for example, a special methadone clinic specifically designed for patients with HIV disease has been developed to ensure appropriate medical and social treatment (65). At Montefiore Medical Center in the Bronx, research into the natural history of HIV disease among intravenous drug abusers has been ongoing (see Chapter 55 in this volume).

EFFICACY OF METHADONE MAINTENANCE TREATMENT

Despite the differences in goals and policies among programs, methadone maintenance treatment has yielded consistently positive evaluations since it was implemented in 1964. To fully understand methadone treatment, the program goals "... to reduce illicit drug consumption and other criminal behavior and secondarily to improve productive social behavior and psychological well being" must be considered (23). The primary goal of methadone treatment is to reduce or eliminate heroin use that is related most closely to the dosage level of methadone. As stated previously, when appropriate doses are provided, heroin use is markedly decreased or eliminated in most patients.

Crack/cocaine has become the major drug of abuse among methadone maintenance patients since the early 1980s. With this increase in use, programs have begun investigating Twelve Step models, self-help programs, pharmacotherapies, and other modalities to address this serious problem. In its review of methadone treatment programs, the General Accounting Office (GAO) reported that in 1989, 14% of the patients in the programs surveyed had problems with cocaine/crack. In eight of the programs, up to 40% of the patients used the drug, while in 16 programs cocaine was used by 0 to 15% of the patients (64). In New York State, in 1990, 51% of the 14,282 admissions to methadone treatment admitted to a problem with a history of current cocaine or crack use, and 72% reported having administered cocaine by injection, thus further increasing the risk of HIV infection (56). This increase in cocaine abuse has led policymakers to criticize methadone maintenance treatment for failing to reduce these numbers. Yet, studies suggest that the level of cocaine use decreases from time of admission. Magura reports a decrease in cocaine use from 84% at admission to 66% after 6 months in treatment (52); Hartel et al. (32) report that prevalence of cocaine use is lower for those patients receiving more than 70 mg/day of methadone (46).

Prior to the increase in cocaine use and HIV infection, alcohol and the medical complications of alcoholism were the most serious problem found among methadone patients, affecting about 20 to 25% of the patients (40,6). Before 1986, medical conditions related to alcoholism were the major cause of mortality in methadone maintenance treatment. Studies also suggest that when patients leave methadone treatment, their drinking behavior increases, possibly to obtain relief from symptoms of narcotic craving without relapsing to the use of heroin. However, many patients used alcohol in conjunction with heroin prior to entering treatment (40). Also, since patients with alcohol and other drug problems were routinely admitted into methadone treatment, these problems had program implications and decreased positive treatment response.

Many studies have documented a substantial reduction in criminal behavior from pretreatment levels. Like most other treatment variables, reduction in criminal behavior increases with length of time in treatment. These trends have been consistent throughout the more than two decades of methadone treatment and in a variety of settings. In Hong Kong, after methadone was introduced in 1976, there was an 85% reduction in the number of heroin addicts sent to prisons during a 4-year period (41). In the study conducted in three Northeastern cities, Ball and Ross (5) reported a 79% decrease in the number of crimes committed by patients during their first 6 months of treatment.

Socially productive behavior as measured by employment, schooling, or homemaking also improves with length of time in treatment. During the first 15 years of methadone treatment in New York, employment rates were just below 60%. During the 1980s, when the employment market changed, cocaine/crack use increased, and homelessness and HIV infection rates increased, social productivity and employment

levels in New York declined to less than 40% in 1990 (3). A study of those socially productive methadone patients in New York showed that they held positions across the spectrum of the job market, including lawyer, architect, musician, film producer, housewife, chef, construction worker, social worker, secretary, laborer, and doorman. There was no relationship between the nature of employment and dose or number of treatment episodes. Many of these successful patients had attempted to become abstinent, relapsed, and subsequently returned to methadone treatment in order to maintain their employment. For the majority of inner-city patients, lack of education and job skills, child care, unemployment, and poverty continue to have an adverse impact on socially productive behavior and treatment response (see Chapter 77 in this volume).

Recent research has concluded that program characteristics are the critical factor in successful outcomes. In their study, Ball and Ross (5) opened what they call the "black box" of treatment, indicating that the major factor in outcome is the length of time in treatment. Factors that influence longer retention are adequate dose, well-trained staff, trusting and confidential relationships between the patients and program staff, clear policies and procedures, low staff turnover and high morale, flexible take-home policies, and other pertinent program characteristics. Although many clinicians consider abstinence as a critical treatment goal, it is problematic and difficult to attain for most patients. There is a high degree of consistency in the results of studies of patients who leave treatment. The majority of discharged patients revert to use of heroin, other illicit narcotics, and/or alcohol. Ball and Ross (5, p. 82) found that 82% of the patients had relapsed to intravenous drug use after having been out of treatment for 10 months, or more, with almost half (45.5%) relapsing after having been out of treatment for 1 to 3 months. Dole and Joseph (17) found that relapse occurred independently of patient variables such as ethnicity, gender, or education level. Older patients may substitute heavy alcohol use for heroin, and favorable outcome is associated with shorter duration of heroin use, longer duration of treatment, employment, and an absence of behavioral problems while in treatment. Withdrawal from treatment may have fatal consequences. Dole and Joseph (17) found that death rates for discharged persons were more than twice those of patients still in treatment. The major difference in the causes of death between treatment and posttreatment is the sharp increase in narcotics-related deaths after leaving treatment. No evidence was found of narcotics-related deaths among properly stabilized patients during methadone treatment (39). However, this study was completed prior to the advent of the HIV epidemic. By 1986, AIDS had become the major cause of death among methadone patients in New York City programs (40).

Methadone maintenance treatment is cost effective and beneficial to society. Rufener and colleagues (62) studied the cost effectiveness of methadone maintenance and other treatment modalities and yielded a benefit/cost ratio of 4.4:1. The most comprehensive examination of economic benefits and costs was performed on data from the Treatment Out-

come Prospective Study (TOPS) (34). After examining the average cost of a treatment day, detailed measurements of rates of criminal activities, and the costs to society of various crimes, the study yielded a final benefit/cost ratio of 4:1. Using any of the studies, it is clear that methadone maintenance pays for itself on the first day it is delivered and that posttreatment effects are an economic bonus. These benefits accrue not only to the patient but to society in general.

SPECIAL ISSUES AND NEW TREATMENT APPROACHES

The current methadone maintenance system faces many problems as it approaches the final decade of this century. Numerous programs are publicly funded and have been subject to apathy and hostility, decreasing funding, deteriorating physical facilities, high staff turnover, and community opposition to the opening and/or continued operation of clinics, caused by concerns about patient loitering and diversion of take-home supplies of methadone. Program plans must be developed to address these critical issues. Programs must develop services to meet new needs as well as policies and procedures to address loitering, diversion, and community concerns. Funding, always problematic, needs to be secured for physical facilities as well as for ongoing operations. Programs have developed strategies to secure additional funding from agencies that did not traditionally fund drug treatment, such as HIV/AIDS service systems and social services agencies. New models of treatment and service delivery should be developed and piloted to supplement existing program models. Service providers and funding and regulatory agencies must work cooperatively to improve treatment and seek solutions to existing problems. Provider coalitions on a state, national, and international basis can provide a forum for this to occur. Broad-based conferences can also serve to discuss, debate, and resolve concerns while serving as vehicles for the transfer of technology from researchers to clinicians.

To enhance the traditional outpatient methadone clinic, changing patient needs dictate that new and innovative approaches be piloted. Since the 1980s, several such efforts have been implemented. Some were developed specifically in response to HIV spectrum disease, whereas others sought to provide innovative ways to expand or enhance programs.

To address homelessness and abuse of cocaine and other drugs, residential short-stay methadone treatment was developed by the Lower East Side Service Center in New York for patients who were not functioning well. A similar program was established in Boston. These programs provide methadone maintenance and residential treatment while endeavoring to resolve the difficulties that interfered with adjustment to outpatient treatment. The program is usually 3 to 6 months in duration and the patient is returned to his/her outpatient clinic after completion. Methadone dose is maintained throughout the program. Although other residential programs provide methadone, most require tapering the dose over a 6-month period. Residential methadone maintenance originally was piloted in 1973 at the New York

stein College of Medicine, under the direction of Dr. Joyce Lowinson, but the program was closed because of lack of funding at the time.

In the New York City prison system, the Key Extended Entry Program (KEEP) offers methadone maintenance treatment to addict inmates who request treatment for heroin addiction upon incarceration. Eligible inmates are misdemeanor offenders with short sentences who otherwise comply with admission standards. They are maintained while in jail and are referred to a community clinic where they are guaranteed continued treatment. This program involves the cooperation of the New York City Department of Corrections, the prison health services, and a network of community-based methadone treatment providers (66). The Beth Israel Medical Center in New York City operated an "interim" clinic in 1989 as a research project. The purpose of interim maintenance was to provide immediate methadone treatment to eligible applicants on a waiting list for comprehensive methadone treatment in order to reduce HIV risk behaviors. The clinic provided an appropriate dose of methadone, AIDS education, and physical examinations. Case-work and counseling were limited. A study of the 301 patients showed that heroin use was reduced from 63% at admission to 29% after 1 month. Cocaine use was not significantly reduced. The controls on the waiting list showed no reduction in the use of either substance. In 1989 the FDA originally proposed "interim methadone maintenance", but this proposal subsequently was withdrawn when treatment providers and policymakers expressed serious concerns (66). The proposal for interim methadone maintenance heightened the debate concerning the appropriate use of methadone. Advocates for interim maintenance argued that it would take many years to adequately expand methadone treatment and that tens of thousands of addicts would be denied treatment. Opponents believed that those entering methadone maintenance treatment in the 1990s were most in need of comprehensive services. They believed that the interim clinic as an inexpensive substitute would jeopardize funding for comprehensive treatment programs. Opponents of interim treatment referred to a study at the Veterans Administration Medical Center in Philadelphia that showed that minimal or low-threshold treatment did not reduce illicit drug use significantly (53).

Because there are many patients who have been in continuous treatment for many years and function on an extremely high level, the medical maintenance model was established. Patients report once every 4 weeks, submit a urine specimen, and receive a prescription for a 4-week supply of methadone in tablet form directly from the physician in charge of their treatment. This allows patients greater freedom to pursue careers, travel, and feel removed from the social stigma associated with the clinic system. Of the 40 patients, 33 remained in the program from 12 to 55 months, five patients were returned to their clinics because of cocaine use, and two left voluntarily. Medical maintenance has been established in

In an effort to provide specialized services for HIV-infected patients, clinics have developed special primary medical care services for patients with HIV infection and AIDS. These clinics provide a significant portion of the medical care for their patients and maintain linkages with infectious disease clinics and hospitals. Drug therapy, T cell monitoring, counseling and testing, prophylaxis for treatment of opportunistic infections, clinical trials, and counseling are part of routine care. Clinics providing these specialized services are now operating in San Francisco, New York, and Miami, and this model is being replicated elsewhere.

Several other models for innovative approaches have also been proposed or are being developed. At the Albert Einstein College of Medicine in the Bronx, two such models are now being developed. One will attempt to provide culturally sensitive, family-centered treatment. The other model involves "front-loading" services to newly admitted patients, in an effort to mobilize intensive resources at the time of greatest need and to integrate the patient more fully into the treatment system. These models are examples of ways to enhance or expand treatment to meet current needs. At present, methadone treatment programs in the United States treat approximately 15% of narcotics addicts at any given time. Effective methods to expand treatment must be developed in order to reach out to those either not yet in treatment or not motivated to seek it. At the same time, efforts to overcome community concerns and opposition to the location of new clinics must be made, if meaningful expansion is to be accomplished. Community and political leaders must be educated to understand the public health value of expansion. Effective outreach strategies must be employed to motivate those addicts in shelters and on the street to accept methadone treatment. Mobile vans have been used in the Netherlands and in Boston to reach addicts where it has not been possible to establish permanent clinic sites. Such a strategy could be used to introduce treatment to shelters and other social service agencies directly serving addicted people.

SUMMARY AND CONCLUSION

Methadone maintenance treatment programs originally were developed to deal with the problem of heroin addiction. Methadone as a medication is unique in its capacity to reduce or eliminate the craving for narcotics and to provide a pharmacologic blockade against heroin. When the Dole-Nyswander protocol and philosophy has been followed, this modality has proved extremely effective. However, since the early years of methadone maintenance, many new social and health problems have emerged. Many of these have had an adverse effect on methadone patients and the programs that treat them. HIV infection and AIDS have placed methadone programs in the position of assuming ever-wider responsibilities. The high retention and attendance by patients give programs the opportunity and the responsibility of providing the medical and social care that a chronic, debilitating, and potentially terminal illness requires. These factors also provide the opportunity to educate and treat patients, to reduce transmis-

sion of HIV and other communicable illnesses such as tuberculosis, and to greatly improve the quality of life for infected patients. These programs are now moving in the direction of becoming primary care clinics for substance abusers.

In summary, a quality methadone maintenance treatment program is one that continuously evaluates and assesses the changing needs of its patients and seeks to meet them to the best of its ability. Today, most methadone maintenance treatment programs face their greatest challenge. The recession of the 1990s has made it mandatory for programs to seek new and creative funding support while patients fight HIV infection, epidemic cocaine and crack use, poverty, homelessness, and other social ills. Programs that seek to innovate, to meet most patient needs within the treatment setting, to develop new methodologies, or to replicate successful efforts of other programs can better meet present and future challenges. At the same time, the public demands programs that are cost effective that produce documented results they can understand. It is critical that all programs develop evaluation capability, document their productivity and that of their patients, and most of all, publicize their successes.

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Methadone Treatment and Acquired Immunodeficiency Syndrome

James R. Cooper, MD

In light of the recent growth in public financial support for the rapid expansion of drug abuse treatment capacity, the unique effectiveness of methadone hydrochloride treatment in reducing intravenous opioid abuse and the associated sharing of injection equipment is reviewed and discussed, and its potential effect on preventing the spread of acquired immunodeficiency syndrome is examined. In addition to methadone, treatment variables that clinical research suggests are integral to effective treatment are identified. Methadone treatment is one of the most helpful means of reducing the risk of acquired immunodeficiency syndrome available, provided that programs of quality are expanded. The medical profession and universities are urged to take steps to ensure quality efforts in prevention and treatment.

(JAMA. 1989;262:1664-1668)

THE SHARING of injection equipment among intravenous drug users significantly increases the risk of transmission of human immunodeficiency virus (HIV) among the addict population, their sexual partners, and their offspring.¹⁻⁵ The number of cases of acquired immunodeficiency syndrome (AIDS) associated with intravenous drug use is significant^{6,7} and increasing dramatically in some regions.⁸ The

For editorial comment see p 1681.

disproportionate prevalence of HIV infection among blacks and Hispanics creates an additional public health concern.⁹⁻¹¹ This increased prevalence of HIV infection among intravenous drug users and their sexual partners and newborn children, insufficient treatment capacity, and the growing concern about public health consequences have led to a renewed interest in providing funds for rapid expansion and improved quality of the current drug abuse treatment system. A primary objective of this new treatment-funding initiative is to reduce the sharing of injection equipment among addicts and thus to prevent the further spread of HIV infection by attracting more intravenous drug users to treatment and retaining them in treatment. There is debate, however, as to what methods of service provision are most likely to fulfill the objective.

Methadone hydrochloride maintenance is one modality of the existing drug abuse treatment system being targeted for expansion. Controversy still

exists about the legitimacy of this treatment approach.¹² Some of the antagonism results from personal bias and prejudice regarding the patient population, which is perceived by some to be composed largely of antisocial or weak persons unable to give up their self-destructive behavior. This is a perception sometimes held by patients and staff as well.¹³⁻¹⁵ Problems associated with poorly operated programs, such as loitering and drug dealing, just add to the controversy (*Ft Lauderdale News/Sun Sentinel*. June 19, 1983;sect A:1,10,11; *Village Voice*. April 5, 1988:31-38). Such problems account, in part, for local neighborhood resistance to opening new clinics in some areas. Despite these existing attitudes, an objective review of the clinical research data demonstrates that methadone treatment has certain unique characteristics that suggest this treatment would significantly reduce the sharing of injection equipment and prevent the spread of HIV infection.

TREATMENT EVALUATION

Much has been written about methadone maintenance programs in the United States. Exhaustive reviews have consistently demonstrated the safety of methadone, regardless of the duration of treatment, when used as directed under medical supervision.¹⁶⁻¹⁸ Evaluation studies that involve large numbers of narcotic maintenance programs have consistently shown this treatment to be highly effective in reducing intravenous drug use and crime and in enhancing social productivity.¹⁹⁻²²

To understand the usefulness of methadone maintenance as an adjunct in AIDS public health prevention efforts, it is important to appreciate the

unique effectiveness of methadone treatment to retain patients and the effect of this modality on reducing intravenous drug use, provided adequate methadone doses are administered and ancillary services are provided to those with an assessed need. Patient retention is crucial for two reasons. Evaluation studies have consistently demonstrated that the length of time in treatment is an important predictor of both in-treatment and posttreatment success, regardless of treatment modality.²³⁻²⁵ In-treatment performance, as measured by decreased use of narcotics and other illicit drugs, decreased criminal activity, and increased social productivity, improves in a direct linear relationship to the length of time spent in treatment.²⁷ Whatever the modality, outcome for patients who receive short-term treatment of fewer than 90 days is relatively poor; indeed, it is not significantly different from patients who receive no treatment.^{23,27}

Comparative analysis of outcome data of available treatment modalities for this subpopulation of drug abusers provides an additional dimension in understanding the effectiveness of narcotic maintenance programs. Of the three modalities available for the treatment of opiate addicts, ie, methadone maintenance, residential drug free, and outpatient drug free, the methadone modality consistently demonstrates its ability to retain the greatest proportion of all patients admitted for the longest periods. This is especially true during the initial part of treatment, which is critical to the AIDS public health issue. The only available data from large, prospective studies reveal that within the first 3 months of treatment, 40% to 50% of new patients leave outpatient or residential drug-free treatment, compared with a 14% dropout rate from methadone maintenance.²⁸ These differential dropout rates early in treatment affect not only individual treatment outcomes but have broader possible ramifications for planning effective AIDS intervention strategies. Because methadone treatment is generally more successful than other approaches in retaining new patients, it is particularly attractive when considering public health methods for reducing intravenous opiate abuse.

In addition to tenure, evaluation studies have revealed several impor-

From the Office of Medical and International Affairs, National Institute on Drug Abuse, Rockville, Md.

Reprint requests to the Office of Medical and International Affairs, National Institute on Drug Abuse, Rockville, MD 20857 (Dr Cooper).

tant findings that impact on program retention and in-treatment performance. There is considerable evidence that higher methadone hydrochloride dose levels (50 to 100 mg) improve program retention and reduce illicit opiate use, particularly during the first 6 months of treatment.²⁹⁻³³ Program tenure and dose level may account for 15% to 25% of the outcome variance.³⁴ Attempts to determine the extent to which other rehabilitative psychosocial services are useful in effecting meaningful behavioral change have been less definitive. Practical research design and methodological limitations have made the task difficult.³⁵ More recent and better-designed evaluation studies^{36,37} suggest that selected patients who receive methadone and who have a psychiatric comorbidity, eg, an affective disorder, benefit from psychotherapy. No particular method of psychotherapy has proved to be superior. Equally important, these and other studies³⁸ suggest that for another population, often with less psychopathology, psychotherapy is neither attractive nor more effective than other ancillary services. However, these studies highlight the importance of a thorough diagnostic intake evaluation and the efficacy of matching services to the patient's needs. The amount of variance that other ancillary services contribute to in-treatment performance is not certain; however, there is general agreement among many clinicians and clinical researchers in drug abuse treatment that patient performance is positively affected, not only by methadone, but by the therapeutic milieu provided by various staff and program services and that a range of services are needed.³⁹ The advent of HIV infection has made the provision of educational and supportive counseling services all the more critical for patients, their sexual partners, and their families.⁴⁰

Research findings that show correlations between specific clinical staff credentials, skills, or qualities such as caring and resourcefulness and therapeutic efficacy are less robust and often confounded by methodological difficulties.⁴¹ Nonetheless, some of these findings are relevant to enhancing the AIDS prevention effort. During the last decade, a small but growing body of literature has emerged that suggests that certain staff characteristics are more important than others in affecting relevant patient-performance measures such as retention in treatment and intravenous drug use. Positive staff attitude and flexible treatment philosophy do affect these measures.⁴²⁻⁴⁴ Furthermore, regardless of educational level and addiction history,⁴⁵⁻⁴⁸ counselors with specific patient

management skills significantly enhance patient retention and reduce intravenous drug use in marked contrast to programs with staff who lack these skills.⁴⁹⁻⁵⁰

While the provision of adequate methadone doses and ancillary services by quality staff enhances in-treatment performance, posttreatment data reveal significant relapse rates for many patients, regardless of the treatment modality, and that there are no predictable preadmission patient characteristics or treatment variables.^{22,25,34,51-53} Multiple management interventions are to be expected for many; each intervention and subsequent abstinence period has a positive impact on the drug abuser's career.⁵⁴⁻⁵⁶ These findings illustrate the chronic, relapsing nature of this disorder and have practical implications when developing AIDS prevention strategies.

COMMENT

Thirty years ago, narcotic maintenance treatment was illegal. Today, considerable progress has been made toward enlightening the public about both narcotic addiction and narcotic maintenance treatment. Still, there remain among the public and the medical community those who dismiss the potential biological aspect of addiction and conceptualize this illness as a self-inflicted disease of the will.^{57,58} Many believe drug-free treatment is the only valid rehabilitative method. Some still discount the efficacy of narcotic maintenance, despite the significant changes in intravenous drug use during treatment, on grounds that treatment is mere narcotic substitution and that relapse is likely for many following treatment. Such bias and prejudice have led some to question the effectiveness of methadone maintenance,⁵⁹ despite the many studies that have consistently demonstrated in-treatment efficacy and the dramatic increase in HIV seroprevalence among intravenous drug users, their sexual partners, and their offspring.

The enormity of the public health problems that result from HIV transmission by intravenous drug users calls for a reassessment of current attitudes and philosophies concerning methadone maintenance. Those who still promote a drug-free life-style as paramount for all addicts or those who believe that the fear of AIDS will motivate addicts to give up drugs will find it difficult to accept any AIDS prevention policy that includes the use of methadone. Increasing public concerns regarding AIDS will probably override these arguments eventually, however (*New York Times*.

June 15, 1987;sect A:30).⁶⁰ In other countries and international organizations, eg, Australia, Switzerland, the United Kingdom, and the World Health Organization, where such debates have occurred, advocates of national and international strategies aimed foremost at risk-reduction efforts, including methadone maintenance, have prevailed.⁶¹⁻⁶³

During the next several years, it is likely that public resources will be made available for the expansion of drug treatment in an attempt to reduce intravenous drug use, as a presidential commission on AIDS has recommended.⁶⁴ Federal funding⁶⁵ for drug abuse treatment and AIDS prevention has recently been increased substantially, and it is likely that additional state revenues will be forthcoming. Public health demand reduction strategies and policies will be developed rapidly. The most important public health objectives will be to attract intravenous opiate users into treatment early in their addiction careers, stop their intravenous drug use and sharing of injection equipment, and retain them in treatment. Preliminary data^{66,67} support the abundant existing evidence that many intravenous opiate users stop injecting drugs when adequate doses of methadone are given and suggest that methadone treatment has a critical role to play in curtailing the spread of AIDS. These objectives are especially important in geographic areas where the HIV seroprevalence among intravenous drug users is low. Preliminary data both in the United States and Europe suggest that HIV seroprevalence is considerably lower among those patients who receive long-term methadone maintenance and who entered treatment before the onset of increasing HIV seroprevalence within the local addict population.^{68,71} In contrast to New York City, NY, where enormous personal tragedy and public health costs from AIDS are inevitable, cities where HIV infection is low or nonexistent still have a brief window of opportunity in which to implement prevention efforts. Attracting and retaining those who already test HIV seropositive will also be important, since it is presumed that many such patients in treatment will no longer be infecting others or exposing themselves to possible cofactors through the sharing of injection equipment. Moreover, educational efforts during treatment may positively affect the sexual practices and family planning of those already infected.

It is not enough for public health officials to expand methadone treatment. Treatment variables known to enhance

its efficacy need to be incorporated as well. The success of this aspect of the AIDS prevention effort will depend in large part on the effectiveness of treatment, measured by its ability to attract patients, stop their high-risk behaviors, and effect major changes in their lifestyles. Because opiate addiction is a chronic, relapsing disorder, relapse-prevention strategies⁷² will need to be incorporated; many will need to be in treatment indefinitely if these prevention efforts are to be sustained. Methadone doses must be raised to sufficient levels to have maximum effect on intravenous drug use. Many will need at least 50 to 100 mg of methadone hydrochloride daily during the initial phases of treatment, a range well above doses administered in some existing programs. Flexible staff philosophies regarding dose and treatment duration are needed. For many, sustained changes in lifestyle will require the availability of quality ancillary educational or vocational services. Counseling patients, their sexual partners, or their families about HIV risk reduction should be an integral part of every program. The existing prevalence of a psychiatric comorbidity, eg, an affective disorder or alcohol abuse, calls for diagnostic intake evaluations and the matching of services to the patient's needs, as well as the use of psychotherapy and adjunctive pharmacotherapies⁷³ when indicated. Compassionate counseling staff capable of formulating, monitoring, and modifying relevant treatment plans are required. They must possess good case-management skills and be capable of responding quickly and effectively to early signs or symptoms of relapse with the necessary behavioral or psychotherapeutic interventions. Program directors must be effective leaders who insist on these types of counseling skills and qualities and encourage coordination of ancillary services.

If programs are successful at retaining patients and if the current course of HIV infection is not altered, it is likely that many patients will eventually need additional medical services. Historically, drug treatment programs have often been the only link to existing health care networks for other needed medical services. Not infrequently, addicts have encountered difficulties receiving services at community health centers. While such medical services might be provided through referral to traditional health centers in some regions, the extent to which such an objective can be uniformly and effectively implemented remains to be determined. Moreover, additional outreach research may demonstrate that the provision of ancillary

or HIV-related medical services at the treatment program may be both efficient and cost-effective.

During the last 3 years, several research demonstration projects have been implemented to determine whether changes in the traditional services provided throughout the continuum of treatment could be modified to reduce waiting lists, attract additional patients to treatment, and use staff and program space more effectively, without adversely affecting existing patient performance or costs. In one attempt to reduce waiting lists in New York City, an interim clinic was established. This clinic is a low-threshold facility designed to provide no other services except the daily administration of methadone until space becomes available in a traditional treatment clinic that provides comprehensive services. Methadone is provided to opiate-dependent persons; there are no other demands of the patient except for daily attendance. Preliminary results suggest some real utility and potential impact on reducing the spread of HIV infection⁶⁷ by significantly reducing the frequency of needle use for injecting heroin alone or in combination with cocaine. Whether such low-threshold programs will also attract previously untreated patients awaits further study and replication.

Several clinical investigations are currently testing whether existing staff and space can be better used. The concept being examined in these investigations is similar in many respects. All are asking whether there is a subpopulation of patients in treatment for years whose behavior suggests they no longer need traditional services other than methadone administration, as well as whether programmatic savings achieved from providing only methadone twice monthly to such patients in an aftercare program can be reallocated to new admissions in need of more rehabilitative services. Six such investigational programs have been operating in New York City for the last 2 years. The extent to which these programs will turn out to be both clinically effective and cost-effective and not contribute to methadone diversion is currently being evaluated.

A recent preliminary report⁷⁴ suggests a logical extension of the aftercare concept from the clinic setting to a physician's private office. Some carefully screened patients can successfully receive care in a physician's office rather than in a formal clinic, a concept envisaged by the original architects of this treatment modality.⁷⁵ While historically some physicians have treated a few patients in their private offices, what is

now being clinically evaluated is the safety and efficacy of administering methadone in a larger selected population of highly responsible and rehabilitated patients. Patients received a 28-day supply of solid-dose medication with no other supportive services except those deemed necessary by the physician. While a similar clinical trial is under way in Baltimore, Md, and the initiation of additional studies has been endorsed,⁷⁶ the clinical and administrative safety and efficacy of these innovative methods await further evaluation.⁷⁷

To obtain maximum benefit from treatment efforts, certain obstacles and limitations need to be remedied. Some states or localities with relatively low HIV seroprevalence rates among current intravenous drug users prohibit either methadone maintenance or the expansion of existing program sites. Other states or local governments and programs limit treatment duration or maximum allowable doses below levels proved to be most efficacious for many in reducing their intravenous drug use. Some require several failures at detoxification before admission to maintenance treatment. These barriers to effective treatment may be overcome by making health professionals, the public, and policymakers aware of the real tragedy occurring in several cities already and the danger that similar harm is likely to occur elsewhere if we do not act soon.

There is little documented evidence⁸⁰ but considerable anecdotal evidence that suggests an erosion in the quality of clinical and administrative staff in some public programs and a gradual evolution to a two-tiered private and public treatment system. Problems in maintaining high levels of staff competence are not uncommon within institutions that experience fiscal constraints and forced-cutback management.^{78,79} Such concerns and experiences are increasingly common in the mental health field today.⁸⁰⁻⁸³ Current data suggest marked differences among methadone programs with regard to the types of medical staff, available physician coverage, and the provision of medical services, regardless of program size.⁸³ A recent study⁸⁰ highlights the significant differences in patient retention and needle-use rates between programs and suggests that poor staff leadership and patient management skills account for these differences. The extent to which these findings are replicated in other programs may justify additional expenditures to improve existing staff quality if this aspect of AIDS prevention is to achieve maximum efficacy.

Our present inability to attract a sub-

stantial number of intravenous drug users to any form of treatment limits the magnitude of the AIDS prevention effort. Some states are implementing various outreach strategies, such as improving accessibility to treatment with mobile methadone-dispensing units. The easy availability of cocaine in some areas, and the fact that some patients are injecting the drug during methadone treatment,^{84,85} has greatly complicated the management of HIV risk reduction. While concomitant pharmacological interventions such as desipramine hydrochloride are being investigated^{86,87} and appear promising, traditional behavioral interventions remain critical to treatment. Such limitations make no less valid the assertion that expanding methadone programs of quality will significantly improve the current public health AIDS effort; they do serve to keep our expectations realistic and highlight the need for additional outreach and treatment intervention research.

CONCLUSION

The growing prevalence of HIV infection among intravenous drug users and the likelihood of further spreading the infection by sharing injection equipment or engaging in sexual activity requires a reexamination of our attitudes about methadone treatment. The seriousness of the problem requires that priority be given to prevention of HIV infection throughout the uninfected intravenous drug-using population, their

sexual partners and children, and the heterosexual community. A successful effort will require improving existing treatment programs as well as expanding treatment.

Methadone treatment is clearly the most promising available treatment. It will make risk-reduction opportunities available to the largest proportion of intravenous narcotic users who want treatment. Maximum risk-reduction effectiveness requires maximum efficacy from methadone programs. Some of the recommended risk-reduction strategies, eg, counseling about HIV infection, safer sex education, and family planning, need to be integral services in methadone programs. If the knowledge already gained from clinical research were implemented now in all programs, AIDS prevention efforts would be significantly enhanced.

Policies predicated on eventual drug-free outcome for all patients limit the potential effectiveness of methadone maintenance as an AIDS prevention effort. State or local laws that prohibit methadone treatment or place arbitrary limits on the duration of treatment can work against the AIDS risk-reduction efforts. These policies need to be reevaluated in light of the AIDS epidemic.

The AIDS prevention efforts among intravenous drug users will benefit significantly from the support and involvement of the medical community. Leadership by state and local medical societies could provide assistance by educating patients as well as the public

and policymakers about the special risk to the public health created by untreated intravenous drug users. Developing quality methadone programs would be an important step to reducing risk. The Florida Medical Association has recently endorsed methadone treatment in the fight against AIDS,⁸⁸ a bold initiative that will undoubtedly influence public policy. Where existing policies limit such efforts, support for policy changes to allow for more effective treatment is needed. As members of program advisory boards, physicians can insist that drug abuse treatment programs be of high quality. They can also encourage respected local physicians with knowledge and skills in narcotic-addiction treatment to become actively involved in the direct provision of methadone treatment. Such changes would help to improve the current perception of methadone treatment among the public and medical community. The deans of medical universities could assist by supporting the formation of closer alliances with free standing methadone treatment programs, encouraging medical and psychiatric residency rotations through such programs, and providing training opportunities for existing staff to improve their diagnostic and managerial skills.

I acknowledge the technical comments and support of Dorynne Czechowicz, MD, Harry Haverkos, MD, and Benny Primm, MD, during preparation of the manuscript. I further acknowledge the editorial assistance of Christopher Ma and Eleanor Waldrop.

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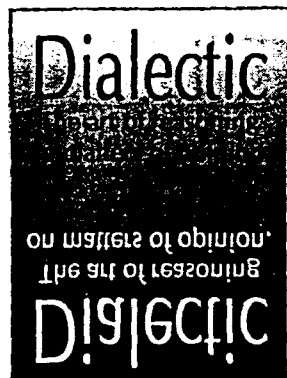
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Can Methadone Maintenance Treatment Be Effective?

Suzan Swanton, L.C.S.W.

Over the past thirty years, research has concluded that methadone maintenance is one of the most effective forms of treatment for opiate addiction. Research findings have demonstrated that it improves the health status of patients, reduces criminal activity, improves employment status, retains patients in treatment longer than other modalities, and has had a positive impact on the war against the spread of HIV. Despite all this, it continues to be controversial.

HISTORY

Dole and Nyswander

As a result of the combined efforts of Vincent P. Dole, M.D., and Marie Nyswander, M.D., methadone maintenance has been available as a treatment intervention for opiate addiction since 1964. Until their research, the treatment of choice had been methadone detoxification protocols established at the Public Health Service Hospital in Lexington, Kentucky, during the 1950s. The obvious failure of this approach for many addicts, as measured by their eventual relapse, led Dole and Nyswander to experiment with a different protocol. In 1964, Dole, a specialist in metabolic diseases, and Nyswander, an experienced clinician and researcher in the field of addiction, began placing addicts on higher doses of methadone for longer periods of time. The results of their research were striking. Addicts with long histories of narcotic abuse, became functioning adults, ceasing their criminal activity and leading productive and well-adjusted lives. In his address to Congress in 1970, Dr. Dole stated that being maintained on methadone "allows people to become whatever they potentially are."¹

Federal Regulations

During the late 1960s and early 1970s, methadone maintenance treatment (MMT) began to gain acceptance as an effective treatment modality. In 1972, the Food and Drug Administration (FDA) issued regulations for the use of methadone maintenance as a treatment for opiate addiction. These regulations required the establishment of a state authority, dictated minimum admission criteria and treatment guidelines, and restricted the use of methadone to only those programs and program physicians approved by the FDA and state authority.

Revised in 1987, the regulations allow for the admission of a patient to methadone maintenance if he/she is 18 years or older, is currently addicted to a narcotic, has an addiction history that began at least one year prior to admission, and has been addicted for the better part of the year prior to admission. Addicts younger than 18 years of age have the additional requirement of having attempted at least two prior forms of drug treatment before being eligible to be admitted to MMT. Exceptions to these admission criteria are pregnant addicts, addicts institutionalized in penal and chronic care facilities, and previously treated patients who voluntarily detoxified from methadone. Under certain conditions, these three categories of applicants do not have to demonstrate current physiological dependence to be eligible for admission (21 Code of Federal Regulations Part 291).

MEDICAL MANAGEMENT OF METHADONE PATIENTS

Advantages of Methadone

As a therapeutic agent, methadone has several advantages over the use of other opiates in the maintenance of addicts. First, it has a long-acting effect, lasting from twenty-four to thirty-six hours after a single dose. This eliminates the need for multiple daily doses and the more frequent withdrawal-euphoria cycle experienced in heroin use. Initially, a patient may experience a brief period of drowsiness before achieving tolerance; otherwise, when maintained on a proper dose of methadone, a patient should not experience either withdrawal or euphoria. This allows the patient to begin to normalize his/her life, establishing regular sleep patterns, securing and maintaining employment, safely operating motor vehicles and other machinery, and participating in social activities with family and peers. Second, methadone is effective when taken orally, thus eliminating all the attendant problems and concerns with the use of hypodermics. Finally, its cross-tolerance with other narcotic drugs is effective in reducing the craving for the illicit drug and thus eliminates the need for criminal activity in MMT patients and their continued exposure to HIV through the use of contaminated needles.

Although methadone maintenance has existed for several decades as a treatment for heroin addiction, controversy continues over its effectiveness and ethics. Suzan Swanton, L.C.S.W., presents a brief history of methadone maintenance treatment and discusses the clinical aspects, counseling, recent trends, and the efficacy of this modality. Ms. Swanton serves as clinical director of the Glenwood Life Counseling Center in Baltimore.

Two physicians assess the current health of methadone maintenance treatment programs. Howard H. Frankel, M.D., Ph.D., argues that methadone maintenance can be effective only if the entire system undergoes restructuring, and physicians take charge of programs, strictly administering them under the rules of medical practice. Dr. Frankel has worked in the public health field as a clinical director of drug and alcohol abuse programs and has written numerous articles. He currently resides in Huntington Beach, California, where he has a private family medicine and consulting practice.

William E. Abramson, M.D., F.A.P.A., looks at the methadone treatment system in Maryland and discusses changes that would enable the state to more effectively reach a greater portion of the state's heroin addicts. Dr. Abramson, the director of the Comprehensive Drug Abuse Program (COMDAP) of the Sheppard and Enoch Pratt Hospital in Towson, Maryland, from 1972 to 1987, is now in the private practice of psychiatry and addiction medicine at Sheppard Pratt. He also has served on the Physician Rehabilitation Committee of Med Chi since 1986 and is a member of the American Society of Addiction Medicine.

Howard H. Frankel, M.D., Ph.D.

Of an estimated 1.84 million people in the United States who have used heroin, about 500,000 are considered heroin addicts.^{1,2}

Many of these addicts, as a direct consequence of their heroin use, commit burglaries, robberies, drive-by shootings, fraud, and murder. So it is no revelation that the public, industry, the criminal justice system and politicians clamor for action, either incarceration or treatment.

Currently, long-term methadone maintenance is one of four major heroin treatment programs available in the United States: the others are therapeutic live-in communities, outpatient drug-free programs, and short-term detoxification. About 750 outpatient programs in 40 states and territories treat approximately 115,000 patients with methadone maintenance.²

Justifiably, methadone maintenance programs have come under investigation and criticism over the past several years.

The distribution of types of treatment slots to meet actual need poses one problem. Inefficient administration of programs, high costs, and ethical issues also raise questions about the effectiveness and wisdom of methadone maintenance.

While a superficial glance at figures may give the appearance of readily available treatment for heroin addicts, a closer look belies this impression. In California, the nation's most populous state (31.5 million), 115 methadone treatment sites offer 5,336 detoxification and 17,938 maintenance slots.³ In 1990, 5800 methadone slots were available in Los Angeles County (population 3.6 million); however, sixty percent of those slots were privately funded. Addicts could not afford to pay the annual cost of \$2800 for methadone maintenance in a private program, so many slots remained vacant.

An even clearer illustration of the lack of care available for heroin addicts is seen in Orange County, California, with a population of 2.5 million. For the entire county,

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only one free methadone maintenance center operates at full capacity of 175 maintenance slots. That same Orange County center also has 150 detoxification slots, but only one third to one half are filled. The maximum twenty-one day treatment is not popular with chronic substance abusers because it neither completely blocks withdrawal symptoms nor prevents them from resuming illegal drug use.

The lack of publicly funded treatment slots for methadone maintenance is not the only problem. Poor administration and uncontrolled costs mar the reputations and effectiveness of some treatment programs. For example, despite monitoring by regulatory agencies, since its inception the Los Angeles program has chronically suffered from bureaucratic bungling, political interference, less than competent medical and clinic staffs, product diversion, and funding misuse.

Finally, is it effective or even ethical to prescribe methadone and other drugs to maintain the hard-smoking, hard-drinking, disease-ridden, psychiatrically disturbed, polydrug users who do not voluntarily desire to alter their life style? Nationwide, a 1990 Government Accounting Office study of 24 methadone centers found that the continued use of heroin by patients in methadone treatment for more than six months ranged from one percent at one program to 47 percent at two others.² While reports have shown that more than fifty percent of patients nationwide receive suboptimum methadone doses to prevent further illegal drug use,⁴ inadequate dosage alone cannot explain flagrant, continual abuse of illicit substances.

With drug addiction increasing at an overwhelming rate and treatment regulation falling to a corps of non-medical bureaucrats, should the medical community even get involved in such a scandalous dilemma? Knowing that drug addiction is not an unsolvable condition, that it has a medical solution, the answer must be yes. But the solution demands a pragmatic approach, and hard questions must be addressed.

First, with more than 25 years of experience in dispensing methadone, why has no one developed a simplified uniform economical delivery and accounting system? Methadone maintenance should be a low cost, effective treatment for heroin addiction. The wholesale cost for 80 mg. of generic brand methadone (a commonly dispensed effective maintenance dose) is \$.73 per day or \$267 annually. Weekly urine drug screens cost about \$300 annually, making a total of under \$600 a year. Yet funding of a methadone maintenance treatment slot averages around \$2800. Should shuffling paper and administering questionable counselling cost over \$2000 a year?

Second, the addict should bear the cost of medication and urine testing. If the patient cannot afford \$600 a year to defray the cost of methadone maintenance, he/she should volunteer to work on meaningful community projects. An idle drug abuser has too much time to look for illicit drugs.

Third, the court sends a powerful message, cooperate with rehabilitation or go to jail. With the judicial system sentencing drug abusers into treatment, why should it not assume a more active role in the treatment, even to the point of establishing clinics within the confines of the courthouse and jail?

Finally, because short-term methadone detoxification treatment does not prevent the heroin addict from resuming the use of illegal drugs, an extensive re-evaluation and justification for the short-term use of this drug is needed. The savings from eliminating high cost, ineffective short-term treatment could fund additional long-term methadone maintenance slots.

The key to a successful methadone treatment program is well-trained medical staff. Physicians must assume full legal and medical responsibility for the program. They must be tough disciplinarians. As a former hands-on clinician and medical director of a strictly disciplined and regulated methadone clinic, I was constantly challenged by patients

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William E. Abramson, M.D., EA,PA.

Maryland, like many other states, has problems with the number and distribution of available treatment slots for methadone treatment. According to data from the Maryland Alcohol and Drug Abuse Administration for the fiscal year ended June 30, a total of 26 certified methadone treatment programs operated in the state. Nineteen of the programs were publicly funded and seven were privately funded.

The programs operate in ten Maryland subdivisions including fifteen programs in Baltimore City. Fourteen Maryland counties have no methadone treatment program or capability. In fiscal year 1993, the programs admitted 3,055 patients to methadone maintenance treatment and 945 patients to methadone detoxification for a total of 4,000 patients admitted to methadone treatment.¹ Unfortunately, with an estimated 12,000 people in our state abusing and dependent on heroin, the inevitable conclusion is that we are currently providing sufficient treatment slots for less than 10% of heroin-using citizens in the state. Only through financial commitment from public and private sources and the involvement of the medical community and the criminal justice system, can we provide adequate effective methadone treatment.

An effective methadone treatment program must have adequate funds to address the multiple health problems experienced by many opioid dependent people: alcohol abuse and dependence; nicotine dependence; multiple organ system physical diseases; psychiatric disorders; poly drug abuse and dependence; risks for HIV transmission and AIDS. In a low budget program, commonly referred to in the treatment field as a "juice program," one gets what one pays for. In a juice program, patients drink methadone dissolved in a juice vehicle, leave a urine specimen if required, and that is all. Undoubtedly, among the 750 outpatient methadone treatment programs in the United States, some are juice programs.² Although theoretically much less expensive, they fail to adequately treat sick people who also happen to be opioid dependent. They reduce the risk of patients dying of opioid dependence, while doing nothing about all the other impairing and life-threatening conditions; they save money but not lives.

While in theory, the medical community should become actively involved in methadone treatment, this is far from the reality of the present situation. Several factors prevent full involvement by physicians in methadone programs.

First, the frustrations and difficulties inherent in treating chronic addictive disorders may impede physician interest in practicing medicine in methadone treatment programs. Physicians involved in methadone treatment must remain aware of the chronic and relapsing nature of addictive disorders when considering discharging patients from treatment for unauthorized drug use. As a former methadone treatment program medical director, I know that at times this is a necessary action. However, it is more realistic to first warn patients that they can be discharged from treatment for unauthorized drug use. If discharged, after a stated waiting period patients should have the opportunity to reapply for treatment and to be readmitted. This approach seems less punitive, more realistic, and more responsive to the nature of addictive disorders, which are chronic diseases, characterized by relapses and remissions, and without cure.

Another factor which may prevent full physician involvement in methadone treatment programs is the high cost of physicians' time. The Drug Enforcement Administration, Food and Drug Administration, and state drug abuse administration require all programs to list a physician as medical director. Program budgets vary, from providing for a physician to act as medical director full time to as little as 20% time. In too many programs, the medical services are provided by a "plug-in-physician" who spends very little time on the program premises or in contact with patients and has little or no involvement in the treatment planning and program decisions. Basically, the plug-in physician signs methadone and other medical orders and satisfies the certification requirements.

Not only physicians, but also our courts and the criminal justice system should become involved in methadone treatment. Locally, both the Baltimore City Jail and the Baltimore County Detention Center have had methadone detoxification programs for narcotic addicted inmates. These programs have been the exception rather than the rule for jails and penal facilities in our state. However, if discharged inmates have no follow-up and direct referral for methadone maintenance treatment, the relapse rate into opioid dependence is quite high. Little if anything will have been accomplished by their detoxification treatment while incarcerated.

Recently, the spread of HIV and AIDS has made methadone treatment a matter of interest for organized medicine at the national level. At the meeting of the House of Delegates of the American Medical Association (AMA) in Chicago in June 1994, the House referred to the Board of Trustees of the AMA a resolution asking the AMA to support the concept of medical methadone maintenance by qualified private practicing physicians as an AIDS prevention measure.³ The concept of qualified physicians prescribing methadone maintenance treatment in private practice, an idea which has been around for many years, may now receive some careful public attention from the AMA. How sad that it took the AIDS epidemic in the United States to prompt this renewed interest in expanding the methadone maintenance treatment of narcotic addicts who have been dying of their disease for many decades before AIDS started killing people.

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Side Effects of Methadone

Isolating the side effects of methadone is difficult. Many of the physical complaints voiced by MMT patients existed prior to treatment and may be attributed to the years of poor health and dental hygiene and poor nutrition associated with the addicted life-style.² Most common are the complaints associated with any narcotic use: constipation and sexual dysfunction including reduced libido and difficulty in achieving orgasm. Constipation can often be controlled by stool softeners and fiber supplements to the diets. Issues in sexual desire and performance (if not caused by physiological reasons other than opiate use), gradually improve as nutrition and health care improve, and psychosocial issues are addressed in counseling.

Dose Levels

The therapeutic window for most MMT patients is a dose between 50-100 mgs. Unfortunately, these doses are not routinely administered to MMT patients at programs.^{3,4} Despite research evidence, program physicians continue to dose patients at sub-therapeutic levels established by administrative policies rooted more in political and cultural concerns than in appropriate medical treatment of a disease.^{5,6}

Medical Complications

The MMT patient presents with many health care issues specific to the addicted population as well as problems found in the population at large. Due to his/her addiction, the addict is subject to a variety of infectious diseases such as HIV, TB, sexually transmitted diseases, skin and subcutaneous infections, viral hepatitis type B, non-A, non-B, and bacterial endocarditis to name a few. Additionally, they may present with renal failure, vascular damage, heart failure, chronic liver disease, and other organ damage that results from the injection of the impurities found in street heroin.⁷ Due to the effectiveness of MMT in retaining patients in treatment, the number of patients over the age of forty in MMT has increased over the years. This adds the additional medical complications found in the same age groups in the non-addicted population.

Despite the fact that methadone is an immunosuppressant and a respiratory depressant, MMT is still the treatment of choice for HIV and AIDS patients when return to street heroin and repeated exposure to opportunistic infections is the alternative. The treatment regime of MMT allows for daily access to medical and psychological care as well as referral to social services. It is generally felt that this benefit far outweighs the risks associated with methadone's effect on the immune and respiratory systems.⁸

The Pregnant Patient

While it is true that babies born to methadone-maintained mothers are addicted, the alternative to MMT for the mother often is not abstinence, but the use of street heroin. The use of street heroin creates great problems for the fetus due to inconsistent daily doses of an addicting drug and the physical anomalies potentially caused by the impurities found in street drugs. Added to this is the mother's reluctance to seek prenatal care or tell her obstetrician about her addiction for fear of facing legal charges. This secrecy, as well as the health care providers' ignorance of the mother's addiction, causes unnecessary problems in the delivery room and the newborn nursery. Methadone maintenance treatment provides the mother with referral for prenatal care, consistent doses of a prescribed drug, coordination of medical services with the obstetrician, and parenting skills education.

Length of Time In Treatment

The length of time an addict needs to remain in MMT varies according to the individual. While some may require a shorter period of time, one year in treatment for every year of active addiction may be the minimal amount of time needed by the addict to repair the physical, psychosocial and spiritual devastation caused by his/her disease. On the other hand, the mounting research on the metabolic and neurochemical nature of addiction suggests some patients may require life-time maintenance to manage their disease medically.

COUNSELING ISSUES IN METHADONE MAINTENANCE TREATMENT

External Resources and Internal Resources

The opiate addicted individual often presents with a paucity of internal and external resources with which to begin the long, arduous task of achieving sobriety. One can never underestimate the impact an addiction to an illegal drug has on the patient's well-being. Because of their disease and the high cost of illegal drugs, addicts are catapulted into a life-style that results in tremendous loss: loss of self-esteem, loss of self-identity as a member of the dominant culture, loss of health, loss of families and friends, loss of years and opportunities, and the financial losses of savings, houses, cars, possessions and jobs.

When they are admitted to treatment, they are often unemployed and lack the necessary skills or employment history to secure a job. If they are employed, they often have jobs that do not offer benefits such as health insurance or paid leave to allow them to seek and attend health care appointments. The lack of child care likewise increases the difficulty of making health care and program appointments and seeking employment opportunities. Patients commonly lack transportation and, in some cases, they are homeless and have no money for food. Family support is often non-existent either because the patients have become disengaged from their families due to their addiction or because their families are as dysfunctional or more dysfunctional than they are. Rarely do they have a drug-free peer network that can provide support. The result is a lack of the emotional support and encouragement from meaningful people in the patients' lives so helpful in recovery from chemical dependency.

Most addicts entering MMT come with great psychological and spiritual pain. Notably, their ego-functioning is impaired particularly in the domains of affect regulation and tolerance, self-esteem, interpersonal relations, and self-care functions.⁹ Because drug affected behavior exhibited by addicts often mimics behaviors found in people diagnosed with personality disorders, MMT patients typically display varying degrees of borderline, narcissistic, antisocial and depressive features. In some cases, the impaired ego functioning and the behavioral features associated with a personality disorder pre-date the addiction while in others they are a by-product of the addiction and its deleterious effect on the human psyche.

The Process and Content of Counseling Sessions

Counseling must address many issues. Initially, counseling interventions focus on stabilizing the patient's medical health, methadone dose, living situation, and employment or other forms of financial support. Given their low self-esteem and lack of self-care functioning, a simple referral for medical care can be a major therapeutic task requiring many hours of patient encouragement and support. Referrals for social services including vocational rehabilitation, housing assistance, health and dental care, and legal assistance are common.

Treatment itself takes on different faces depending on the theoretical orientation of the counselor. Most often it consists of a psychoeducational model with attention given to both interpersonal and educational issues. Topics addressed include information on nutrition, job interviewing, health care, relapse prevention, drug free recreational activities, daily living skills such as budgeting and cooking, relationship skills, family and co-dependency issues, fellowship meetings, stress reduction, and effectively dealing with negative emotional states.¹⁰

The quality of the therapeutic relationship greatly impacts treatment outcome.¹¹ Establishing a therapeutic alliance with patients who have poor relationship skills and who have for years used a mind altering substance as their intermediary in their relationship to the world requires great skill. The continual processing, exploring and negotiating of the therapeutic relationship achieve the greatest therapeutic gain.

In many respects, the drug served as a synthetic ego function for the patient, assisting him/her in coping with feelings such as pain, anxiety, frustration, anger, emptiness and relationship issues. Now, without the drug, the patient needs the counselor to perform certain auxiliary ego functions until he/she can develop them for him/herself. For instance, the counselor may initially serve as a container for potentially overwhelming feelings emerging after years of narcotic sleep. The identification, exploration, toleration and appropriate expression of these feelings become a primary therapeutic task. The counselor may also need to perform protective functions such as helping a patient anticipate the consequences of his/her behavior, and soothing functions such as calming and reassuring a distressed patient. All of these functions were once performed by the drug. Eventually, within the context of a consistent and healing relationship and with carefully timed nurturing and limit-setting interventions, the patient will internalize these functions and begin performing them for him/herself.

Methadone maintenance treatment must seek to provide the patient with a corrective emotional experience. This can only occur in an environment staffed by counselors who take a proactive stance with the patients, challenging them to honor themselves and frustrating destructive, drug-affected behavior. Structure and support are the arena where new behavior can safely be explored and applauded. In such an environment, an MMT patient can unravel the many defenses and self-destructive behaviors that have sustained him/her for many years and enabled him/her to survive in a world experienced as hostile and painful.

All of these issues can be addressed in counseling because MMT retains patients in treatment and staves off the physical discomfort and cravings of withdrawal. Methadone maintenance treatment buys the patient time to heal physically, emotionally, and spiritually. Herein lies one of MMT's greatest values as a therapeutic agent. Dr. Dole's words are no less true today than they were twenty-four years ago. Methadone maintenance treatment "allows people to become whatever they potentially are."¹²

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who thought they could beat the system. After several discharges from the clinic for unauthorized drug use, abstinence was achieved in approximately 90 to 95 percent of the caseload.

For methadone maintenance to survive as a viable pharmacologic treatment for heroin addiction, the entire present program must be restructured. Sensible rules and well-trained personnel who fully understand how to cost-effectively treat the problem must replace petty states' rights, unrealistic regulations, and top-heavy hierarchies of bureaucrats. A unified command of medical professionals must fight this "war on drugs" with an austere battle plan, using sound, disciplined, medical treatment practices. It can be done.

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Ms. Swanton serves as clinical director of the Glenwood Life Counseling Center in Baltimore, Maryland

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SECTION 4

COMMENTARIES AND CAMERA-READY VISUALS

Commentaries and Camera-Ready Visuals

This section contains commentaries to accompany each of the figures from **Section 1** of this manual. Also in this section are camera-ready copies of all of the figures from that section. These commentaries and visuals are designed to be used to support an overhead transparency presentation on methadone maintenance treatment research in the United States. Visuals A through D are not found in the **Section 1** text; they are designed to provide background information for the stand-alone presentation.

The Visual Commentaries

The commentaries and visuals can be matched by their letters, that is, “Visual A” commentary corresponds with the visual labeled “A.” The commentaries can be used verbatim or edited. They are produced here in large typeface to make them easier to read while making a presentation.

Each commentary begins on a separate page and describes 1 visual. The visuals (except A through D) include the figures that are described in **Section 1**. The question with which each figure corresponds is repeated at the top of each commentary page.

The Presentation

The commentaries that accompany these visuals are designed to be read verbatim while showing the visuals. However, the presenter may review the material and modify the commentary.

We suggest that when preparing this presentation, the presenter obtain statistics specific to the region in which the presentation is shown. For example, when describing Visual DD, “Average Costs Per Year for 1 Heroin Addict,” it would be helpful to determine the current local applicable annual costs for 1 addict for active heroin use, incarceration, and residential drug-free treatment.

The Visuals

The visuals can be used to make overhead transparencies and 35-mm slides, or they can be photocopied and given as handouts.

**VISUAL A: METHADONE MAINTENANCE TREATMENT:
TRANSLATING RESEARCH INTO POLICY**

Suggested Commentary:

The following presentation provides an overview of the graphics that support information contained in the manual developed by the National Institute on Drug Abuse (NIDA), *Methadone Maintenance Treatment: Translating Research into Policy*.

VISUAL B: METHADONE AS TREATMENT FOR OPIOID ADDICTION

Question: Why is methadone useful for the treatment of addiction to opioids such as heroin and morphine?

Suggested Commentary:

In contrast to heroin:

1. Methadone is orally effective.
2. It does not cause euphoric intoxication or lethargy.
3. It does not cause impairment in thinking, behavior, or functioning.
4. It does not dull normal emotions and physical sensations.
5. It diminishes opioid drug hunger.
6. It reduces the likelihood of heroin-induced euphoria.
7. Long-term use will continue to be effective without dosage increases.
8. It is medically safe.
9. It is long-lasting.
10. It decreases drug-seeking behavior.

[Note to the presenter: Below are explanations for each of the above ways in which methadone is useful for opioid addiction treatment and differs from heroin. The statements may be used as background information to help with answering questions from the audience.]

1. **Orally effective**—Unlike heroin and morphine, the full effects of methadone can occur when it is taken orally. Since it is given in pill or liquid form, methadone can be dispensed to patients easily, and it can be easily consumed. Also, since methadone must pass through the stomach, the methadone blood level will rise slowly. There is therefore no euphoria or intoxicating “high,” as occurs with injected heroin.
2. **No intoxication or lethargy**—Heroin and other opiates cause an intoxication that has 2 phases: a brief euphoric episode with an exaggerated sense of well-being, followed by a longer period of apathy, lethargy, and laziness. In contrast, when methadone is given to a patient who has adjusted to methadone maintenance, a single dose lasts from 24 to 36 hours, without creating intoxication.
3. **No impairment**—Illegal use of heroin and other opiates can cause problems in people's thinking, behavior, and functioning. In contrast, people who have developed tolerance to methadone can function normally—that is, they have been in methadone maintenance treatment for a while and their bodies have adjusted to it. Patients who have developed tolerance can perform mental and physical tasks without problems while in methadone maintenance treatment.

4. **Normal emotional and physical sensations**—Heroin and other opiates cause a dulling of emotional and physical sensations. In contrast, once patients have adjusted to methadone maintenance, they experience emotional and physical sensations like anyone else. They do not feel “drugged.”
5. **Diminishes opioid drug hunger**—People who use short-acting opioids such as heroin frequently experience a powerful urge or hunger for opioids. This drug hunger is a major reason why opioid addicts relapse—return to drug use—after receiving treatment. In contrast to heroin, methadone maintenance relieves the frequent urge for opioids.
6. **Minimizes euphoria**—When people use heroin, they usually experience an intoxicating, euphoric “high.” When people who are already using heroin use even more heroin, they experience a more intense euphoria—a “higher high.” In contrast, when people use methadone, they do not experience euphoria. Further, when people using methadone also use heroin, they generally do not experience euphoria from the heroin.
7. **Dosage stability**—Tolerance to heroin develops rapidly. That is, the user must increase the dosage in order to experience the same euphoria as before and in order to avoid withdrawal. In contrast, when patients receive adequate levels of methadone at about the same dosages each day, the methadone will suppress or lessen the opioid drug hunger and withdrawal effects. Also, methadone will suppress drug hunger and withdrawal effects for long periods of time without the need for increasing dosages.
8. **Medically safe**—There are many dangers associated with using heroin. Heroin as purchased on the street generally contains a small amount of pure heroin and a large amount of adulterants, fillers such as milk sugar and corn starch, which often contain harmful bacteria and contaminants. These impurities enter the bloodstream along with the heroin. Since the actual amount of opioid in street heroin varies greatly, an overdose can result when a batch of heroin is stronger than normal.

Heroin users usually use needles to inject the heroin, increasing the risk of infection from impurities in the heroin and contaminants on the needle itself, such as HIV-infected blood. Heroin users often share needles, increasing the risk of transmitting diseases from 1 user to another. In contrast, methadone is medically safe. It contains no impurities, is made in a specific potency or strength, is consumed orally, and does not require needles for administration.

9. **Long-lasting**—Heroin is usually injected several times a day. This means that the heroin user's blood level of heroin rises and falls rapidly. As a result, the heroin user experiences many rapid “up-and-down” cycles—a brief period of euphoria, a brief period of sedation, followed by a period of withdrawal and anxiety. In contrast, since methadone is swallowed and must travel through the stomach and intestines, there is no rapid up-and-down cycle. As a result, the effects of methadone are gradual and much longer lasting than the effects of injected heroin or morphine. In fact, the methadone blood level remains steady and impedes withdrawal for 24 to as long as 36 hours.
10. **Decreases drug-seeking behavior**—A relatively large dose of methadone is cross-tolerant with all other opioids; it will inhibit the withdrawal effects from other opioids. When patients who are receiving methadone maintenance treatment use heroin, they do not experience an intoxicating euphoria. Since methadone-maintained patients realize that they will not get “high” from using heroin and other illicit opioids, they are less likely to use them.

VISUAL C: COMPARATIVE PROFILES OF HEROIN AND METHADONE

Question: How does methadone differ from heroin?

Suggested Commentary:

- **Route of administration**—Heroin is injected; methadone is consumed orally.
- **Onset of action**—The effects of injected heroin are immediate; the effects of orally ingested methadone take about 30 minutes.
- **Duration of action**—The effects of heroin are short-acting, about 3 to 6 hours. The effects of methadone are long-lasting, from about 24 to 36 hours.
- **Euphoria**—Injected heroin commonly causes euphoria within the first few minutes after injection. Orally administered methadone rarely causes euphoria, and is less likely to do so in patients who have developed tolerance.*
- **Withdrawal symptoms**—The withdrawal symptoms associated with chronic heroin use occur within 3 or 4 hours after cessation of the drug. Withdrawal symptoms associated with long-term use of methadone usually occur 24 hours after the last use.

[*Note to the presenter: People who are not tolerant to opioids can experience mild euphoria after ingesting methadone. However, this drug is legally administered to long-time opioid addicts only.]

VISUAL D: MAJOR RESEARCH STUDIES

Question: What were the major research studies of the effectiveness of methadone maintenance treatment?

Suggested Commentary:

NIDA has funded numerous studies of several aspects of methadone maintenance treatment. The results of many of these studies will be described in this presentation, especially the following:

- **The Drug Abuse Reporting Program (DARP) Studies**—The DARP was a series of studies exploring the functioning of 44,000 patients admitted to 52 drug abuse treatment programs for 12 years between 1969 and 1973.

Information about participants was collected at intake, bi-monthly during treatment, and 6 and 12 years after first admission (Simpson and Sells, 1982 and 1990).

- **The Treatment Outcome Prospective Study (TOPS)**—The TOPS study was a large-scale exploration of the functioning of more than 11,000 patients admitted to 41 drug abuse treatment programs between 1979 and 1981.

Information about participation was collected at intake, 1 month after entry, and at 3-month intervals during treatment. Posttreatment interviews were conducted at 3 months, 1 year, 2 years, and 3 to 5 years after discharge (Hubbard et al., 1989).

- **The Ball and Ross Study**—In this study, investigators examined the functioning and effectiveness of 6 methadone maintenance treatment programs in 3 cities—New York, New York; Philadelphia, Pennsylvania; and Baltimore, Maryland—between 1985 and 1986. Interviews were conducted with all program staff and a sample of current and former male patients. In addition, inspection was made of more than 2,000 active patient records, and observation of clinic operations was conducted (Ball and Ross, 1991).

- **The UCLA Methadone Study**—At the University of California, Los Angeles, interviews were conducted with 933 heroin addicts in methadone maintenance treatment programs from 1978 to 1981. Patients were studied in 4 groups: those who had experienced 1, 2, 3, or 4 or more cycles of methadone maintenance treatment. They were evaluated regarding daily narcotics use, arrests, marijuana use, alcohol use, marital status, and participation in methadone maintenance treatment (Powers and Anglin, 1993).

VISUAL E: PATIENT STATUS BEFORE AND AFTER METHADONE MAINTENANCE TREATMENT

Question 1: Is methadone maintenance treatment effective for opioid addiction?

Suggested Commentary:

Methadone maintenance treatment is effective in improving patients' lives with regard to (1) time using narcotics daily, (2) time unemployed, (3) days involved in crime, (4) time dealing drugs, and (5) time incarcerated.

McGlothlin and Anglin (1981a) examined patients from 3 methadone maintenance treatment programs for 2 years. Following methadone maintenance treatment, patients decreased the percentage of time they spent incarcerated, using and dealing drugs, unemployed, and involved in crime. This study demonstrates that methadone maintenance treatment can contribute to a significant reduction in undesirable behaviors.

The left side of each graph describes behavior before methadone maintenance treatment, and the right side of each graph depicts behavior following methadone maintenance treatment, including those who left treatment before the year ended.

- Figure 1 shows that the percentage of **time using narcotics** was much greater before methadone maintenance treatment than after.
- Figure 2 illustrates that the percentage of **time unemployed** decreased after treatment.
- Figure 3 demonstrates that the percentage of **days the patient was involved in crime** decreased after methadone maintenance treatment.
- Figure 4 depicts that the percentage of **time dealing drugs** decreased after methadone maintenance treatment.
- Figure 5 illustrates that the percentage of **time incarcerated** decreased after methadone maintenance treatment.

VISUAL F: THE EFFECTS OF HEROIN AND METHADONE ON FUNCTIONAL STATE

Question 1: Is methadone maintenance treatment effective for opioid addiction?

Suggested Commentary:

Heroin and methadone have different effects on an individual's functional state and mood: repeated injections of heroin cause multiple cycles of elevation and depression, but methadone promotes a relatively steady state.

This study shows that an opioid addict's mood and functional state can be stabilized with methadone maintenance treatment.

- The top graph, Figure 6, depicts a typical day for a heroin addict. Note that the addict generally injects heroin several times each day. Each injection causes an elevation in mood: the user feels "high." This is followed by a rapid decline in mood and functional state: the user no longer feels "high" and may begin to feel sick. At the end of the day, or in the early morning, the user feels quite sick. Overall, a typical day includes several cycles of elevated and depressed mood and functional state.
- The bottom graph, Figure 7, illustrates that a single oral dose of methadone in the morning promotes a relatively steady state of mood and function. The figure also demonstrates that an injection of heroin during methadone maintenance treatment has a less intense effect on mood and function than does an injection of heroin in active users who are not in methadone treatment. The dotted line in Figure 7 depicts the course of a patient's mood and function when a dose of methadone is omitted. Dole, Nyswander, and Kreek found that the decline in mood and function is gradual, not steep.

VISUAL G: IMPROVEMENTS: DRUGS AND CRIME 1 YEAR AFTER DARP

Question 1: Is methadone maintenance treatment effective for opioid addiction?

Suggested Commentary:

Methadone maintenance treatment can effectively help reduce illicit drug use and crime. This is demonstrated by the 1982 DARP study conducted by Simpson and Sells.

The graph compares reductions in illicit drug use and crime by patients who received methadone maintenance treatment and by patients who received no treatment.

- The shaded columns illustrate that during the first year after treatment, 41 percent of methadone maintenance treatment patients were no longer addicted to illicit opioids and were not involved in major crime. Only 27 percent of individuals who received no treatment were no longer addicted to illicit opioids and were not involved in major crime.
- The white columns show that 27 percent of methadone maintenance treatment patients had not used any illicit drugs and had no arrests or incarcerations during the year after methadone maintenance treatment. In contrast, 14 percent of those not treated reported no illicit drug use or arrest.
- Overall, 68 percent of methadone maintenance treatment patients experienced significant improvements regarding illicit drug use and crime. This is in contrast to about 41 percent of those not treated.

**VISUAL H: THE EFFECT OF METHADONE MAINTENANCE
TREATMENT DURATION ON DRUG USE AND CRIME**

Question 1: Is methadone maintenance treatment effective for opioid addiction?

Suggested Commentary:

The DARP study also shows that the longer patients stay in treatment, the more likely they are to remain crime free.

As Figure 9 illustrates, there is a relationship between how long patients remain in treatment and how well they function after treatment. In this instance, the length of treatment was associated with abstinence from illicit drug use and an absence of crime. Notice that 30 percent of those who stayed in treatment for more than 12 months were abstinent, while 20 percent of those who stayed in treatment for less than 3 months were abstinent.

VISUAL I: REDUCTIONS IN ILLICIT OPIOID USE DURING AND AFTER METHADONE MAINTENANCE TREATMENT

Question 2: Does methadone maintenance treatment reduce illicit opioid use?

Suggested Commentary:

Two separate studies of 2 different groups of heroin addicts were conducted several years apart. Both demonstrated about a 40-percent reduction in illicit opioid use at the end of 1 year after methadone maintenance treatment.

- Figure 10 illustrates that in the TOPS study by Hubbard and others (1989), about 64 percent of the patients used heroin at least weekly in the year before treatment; however, 18 percent used heroin at least weekly in the year after treatment and about 19 percent continued use 3 to 5 years after treatment.
- Figure 11, on the right, illustrates that in the DARP study by Simpson and Sells in 1982, 44 percent of methadone maintenance treatment patients were using heroin daily in the year following treatment and 24 percent continued weekly use 3 years after treatment. Note that 100 percent had been using heroin daily in the 2 months before admission. Daily illicit opioid use continued to decline steadily for the next 3 years.

These studies demonstrate that methadone maintenance treatment can significantly reduce illicit opioid use.

**VISUAL J: DARP: CHANGES IN ILLICIT OPIOID USE:
PRETREATMENT TO 12-YEAR FOLLOW-UP**

Question 2: Does methadone maintenance treatment reduce illicit opioid use?

Suggested Commentary:

Among patients in the DARP studies conducted by Simpson and Sells (1990), (1) methadone maintenance treatment resulted in a rapid decline in illicit opioid use and (2) this reduction in illicit opioid use remained steady for 12 years.

- Figure 12 illustrates that improvements among patients who used no illicit opioids or who used opioids less than daily persisted into the 12th year after treatment.
- About half of patients treated with methadone maintenance reported no illicit drug use after 12 years.
- The graph also shows that the benefits associated with methadone maintenance treatment seem to improve over time. For example, at the end of 1 year, about half of the subjects had returned to daily illicit drug use, but by year 12, about half of these were once again abstinent.

VISUAL K: REDUCTION OF HEROIN USE BY LENGTH OF STAY IN METHADONE MAINTENANCE TREATMENT

Question 2: Does methadone maintenance treatment reduce illicit opioid use?

Suggested Commentary:

The length of stay in methadone maintenance treatment correlates positively with a reduction in heroin use, according to Ball and Ross (1991).

- As seen in Figure 13, nearly 100 percent of 617 addicts used heroin daily before entering treatment.
- Of patients who received less than 6 months of methadone maintenance treatment, about 67 percent reported using heroin.
- Of patients whose average stay in methadone maintenance treatment was 6 months to 4½ years, about 23 percent reported using heroin.
- Of patients who remained in treatment more than 4½ years, about 8 percent reported using heroin.

VISUAL L: THE EFFECTS OF METHADONE MAINTENANCE TREATMENT ON ALCOHOL AND OTHER DRUG USE

Question 3: What effect can methadone maintenance treatment have on the use of alcohol and other drugs?

Suggested Commentary:

As reported in the TOPS study of 4,184 patients, methadone maintenance treatment was associated with reductions in (1) any illicit opioid use, (2) any cocaine use, (3) any marijuana use, and (4) alcohol abuse.

- “Any opioid use” declined from 63 percent before treatment to 17 percent 1 year after treatment. This was the most dramatic decline.
- “Any cocaine use” declined from 26 percent to 18 percent.
- “Any marijuana use” declined from 55 percent before treatment to 46 percent 1 year after treatment.
- Alcohol abuse remained almost steady, declining from 25 percent to 24 percent 1 year after treatment.

From this study we see that methadone maintenance treatment has the most significant effect on the reduction of opioid use, but it also can contribute to a reduction in other drug use.

**VISUAL M: THE EFFECTS OF METHADONE MAINTENANCE
TREATMENT ON CRIME DAYS**

Question 4: Does methadone maintenance treatment reduce criminal activity?

Suggested Commentary:

The Ball and Ross study (1991) of 617 patients demonstrated that methadone maintenance treatment is associated with a dramatic decline in the average number of crime days per year.

- The average number of crime days per year before treatment was 237. During the 4-month initial methadone maintenance treatment, the average number of crime days per year was 69. This represents about a 71-percent decline.
- This dramatic decline was followed by steady but less dramatic declines in the average number of crime days among those in methadone maintenance treatment for 1 to 3 years.
- Patients who remained in treatment for 6 or more years reported only 14½ crime days per year, representing a 94-percent decline in the average number of crime days.

**VISUAL N: CRIME BEFORE AND DURING METHADONE
MAINTENANCE TREATMENT AT 6 PROGRAMS**

Question 4: Does methadone maintenance treatment reduce criminal activity?

Suggested Commentary:

Ball and Ross (1991) found a dramatic decline in crime when comparing pretreatment crime days per year with crime days per year after 6 months or more in methadone maintenance treatment.

- Figure 16 illustrates the average number of crime days reported by patients in 6 methadone maintenance treatment programs. Although there are differences among programs, the dramatic decrease in crime days during methadone maintenance treatment occurred for all 6 programs.
- The reduction in crime days ranged from approximately 87 percent in program D to about 95 percent in program B. The average reduction in crime days for all programs was slightly over 91 percent.
- The cost benefits of methadone maintenance treatment become obvious when one compares the costs of providing treatment to the social costs if the crime level had continued.

VISUAL O: CHANGES IN EMPLOYMENT DURING AND AFTER METHADONE MAINTENANCE TREATMENT

Question 5: Does methadone maintenance treatment improve the likelihood of obtaining and retaining employment?

Suggested Commentary:

Methadone maintenance treatment sometimes affects full-time employment, as demonstrated by the TOPS and DARP studies. In 1 study, there was little effect; but in the other, methadone maintenance treatment was associated with significant increases in full-time employment.

- Figure 17 illustrates that patients in the TOPS studies published by Hubbard and others in 1989 had small and inconsistent changes in their full-time employment rate during and after treatment. Employment was at about 24 percent before treatment, ranged from 20 to 25 percent during the first year after treatment, rose to 29 percent in posttreatment year 2, and declined to 18 percent 3 to 5 years after treatment.
- In contrast, in the DARP studies, Simpson and Sells (1982), shown in Figure 18, reported an abrupt increase from 33-percent full-time employment before treatment to nearly 60 percent after treatment.

**VISUAL P: HIV INFECTION RATES BY METHADONE
MAINTENANCE TREATMENT STATUS**

Question 6: Does methadone maintenance treatment reduce HIV risk behaviors and the incidence of HIV infection among opioid-dependent injection drug users?

Suggested Commentary:

In a longitudinal study of HIV infection among injection drug users in and out of treatment, a significantly higher rate of new infections was seen among subjects who were not in methadone maintenance treatment.

As you can see in Figure 19, at the beginning of the study, 18 percent of individuals out of treatment were HIV positive, while only 11 percent of individuals in methadone maintenance treatment were infected. After 18 months, 33 percent of the out-of-treatment individuals were infected and 15 percent of the methadone-maintained individuals were HIV positive.

**VISUAL Q: EIGHTEEN-MONTH HIV SEROCONVERSION BY
METHADONE MAINTENANCE TREATMENT
RETENTION**

Question 6: Does methadone maintenance treatment reduce HIV risk behaviors and the incidence of HIV infection among opioid-dependent injection drug users?

Suggested Commentary:

When HIV-infection incidence rates were examined in relation to whether subjects (1) remained in methadone maintenance treatment, (2) changed their treatment status, or (3) remained out of treatment, dramatically different rates of new cases of HIV seropositivity were observed. Those who remained out of treatment were nearly 6 times more likely to become infected than those who remained in treatment during the 18 months of the study. As you see here in Figure 20, there was a 22-percent increase in HIV seroconversion for out-of-treatment individuals and a 3.5-percent increase in HIV seroconversion for methadone-maintained individuals.

VISUAL R: HIV SEROPOSITIVITY AMONG NEW AND ESTABLISHED METHADONE MAINTENANCE TREATMENT PATIENTS

Question 6: Does methadone maintenance treatment reduce HIV risk behaviors and the incidence of HIV infection among opioid-dependent injection drug users?

Suggested Commentary:

A survey of 28 methadone maintenance treatment programs in New York City by Truman and Brown (1989) demonstrated that HIV seropositivity in patients who were already participating in methadone maintenance treatment was 27.2 percent, compared with a seropositivity rate of 45.9 percent for new admissions, showing a relationship between methadone maintenance treatment and reduced HIV infection among the opioid addicted.

**VISUAL 5: RAPID RETURN TO INJECTION DRUG USE
FOLLOWING PREMATURE TERMINATION OF
METHADONE MAINTENANCE TREATMENT**

Question 6: Does methadone maintenance treatment reduce HIV risk behaviors and the incidence of HIV infection among opioid-dependent injection drug users?

Suggested Commentary:

Methadone maintenance treatment is associated with reductions in injection drug use and the risks related to HIV infection. When drug users leave methadone maintenance treatment prematurely, they have an increased likelihood of returning to injection drug use.

In the Ball and Ross study (1991) of 388 patients who remained in treatment for 1 year or more, 71 percent had stopped injection drug use.

In this study, 105 patients left methadone maintenance treatment prematurely. About 82 percent of them returned to injection drug use within 1 year.

**VISUAL T: INCREASED METHADONE MAINTENANCE CENSUS
AND DECREASED HEPATITIS CASES: NEW YORK CITY,
1971-1973**

**Question 7: What components of methadone maintenance treatment
account for reductions in AIDS risk behaviors?**

Suggested Commentary:

Reducing behaviors that put one at risk for contracting HIV and developing AIDS has the added benefit of reducing the spread of other infections, such as hepatitis.

As seen in Figure 23, during the years 1971 to 1973, the treatment capacity for methadone maintenance in New York increased from about 15,000 to about 35,000. When methadone maintenance treatment capacity was expanded in New York, there was a decrease in reported cases of serum hepatitis.

During that time period, reported cases of serum hepatitis decreased from about 2,000 to about 600, as shown in Figure 24. This represents a decrease of approximately 87 percent in reported hepatitis cases.

This study suggests a relationship between methadone maintenance treatment and a reduction in the incidence of serum hepatitis.

VISUAL U: DIFFERENCES BETWEEN MEN AND WOMEN IN HIV INFECTION RATES AND RISK BEHAVIORS

Question 8: Do risk factors for HIV infection acquisition and transmission differ for women compared to men in methadone maintenance treatment?

Suggested Commentary:

As depicted in Figure 25, overall HIV infection rates are roughly the same for males and females entering drug abuse treatment in the United States: 5.4 percent for males and 4.4 percent for females. However, female injection drug users (IDUs) differ from males in the types and contexts of their risk behaviors. The main HIV infection risk for both men and women IDUs is needle sharing, and the most common needle sharing context for women is with their sex partners. Thus, differences in risk behaviors between men and women can greatly affect the rates at which they contract or transmit HIV. Schoenbaum and her colleagues found that more than 4 times as many women as men engage in sex work—23 percent of women and 5 percent of men.

The same study found that having an IDU as a sex partner was associated with HIV infection independent of or in addition to injection risk behaviors such as sharing needles. Risk for HIV infection increases with multiple sexual partners. Schoenbaum found that women are more likely than men to have multiple IDUs as sex partners: 57 percent of women had 1 or more IDUs as sex partners compared to 45 percent of men.

VISUAL V: POTENTIAL TREATMENT ISSUES FOR WOMEN

Question 9: Is methadone maintenance treatment effective for women?

Suggested Commentary:

- Since the earliest methadone maintenance treatment programs in the United States, women have been treated successfully with methadone through all phases of their lives, including pregnancy. There is consensus that the major findings for the effectiveness of methadone maintenance treatment, especially cessation of illicit drug use and lifestyle stabilization, apply to both men and women.
- However, there are gender-specific issues that are important to treatment effectiveness for IDU women. Figure 26 outlines key issues that must be addressed if methadone maintenance treatment is to be successful for women. Women are often isolated socially; a number of studies have documented that drug-using women are likely to experience low self-esteem, clinical depression, and anxiety disorders to a much greater degree than their male counterparts.

These studies also found that female drug users often have been physically and sexually abused. These experiences of sexual violence, especially if they occurred during childhood, have profound, lifelong psychological effects and often underlie addiction, complicating successful recovery.

- In addition, female addicts are more likely than male addicts to require child care and transportation. As the previous visual (Figure 25) demonstrated, female addicts are more than 4 times as likely as male addicts to support themselves through sex work, making healthy vocational options critical to recovery for female addicts. If sex work remains the only income option, it could be a pathway to relapse. DARP studies have shown that women in recovery are less likely to find employment than males.
- These gender-specific social and psychological factors suggest that methadone maintenance treatment for women succeeds best when it offers child care, transportation to treatment, nonconfrontational therapy and counseling, and vocational job skills training and education designed for women.

VISUAL W: METHADONE SAFETY FOR PREGNANT WOMEN AND THEIR INFANTS

Question 10: Is methadone safe for pregnant women and their infants?

Suggested Commentary:

- Since the early 1970s, methadone maintenance treatment has been used successfully with pregnant women. There is wide consensus that methadone may be safely administered during pregnancy with little risk to mother and infant. Research by Finnegan and by Kaltenbach, Silverman, and Wapner has documented that methadone administered during pregnancy improves both maternal and infant outcomes compared to women not in treatment.
- In addition, Finnegan and Kaltenbach have documented that withdrawal is manageable for infants born addicted to methadone and that there are no long-term adverse neurobehavioral consequences to *in utero* exposure to methadone. Methadone maintenance treatment provides protection to the fetus from erratic opioid levels and frequent opioid withdrawal, which typically are seen in untreated opioid-addicted pregnant women.

VISUAL X: METHADONE DOSAGE ADJUSTMENT DURING PREGNANCY

Question 11: Is it necessary to reduce methadone dose or detoxify women from methadone during pregnancy to protect the fetus?

Suggested Commentary:

Women have been safely maintained on stable methadone dosage during pregnancy without adverse long-term effects on their health and the health of their infants. Figure 28 outlines 3 main considerations regarding dosage for pregnant women in methadone maintenance treatment:

- Pregnancy can lower methadone blood levels.
- Lower methadone blood levels can increase relapse risk.
- Dosage levels should be evaluated and individually tailored to reduce the mother's risk of relapse and to stabilize both the mother and her unborn child.

VISUAL Y: COMMON SIDE EFFECTS AFTER 6 MONTHS TO 3 YEARS OF METHADONE MAINTENANCE TREATMENT

Question 12: Is the long-term use of methadone medically safe, and is it well tolerated by patients?

Suggested Commentary:

Methadone is a medically safe drug. Studies by Hartel and by Kreek showed that long-term methadone maintenance at doses of 80 to 120 milligrams per day is not toxic or dangerous to any organ system after continuous treatment for 10 to 14 years in adults and 5 years in adolescents.

Methadone does not cause toxicity or have dangerous biological effects. There also appear to be no dangerous or troubling psychological effects from long-term administration.

In the early stages of treatment, methadone can cause these minor side effects:

- Increased sweating
- Constipation
- Alteration of sexual interest (libido abnormalities)
- Alteration of sleep and appetite (appetite abnormalities)
- Nausea
- Drowsiness
- Nervousness/tension
- Headaches
- Body aches and pains
- Chills

However, as studies by Kreek (1979), Jaffe and Martin (1995), and Hartel (1989 and 1990) demonstrate, many of these side effects just about disappear with long-term, high-dose methadone maintenance treatment.

VISUAL Z: PROGRAM CHARACTERISTICS ASSOCIATED WITH SUCCESS OF METHADONE MAINTENANCE TREATMENT

Question 13: Are there program characteristics associated with the success of methadone maintenance treatment?

Suggested Commentary:

In numerous research studies, investigators have identified program characteristics that contribute to methadone maintenance treatment success. Studies by McLellan and others (1993), Ball and Ross (1991), and Joe, Simpson, and Hubbard (1991) identified the following characteristics:

- Providing comprehensive services
- Integrating medical, counseling, and administrative services
- Identifying and meeting patients' individual treatment needs
- Implementing a policy of adequate dosage
- Having sufficient staff with low turnover
- Providing sufficient staff training

When these components are added to maintaining patients on methadone, the treatment success rate is greatly increased.

VISUAL AA: ROLE OF PSYCHOSOCIAL SERVICES IN REDUCING ILLICIT OPIOID USE

Question 13: Are there program characteristics associated with the success of methadone maintenance treatment?

Suggested Commentary:

This study shows that dispensing of methadone coupled with little more than urinalysis does not substantially reduce illicit opioid use. However, patients who participate in methadone maintenance treatment programs that offer comprehensive psychosocial services are more likely to succeed in treatment.

- Figure 31 depicts the results of a recent study by McLellan and others (1993) of the random assignment of patients to 3 types of treatment programs: (1) minimum methadone services (methadone and no counseling), (2) standard methadone services (methadone plus counseling), and (3) enhanced methadone services (methadone, counseling, and other psychosocial treatment).
- Patients receiving the most comprehensive array of treatment services had the highest rate of opioid-free urine test results for the 24 weeks of the study.
- Patients receiving minimal services had the highest rate of opioid-positive urine test results. (Note that these patients were removed from participation in this portion of the study because of their drug use and psychiatric difficulties and were provided with additional supportive services.)

VISUAL BB: PATIENT CHARACTERISTICS ASSOCIATED WITH SUCCESS IN METHADONE MAINTENANCE TREATMENT

Question 14: Are there patient characteristics associated with the success of methadone maintenance treatment?

Suggested Commentary:

Patients who demonstrate emotional, psychological, and social well-being generally experience greater treatment success than patients who have emotional, psychological, and social problems.

Several studies have shown that certain patient characteristics are associated with success in methadone maintenance treatment. Studies by McLellan (1983), Simpson and Sells (1982), Ball and Ross (1991), and Anglin and Hser (1990) identified these characteristics as:

- Over 25 years old
- Minimal criminal involvement
- Short history of drug abuse
- Mild to moderate drug abuse severity
- Emotional and psychiatric stability
- Intact social support network
- Positive employment history

VISUAL CC: COMPARISON OF TREATMENT AND SOCIETAL COSTS OF ACTIVE HEROIN ADDICTION

Question 15: Are there cost benefits to methadone maintenance treatment?

Suggested Commentary:

- **Methadone maintenance treatment is cost-effective and beneficial to society. A study by Harwood and others of the cost benefits of methadone maintenance treatment showed that the costs to society of the criminal activities related to active heroin use can run as high as 4 times more than the costs for methadone maintenance treatment.**
- **For example, in 1988, methadone maintenance treatment for 100 patients for 1 year cost about \$240,000. In contrast, the annual cost to society related to the criminal activities of 100 active heroin addicts not in treatment in that year would have exceeded \$960,000.**

VISUAL DD: AVERAGE COSTS PER YEAR FOR 1 HEROIN ADDICT

Question 15: Are there cost benefits to methadone maintenance treatment?

Suggested Commentary:

- The cost of methadone maintenance treatment is far less than the cost of active heroin use, incarceration, and drug-free residential treatment.
- The New York State Division of Substance Abuse Services estimated the yearly costs associated with active heroin use, incarceration, residential drug-free treatment, and methadone maintenance treatment in 1991. As the graph illustrates, the cost of active heroin use for 1 addict for 1 year was about \$43,000 in 1991. This includes the cost of the heroin, the loss of property related to theft and burglary, and the costs of security measures to combat such crimes.
- The cost of 1 year in jail or prison was about \$34,000 in 1991 in New York. This includes court costs. The cost of 1 year of residential drug-free treatment in 1991 was about \$11,000, and the cost of 1 year of methadone maintenance treatment in 1991 was roughly \$2,400—about 18 times less than the cost of heroin use to society and about 14 times less than the cost of incarceration.

[Note to the presenter: It is suggested that you obtain current local information regarding these costs.]

VISUAL EE: ONE-YEAR TREATMENT RETENTION RATES FOR 3 LARGE STUDIES

Question 16: What are the retention rates for methadone maintenance treatment?

Suggested Commentary:

Research suggests that about two-thirds of the patients who participate in methadone maintenance treatment programs leave within the first year after admission.

- In the DARP studies, Simpson and Sells examined 3 groups of patients who were admitted to methadone maintenance treatment and found 1-year retention rates of about 40 percent, 50 percent, and 60 percent.
- In the TOPS studies, Hubbard and colleagues found that about 34 percent of the patients admitted to 17 methadone maintenance treatment clinics were retained for more than 1 year.
- One-year retention rates for the 6 methadone maintenance treatment programs studied by Ball and Ross (1991) ranged from 25 percent to 44 percent.

VISUAL FF: PREDICTORS OF RETENTION FOR METHADONE MAINTENANCE TREATMENT

Question 16: What are the retention rates for methadone maintenance treatment?

Suggested Commentary:

This study conducted by Condelli and Dunteman (1993) shows that methadone maintenance treatment programs should provide patients with high-quality social services as soon as possible after admission in order to promote retention. The study found that 3 **program** variables predicted retention:

- Prompt provision of high quality services
- Accessibility of the program
- Disclosure of the patient's methadone dose level

Two **patient** variables were shown to predict retention:

- Daily use of marijuana during the year before admission
- Age of the patient before admission

The patient's daily use of marijuana during the year before admission to methadone maintenance treatment may relate to an "amotivational syndrome" that can accompany heavy marijuana use, especially when combined with depressants. Patients with this syndrome were more likely to leave treatment. This study also noted that patients who were 25 years of age or younger were more likely than older patients to drop out of methadone maintenance treatment programs, possibly because they lacked the motivation, maturity, and life goals that older patients often possess.

**VISUAL GG: MANDATED METHADONE MAINTENANCE
TREATMENT AND 3 TREATMENT OUTCOMES**

Question 17: Is mandated methadone maintenance treatment as effective as voluntary treatment?

Suggested Commentary:

- Patients who are legally coerced into methadone maintenance treatment experience treatment success at about the same rate as patients who voluntarily participate in treatment.
- Anglin and associates studied patients for whom treatment was mandated and patients who entered treatment voluntarily. One group was forced to participate in methadone maintenance treatment (high coercion). A second group (not represented on the visual) was under moderate legal pressure to participate in treatment (medium coercion). A third group was under mild legal pressure to participate in treatment (low coercion).
- The study compared the behaviors of individuals in the high coercion group and the low coercion group for 3 treatment outcomes: time employed, daily narcotics use, and criminal involvement. As the visual illustrates, patients who were coerced into treatment had these treatment outcomes at about the same rate as did patients who voluntarily participated in methadone maintenance treatment.

VISUAL HH: TREATMENT MODALITY SELECTION DECISION TREE FOR BUPRENORPHINE, LAAM, OR METHADONE

Question 18: In addition to methadone, are there any other medications used for opioid substitution in the United States?

Suggested Commentary:

- There are 2 alternatives to methadone: L-alpha-acetyl-methadol (LAAM) and buprenorphine. LAAM is a long-acting synthetic opioid similar to methadone in its clinical effect, but with a slower onset and longer duration of action.
- Buprenorphine, still under study in the United States and not yet approved for opioid treatment, has properties of both opioid agonists and antagonists. Opioid agonists exert heroin-like analgesic properties. Opioid antagonists—such as naloxone (Narcan) and naltrexone (Trexan)—reverse heroin-like symptoms and the effects of heroin. In the United States, buprenorphine for opioid addiction treatment is considered experimental.
- Figure 40 presents a decision tree for selecting a treatment modality based on a sequential pharmacological intervention. An opioid addict would first be treated with daily doses of buprenorphine. If the daily buprenorphine treatment were successful, treatment could progress to 1 of 3 choices: reducing buprenorphine to 3 doses per week; changing to naltrexone; or ending medication.

If the daily buprenorphine treatment were unsuccessful, treatment could progress to 1 of 2 choices: LAAM or methadone. From there, treatment could continue with LAAM or methadone, or change from LAAM to methadone or from methadone to LAAM.

- The decision tree is not meant to be an inflexible prescription of a treatment model and does not imply that one treatment is superior to or more appropriate than another. Rather it is offered as a guide for clinical decision-making and suggests the wide range of treatment options available to clinicians.

VISUAL II: CLIENT AND PROVIDER BENEFITS OF LAAM

Question 19: What are the clinical benefits of LAAM?

Suggested Commentary:

LAAM can suppress opioid withdrawal for up to 72 hours. Steady-state blood levels are achieved in about 2 weeks. Research on both LAAM and methadone maintenance treatment provides comparable results regarding patients' reported clinic attendance, opioid withdrawal symptoms, illicit drug use, employment status, and criminal activity. Both treatments are similar regarding overall effectiveness and medical safety; however, LAAM is less sedating than methadone.

Any patient suitable for methadone maintenance treatment can be treated with LAAM although it may be especially appealing to patients who have difficulty attending programs on a daily basis, find methadone's duration of action too short (due to rapid metabolism), find methadone too sedating, or who reject methadone because of its stigmatization.

Figure 41 lists some of the benefits of treating opioid addicts with LAAM rather than methadone maintenance:

- Because LAAM is administered 3 times per week, LAAM maintenance programs reduce patient visits to the clinic, eliminate the need for weekend take-home medication or weekend staff at clinics, reduce paperwork for each client, and reduce clinic crowding.
- Further, LAAM's slow onset of action and absence of euphoria or rush following oral administration make it an unpopular drug for street diversion and illegal use.

VISUAL JJ: POTENTIAL BENEFITS OF BUPRENORPHINE

Question 20: What are the clinical benefits of buprenorphine?

Suggested Commentary:

- Buprenorphine currently (1995) an experimental opioid treatment in the United States, has the ability to suppress opioid withdrawal, retain patients in treatment, and decrease illicit opioid use. It has a higher safety profile than methadone with regard to overdose and produces only a mild degree of physical dependence following prolonged administration.
- Research on buprenorphine has shown that it has the potential to be a feasible alternative to methadone maintenance treatment. Figure 42 outlines the benefits of buprenorphine treatment:
 - NIDA is testing a buprenorphine-naloxone combination tablet that can eliminate or greatly reduce the abuse potential of buprenorphine. When the combination tablet is taken sublingually as prescribed, only a little naloxone is absorbed, so the patient essentially gets just the buprenorphine effect. However, if the tablet is dissolved and injected, the naloxone will antagonize the buprenorphine, resulting in a range of reactions, including blockade of opioid effects and precipitation of an immediate withdrawal. This reduces the potential of abuse of the medication.
 - Buprenorphine withdrawal symptoms are mild following abrupt cessation. Thus, buprenorphine can be discontinued with relative ease.
 - Patients receiving buprenorphine can be easily transferred to opioid antagonist treatment, such as naltrexone, without withdrawal. Patients with a higher level of physical dependence and whose needs cannot be met by buprenorphine can be transferred to an opioid agonist, such as methadone or LAAM.
 - Patients receiving buprenorphine require lower-milligram doses than do patients on methadone maintenance treatment. Compton, Ling,

Charuvastra, and Wesson found that the median doses of buprenorphine for adequate clinical stabilization may be in the 12- to 16-milligram range; earlier studies showed doses of 8 milligrams buprenorphine were comparable to 30 milligrams methadone.

- Buprenorphine may attract addicts who had not previously considered opioid substitution therapy.

METHADONE MAINTENANCE TREATMENT:

TRANSLATING RESEARCH INTO POLICY

**NATIONAL INSTITUTE ON DRUG ABUSE
NATIONAL INSTITUTES OF HEALTH
U.S. PUBLIC HEALTH SERVICE**



METHADONE AS TREATMENT FOR OPIOID ADDICTION

- Orally Effective
- No Intoxication Or Lethargy
- No Impairment
- Normal Emotional And Physical Sensations
- Diminished Opioid Drug Hunger
- Rare Euphoria
- Dosage Stability
- Medically Safe
- Long-Lasting
- Decreased Drug-Seeking Behavior

COMPARATIVE PROFILES OF HEROIN AND METHADONE

	Heroin	Methadone
Route Of Administration	Injected	Consumed Orally
Onset Of Action	Immediate	30 Minutes
Duration Of Action	Short-Acting (3-6 Hours)	Long-Lasting (24-36 Hours)
Euphoria	Common	Rare
Withdrawal Symptoms	3-4 Hours After Last Use	24 Hours After Last Use

MAJOR RESEARCH STUDIES

- The Drug Abuse Reporting Program (DARP) Studies
- The Treatment Outcome Prospective Study (TOPS)
- The Ball And Ross Study
- The UCLA Methadone Study

PATIENT STATUS BEFORE AND AFTER METHADONE MAINTENANCE TREATMENT

(Composite Average Of Three Treatment Programs For 2 Years)
(Adapted From McGlothlin And Anglin, 1981)

Time Using Narcotics Daily, %

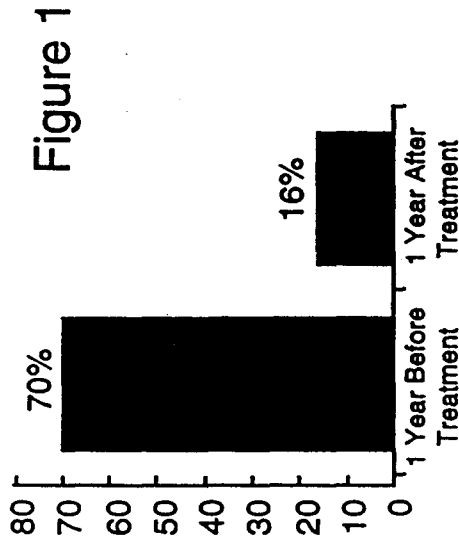


Figure 1

Time Unemployed, %

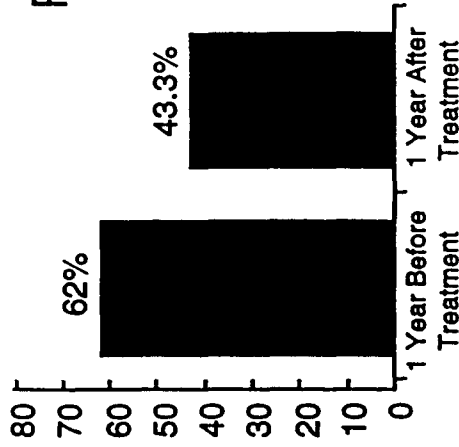


Figure 2

Days Involved in Crime, %

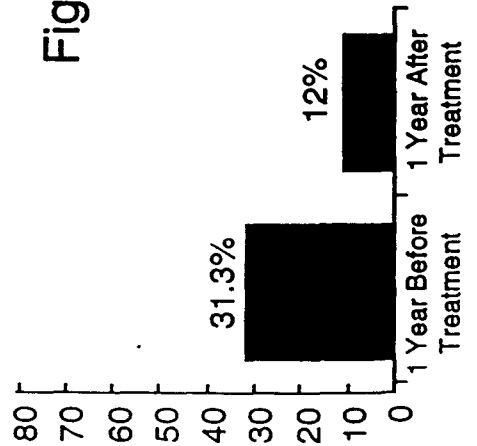


Figure 3

Time Dealing Drugs, %

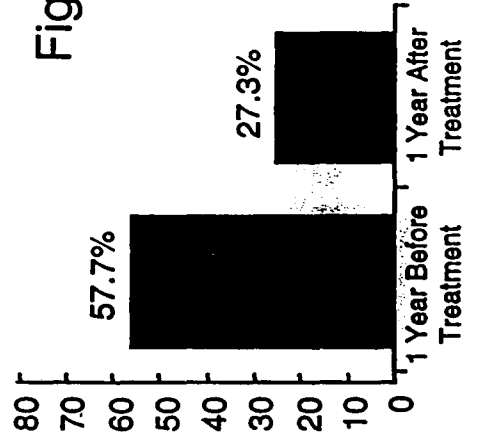


Figure 4

Time Incarcerated, %

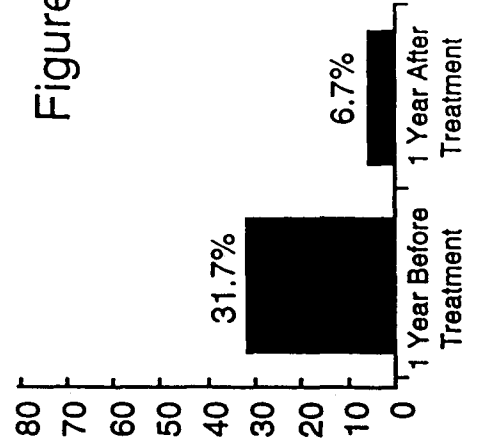


Figure 5

THE EFFECTS OF HEROIN AND METHADONE ON FUNCTIONAL STATE

(Adapted From Dole, Nyswander, And Kreek, 1966)

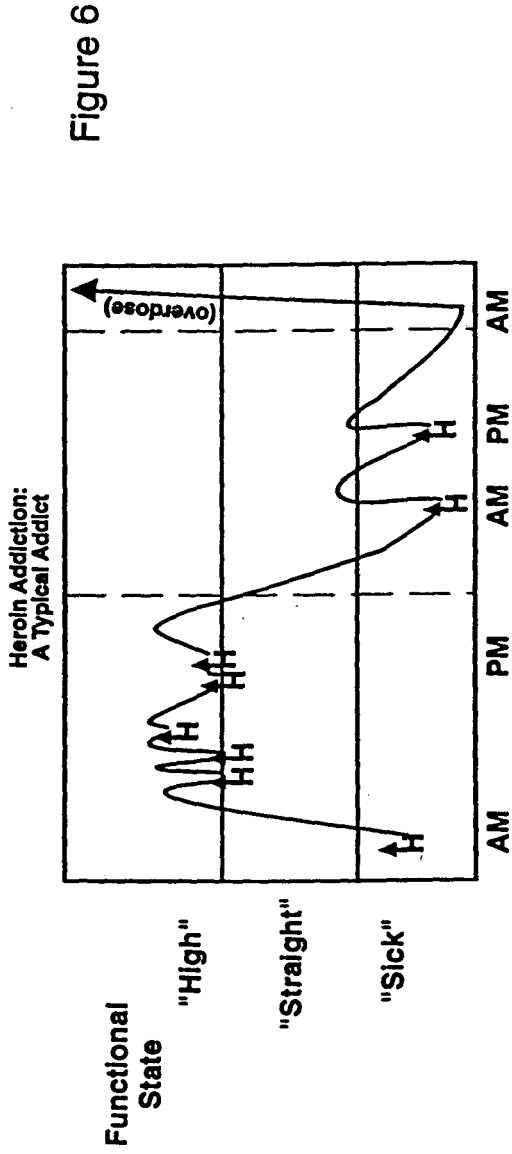


Figure 6

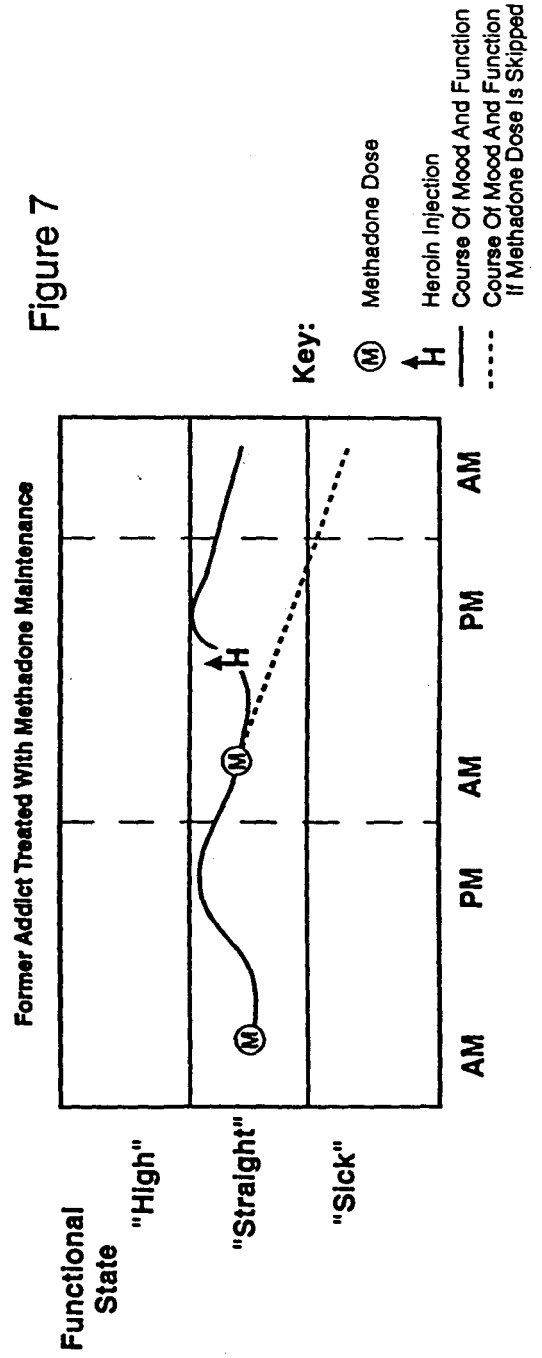


Figure 7

Figure 8

IMPROVEMENTS: DRUGS AND CRIME 1 YEAR AFTER DARP

(Adapted From Simpson And Sells, 1982)

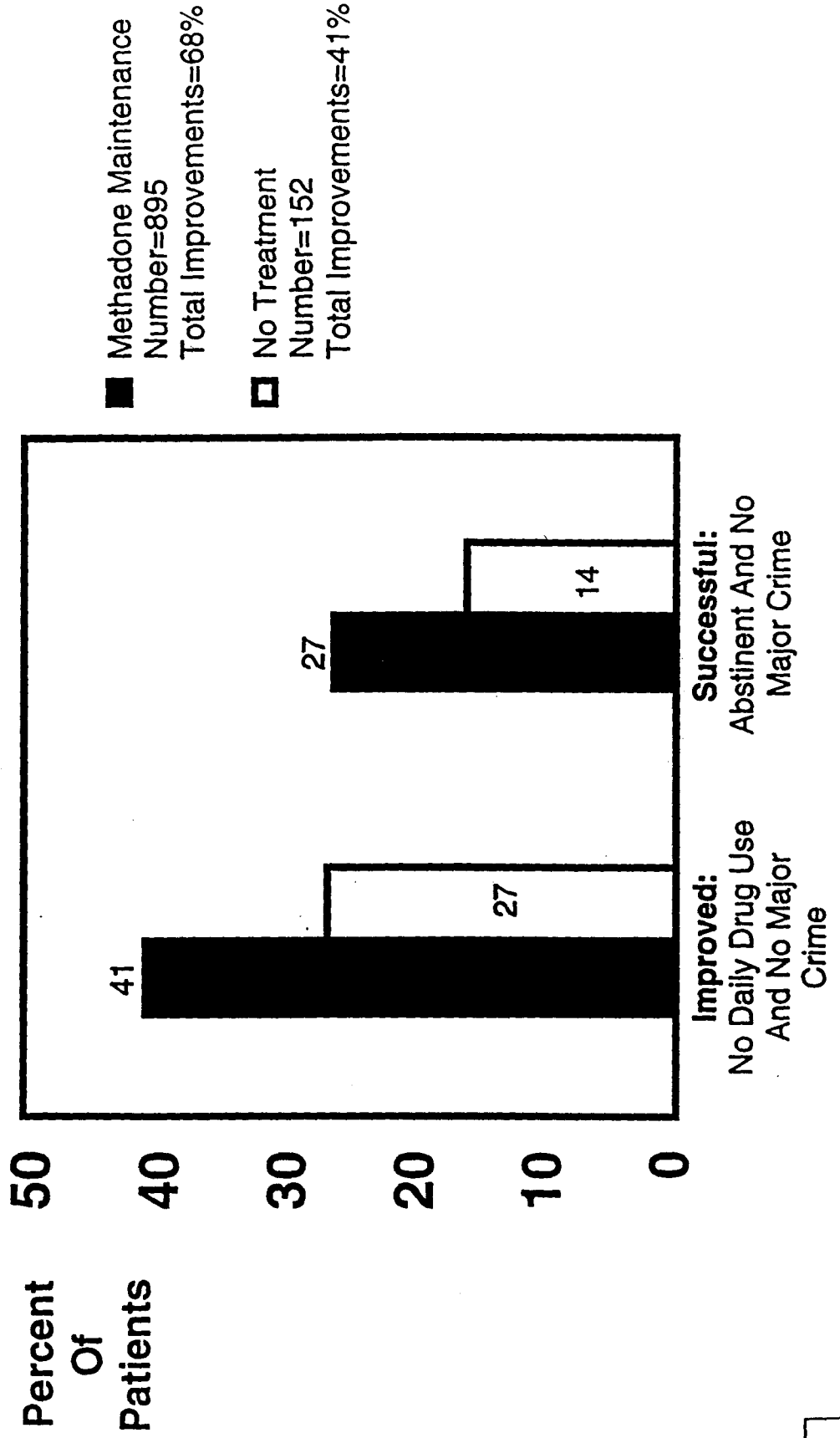
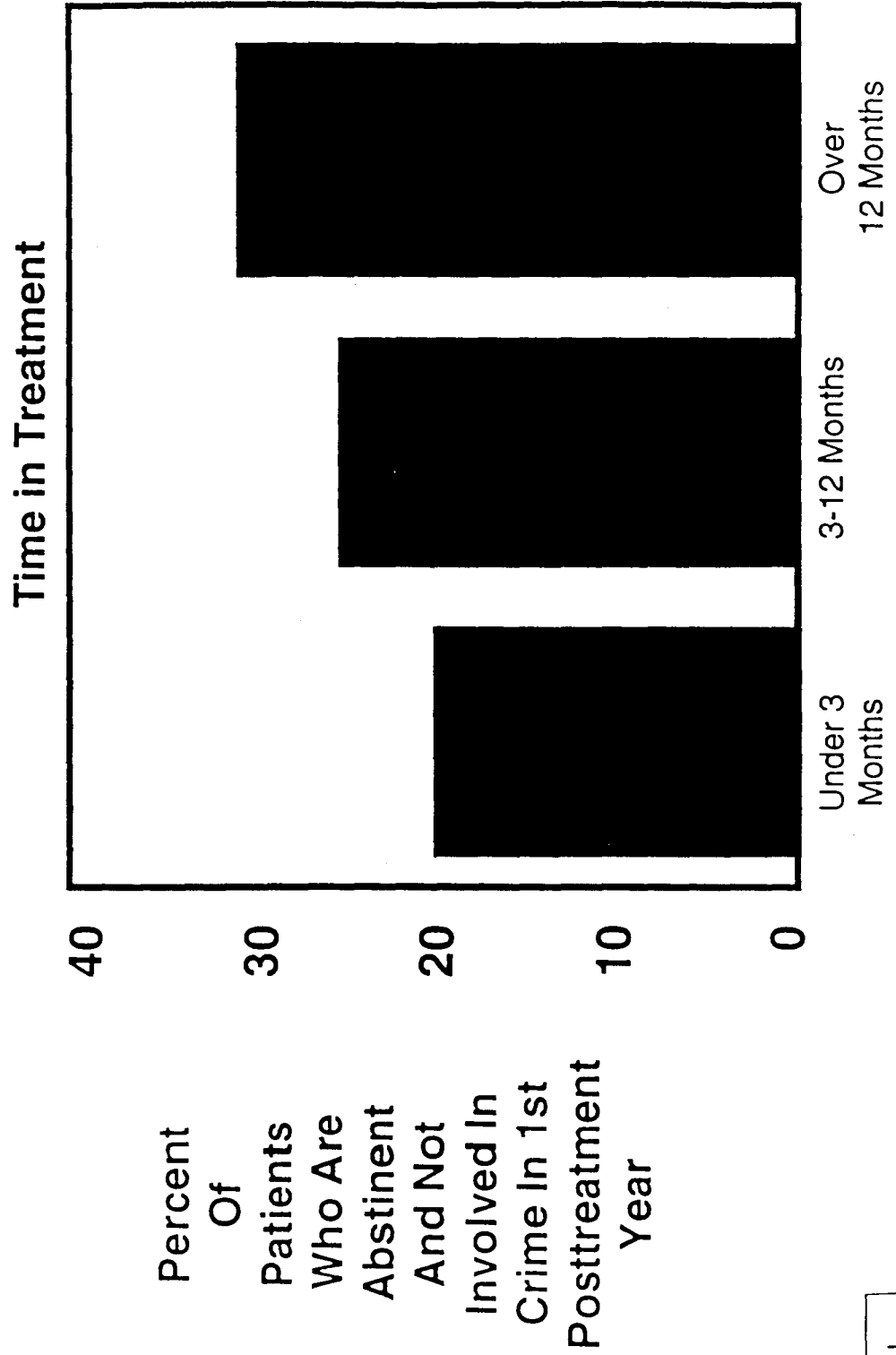


Figure 9

THE EFFECT OF METHADONE MAINTENANCE TREATMENT DURATION ON DRUG USE AND CRIME

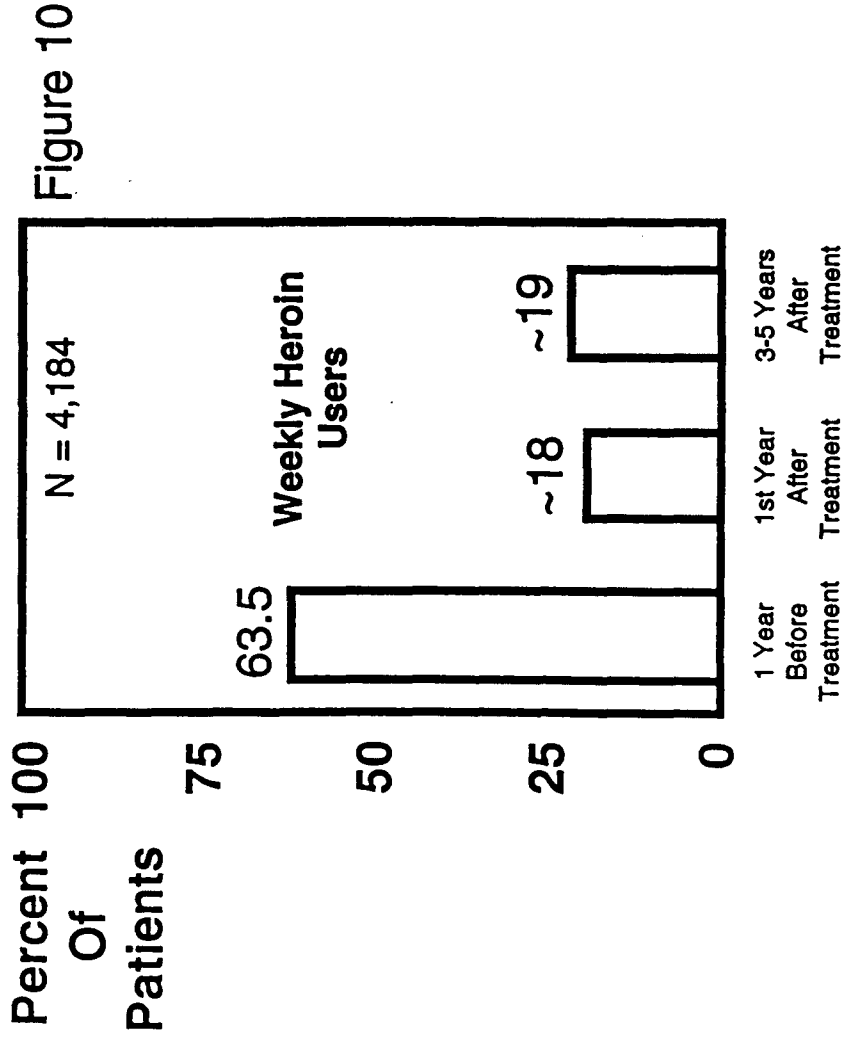
(Adapted From Simpson And Sells, 1990)



REDUCTIONS IN ILLICIT OPIOID USE DURING AND AFTER METHADONE MAINTENANCE TREATMENT

(Adapted From Hubbard et al., 1989; Simpson And Sells, 1982)

TOPS



DARP

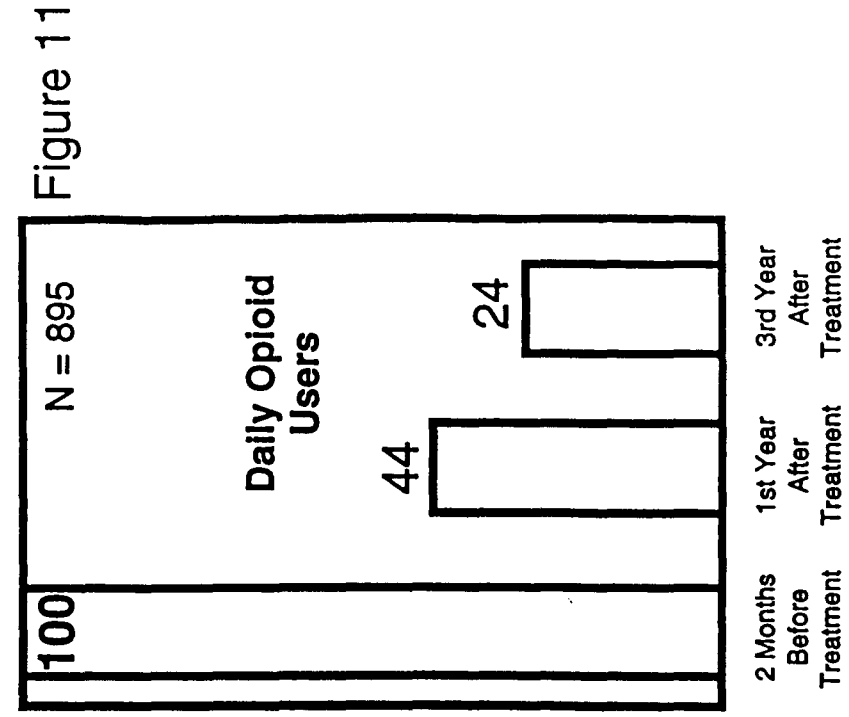


Figure 12
**DARP: CHANGES IN ILLICIT OPIOID USE:
 PRETREATMENT TO 12-YEAR FOLLOW-UP**
 (Adapted From Simpson And Sells, 1990)

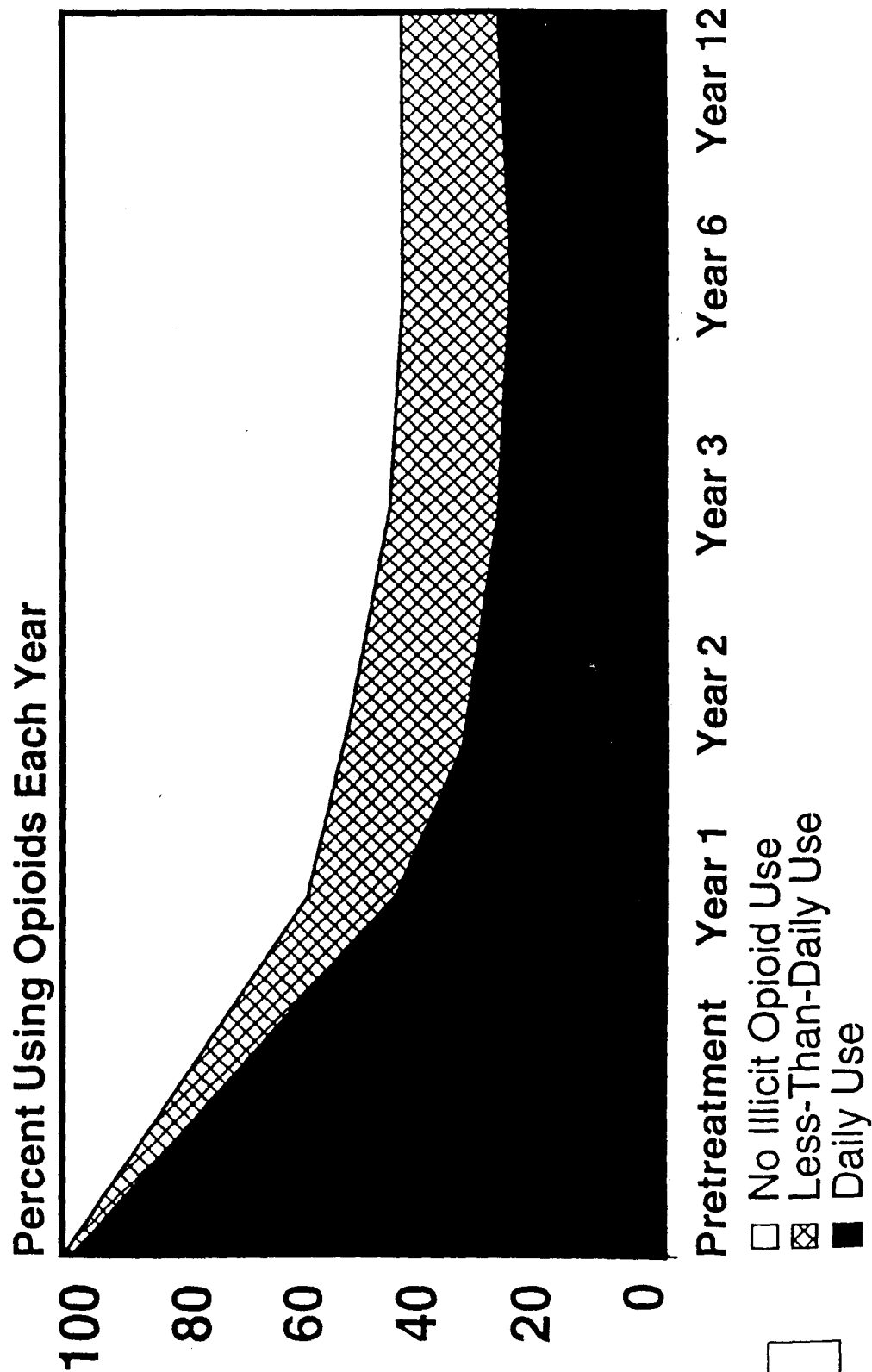


Figure 13
**REDUCTION OF HEROIN USE BY LENGTH OF STAY
 IN METHADONE MAINTENANCE TREATMENT**
 (Ball And Ross, 1991)

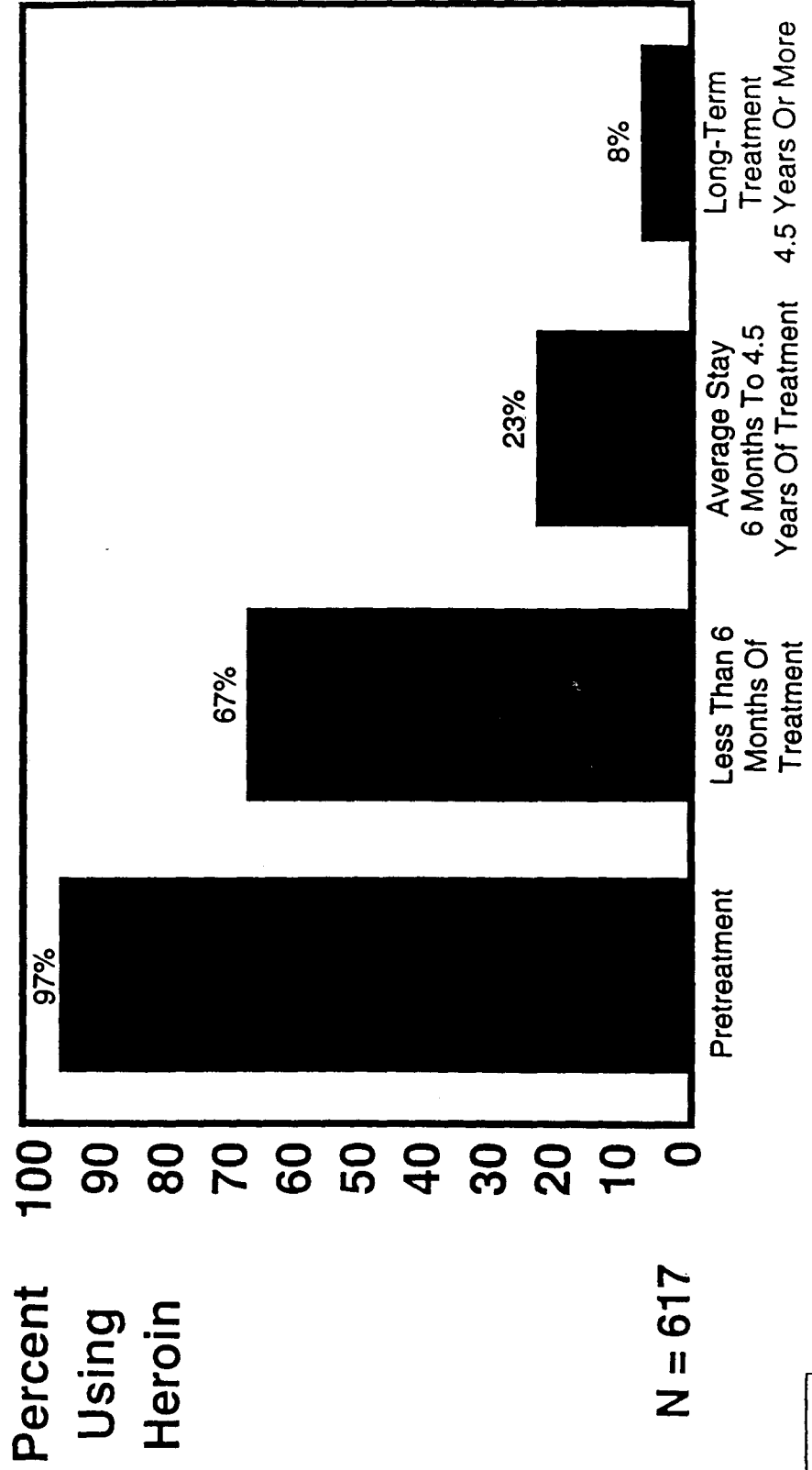


Figure 14.
THE EFFECTS OF METHADONE MAINTENANCE
TREATMENT ON ALCOHOL AND OTHER DRUG USE

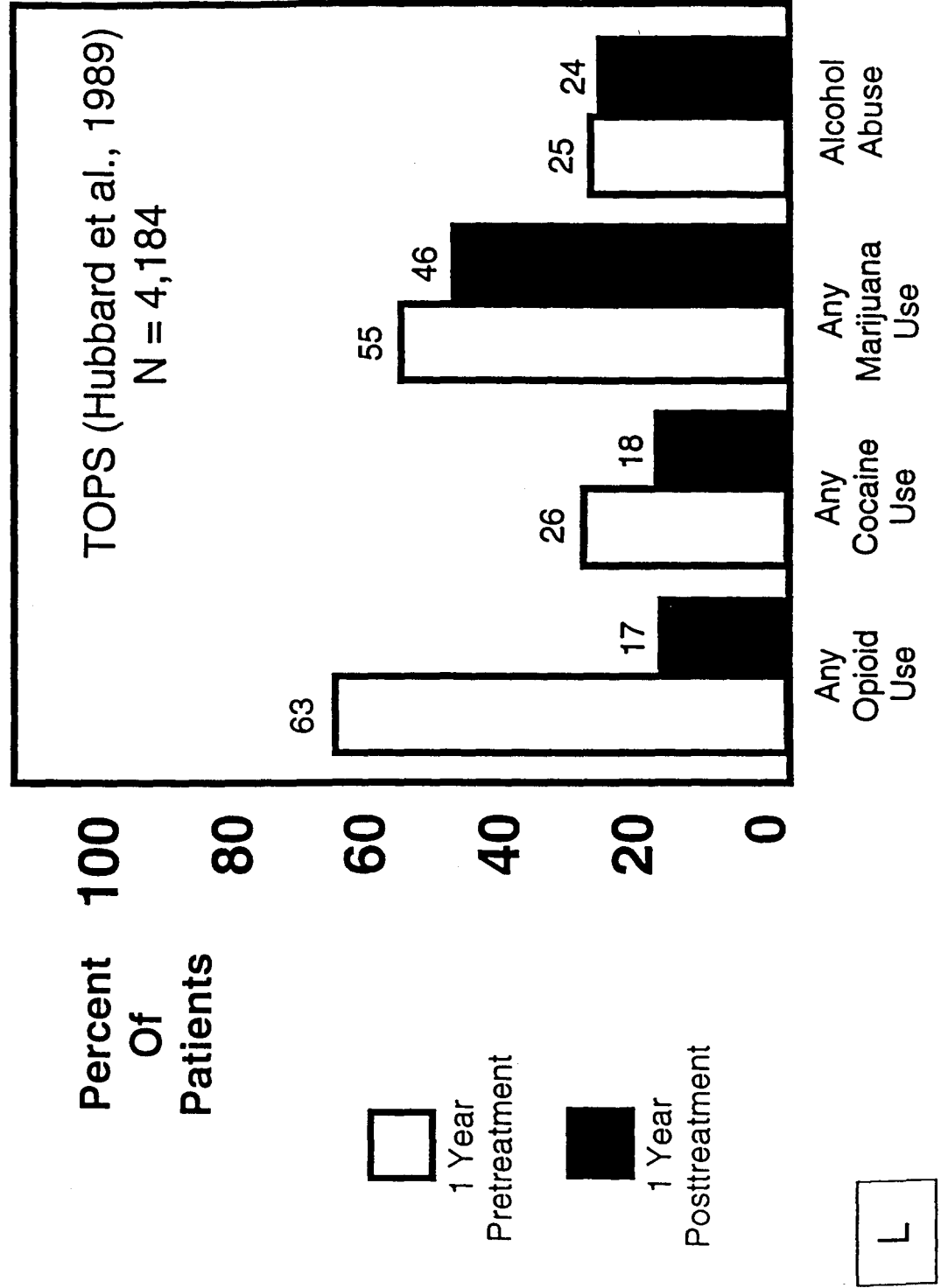


Figure 15
THE EFFECTS OF METHADONE MAINTENANCE TREATMENT ON CRIME DAYS

(Adapted From Ball And Ross, 1991)
 N = 617

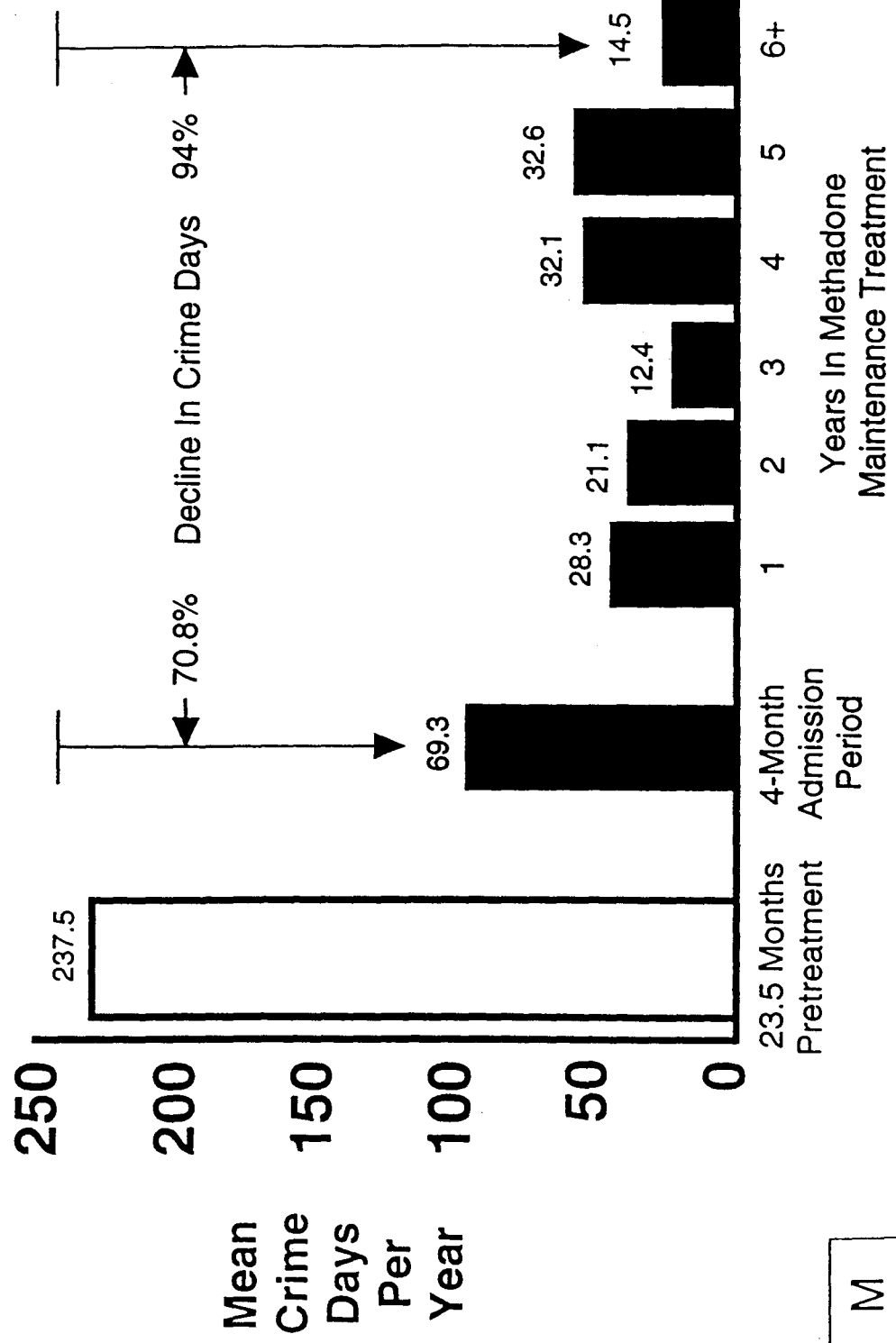
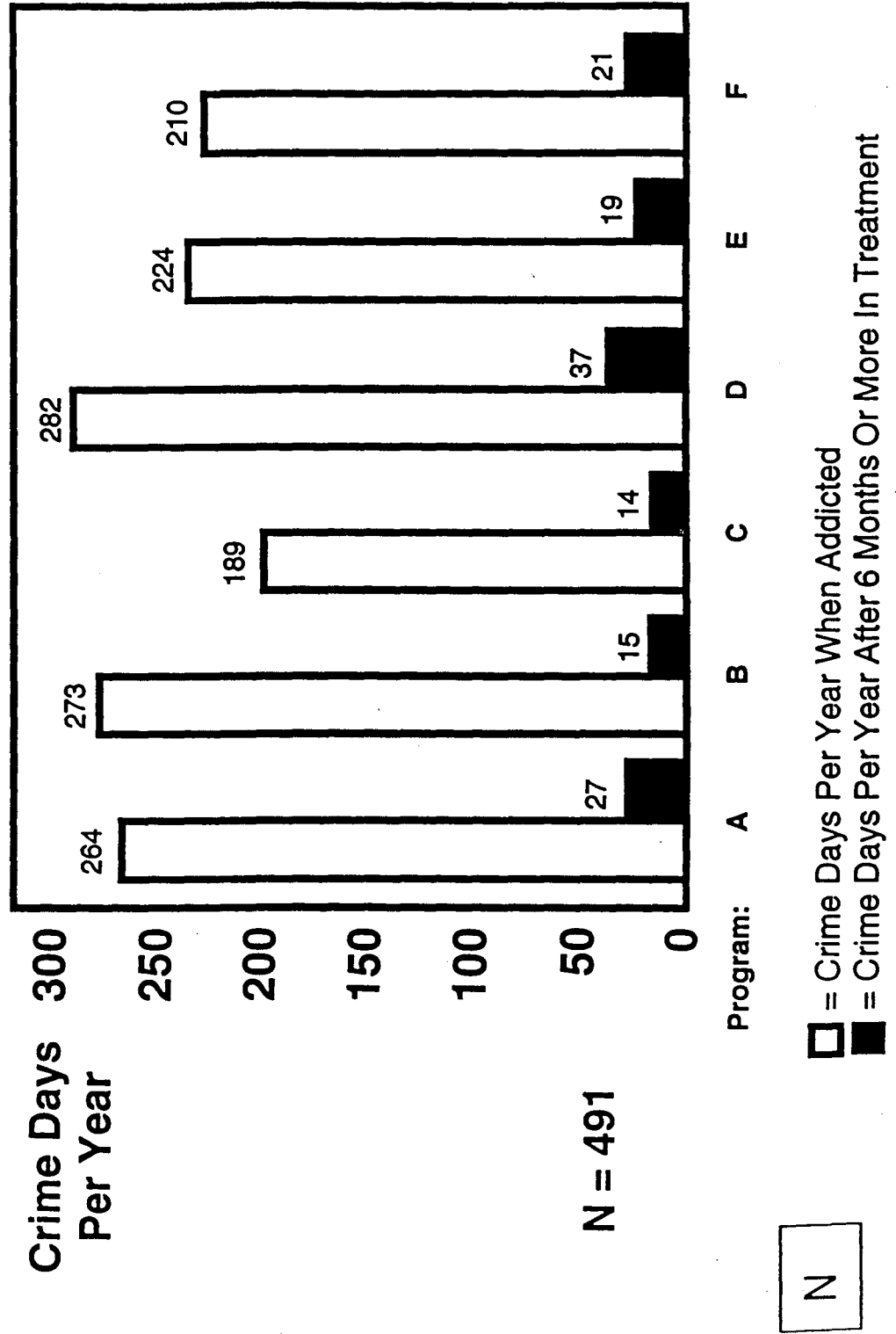


Figure 16
**CRIME BEFORE AND DURING METHADONE
 MAINTENANCE TREATMENT AT 6 PROGRAMS**
 (Ball And Ross, 1991)



N

CHANGES IN EMPLOYMENT DURING AND AFTER METHADONE MAINTENANCE TREATMENT

Figure 17

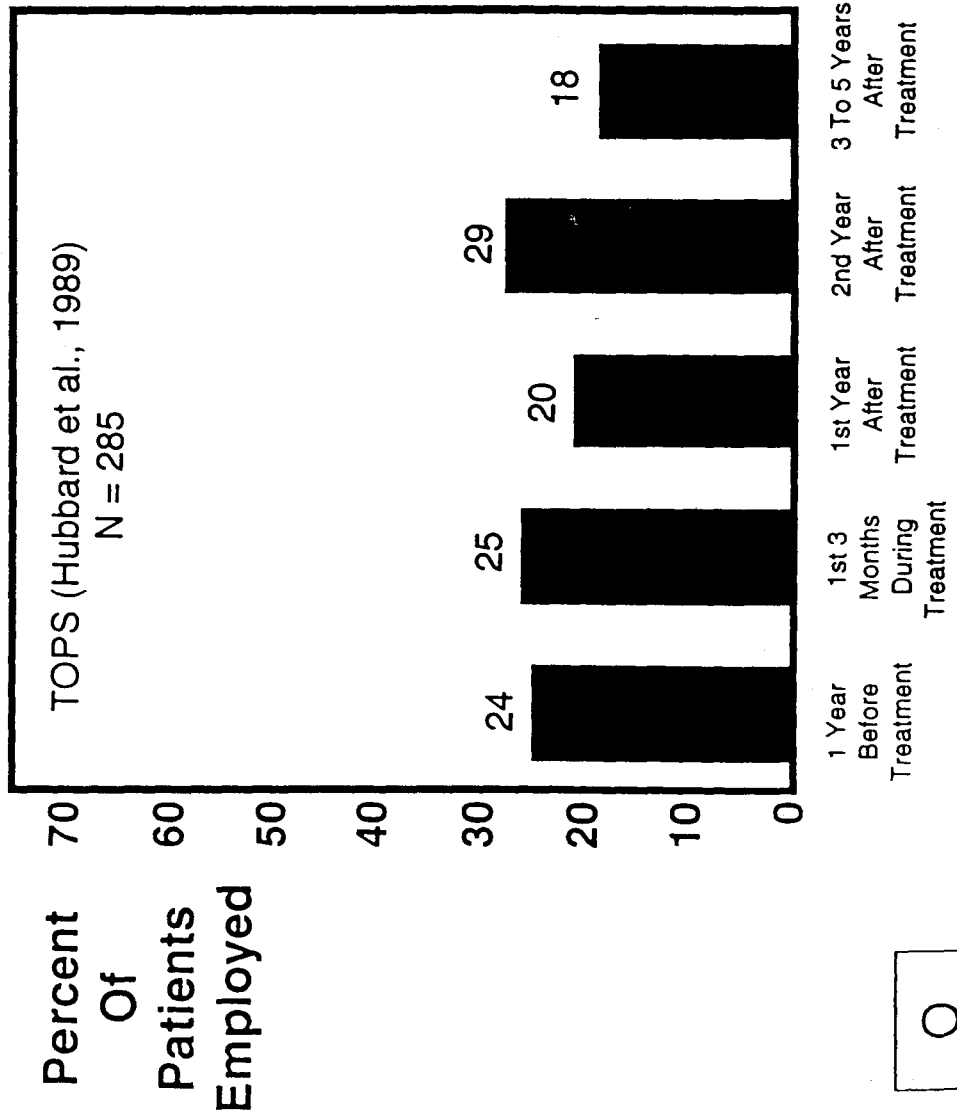
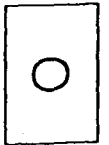
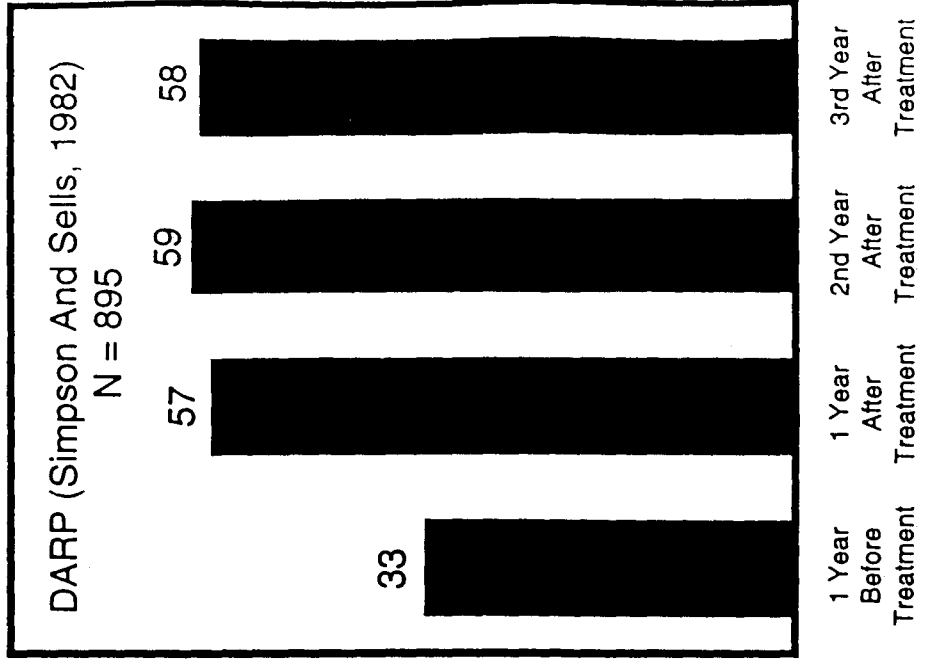


Figure 18



HIV INFECTION RATES BY METHADONE MAINTENANCE TREATMENT STATUS

Figure 19

(Adapted From Metzger et al., 1993)

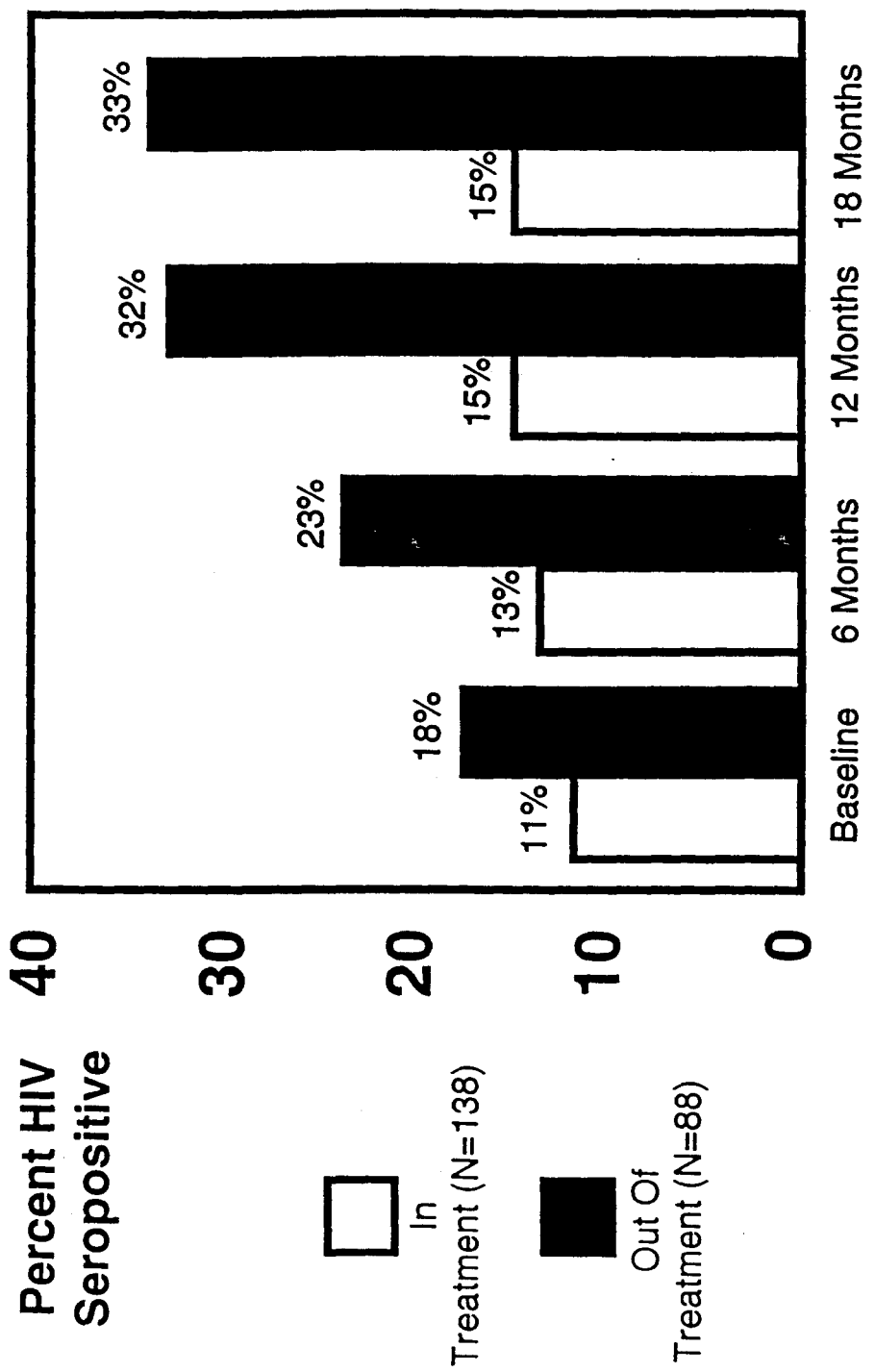


Figure 20
**EIGHTEEN-MONTH HIV SEROCONVERSION BY
METHADONE MAINTENANCE TREATMENT RETENTION**

(Adapted From Metzger et al., 1993)

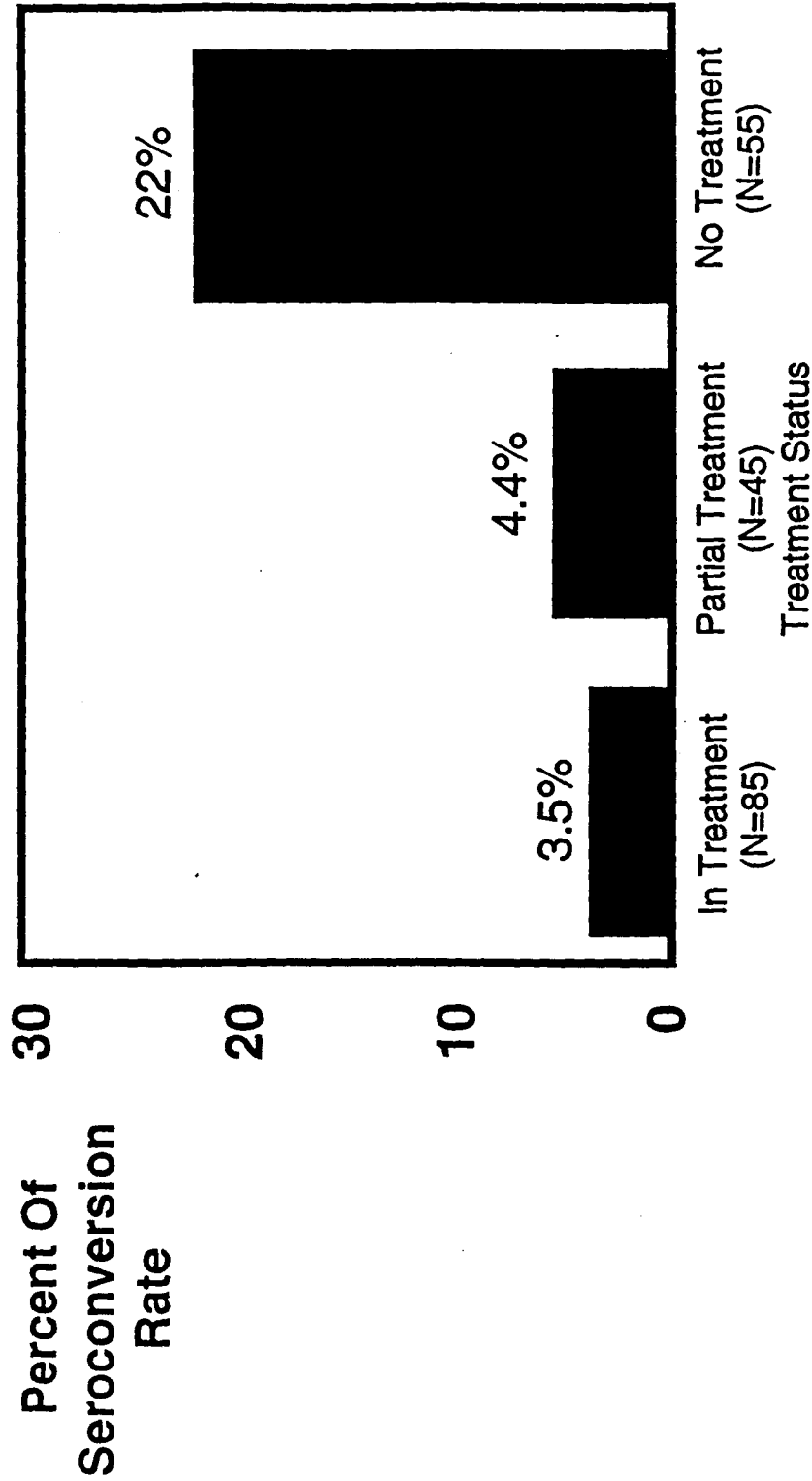


Figure 21

HIV SEROPOSITIVITY AMONG NEW AND ESTABLISHED METHADONE MAINTENANCE TREATMENT PATIENTS

(Truman And Brown, 1989)

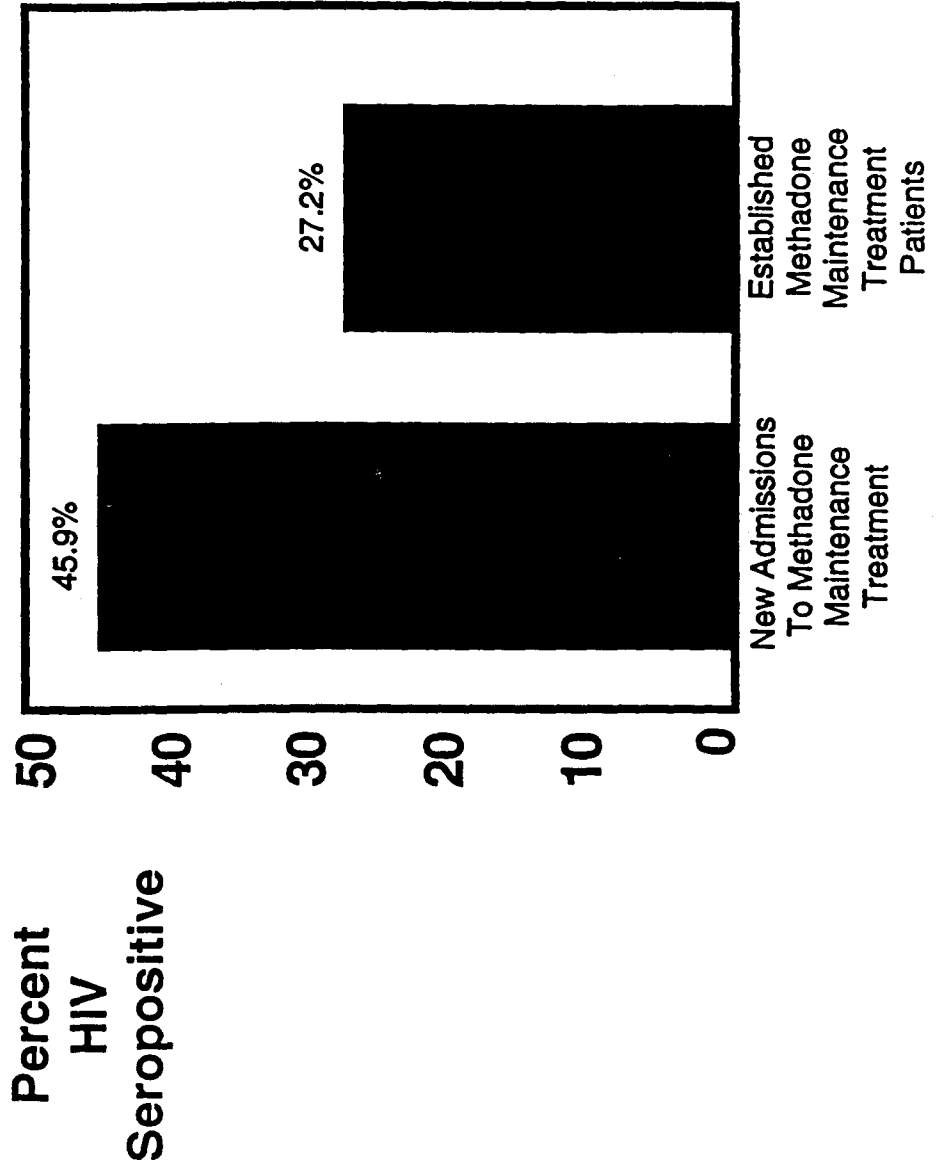
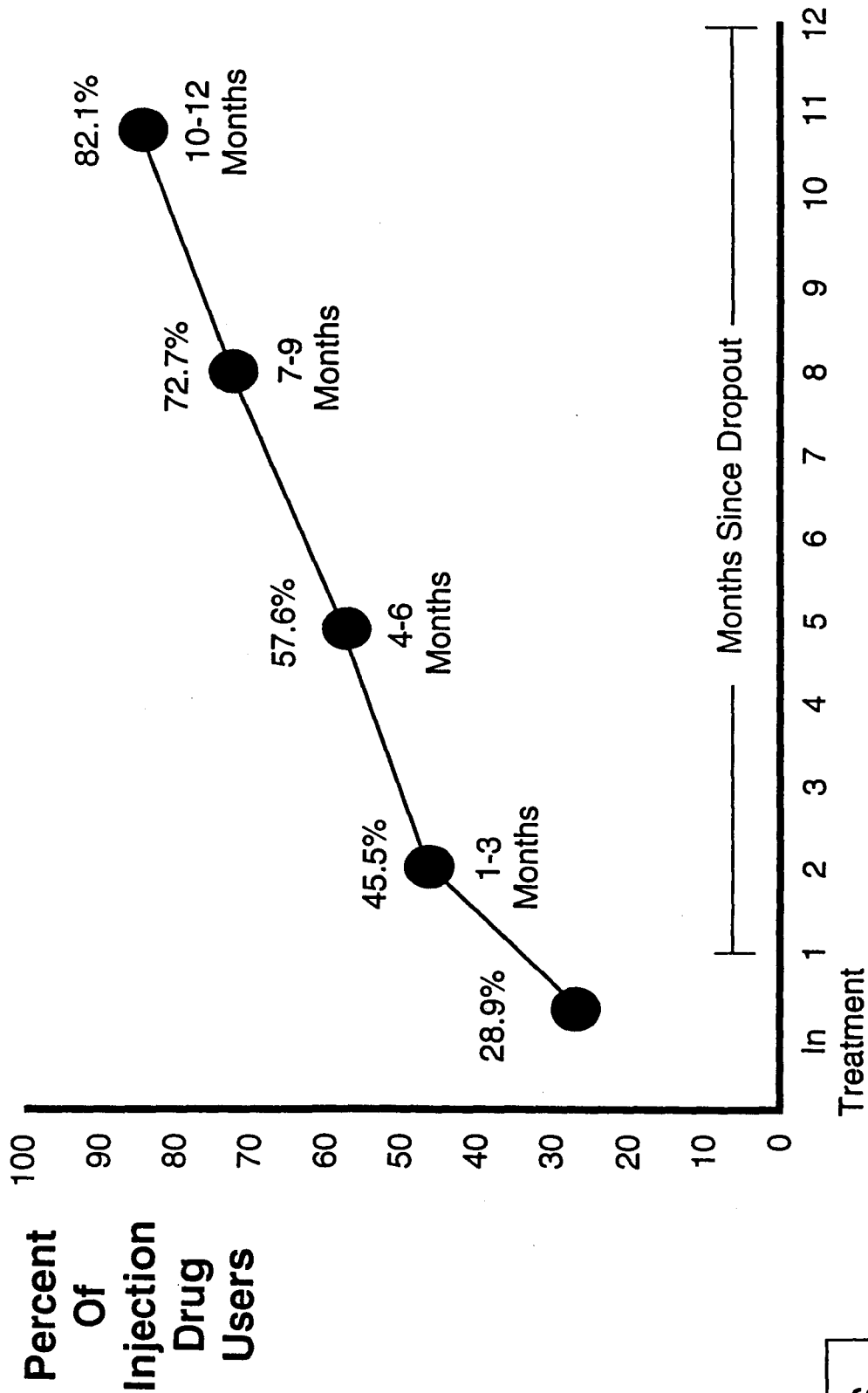


Figure 22
RAPID RETURN TO INJECTION DRUG USE FOLLOWING
PREMATURE TERMINATION OF METHADONE
MAINTENANCE TREATMENT

(Ball And Ross, 1991)

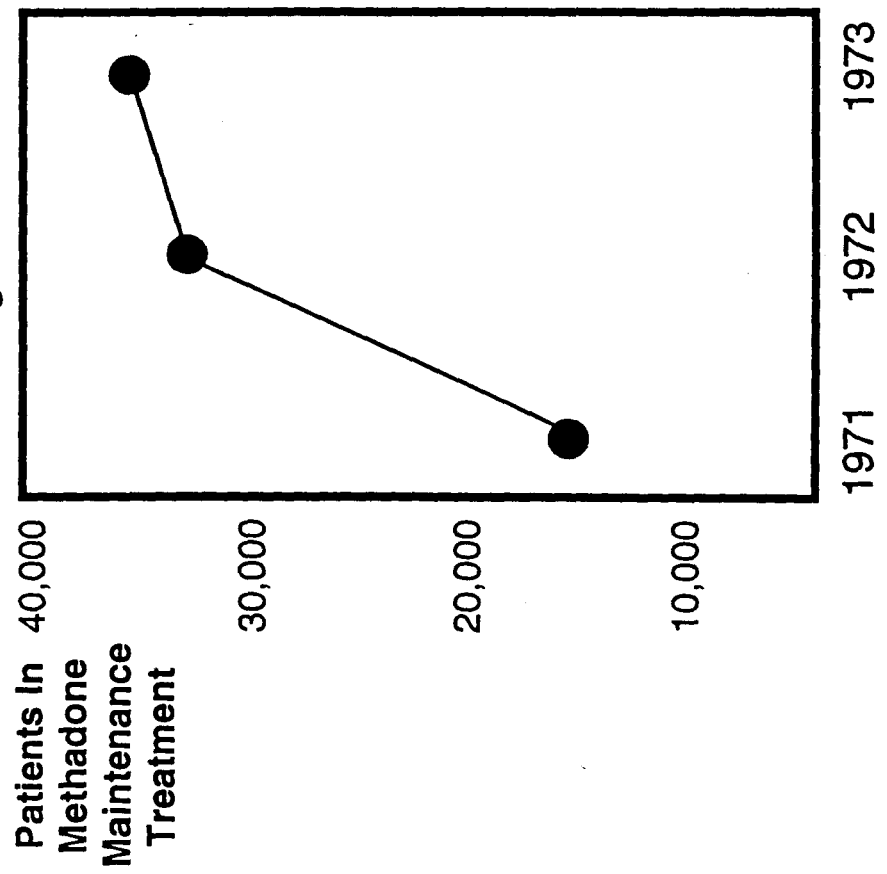


(N = 388 Male Patients)

INCREASED METHADONE MAINTENANCE CENSUS AND DECREASED HEPATITIS CASES: NYC, 1971-1973

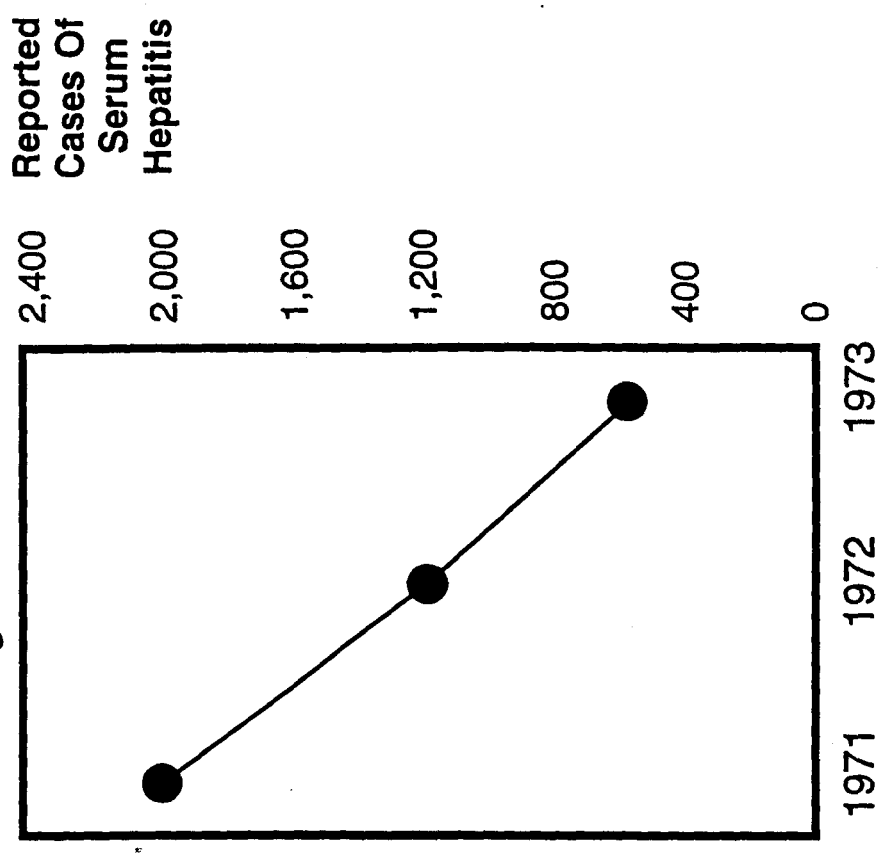
(Dole, Joseph, And DesJarlais, 1981)

Figure 23



3-Year Increase
(19,900 Additional Patients)

Figure 24



3-Year Decrease
(1,500 Fewer Cases)

Figure 25.
**DIFFERENCES BETWEEN MEN AND WOMEN IN
 HIV INFECTION RATES AND RISK BEHAVIORS**

(Adapted From Allen, Onorato, Green, Schoenbaum, et al., 1989)

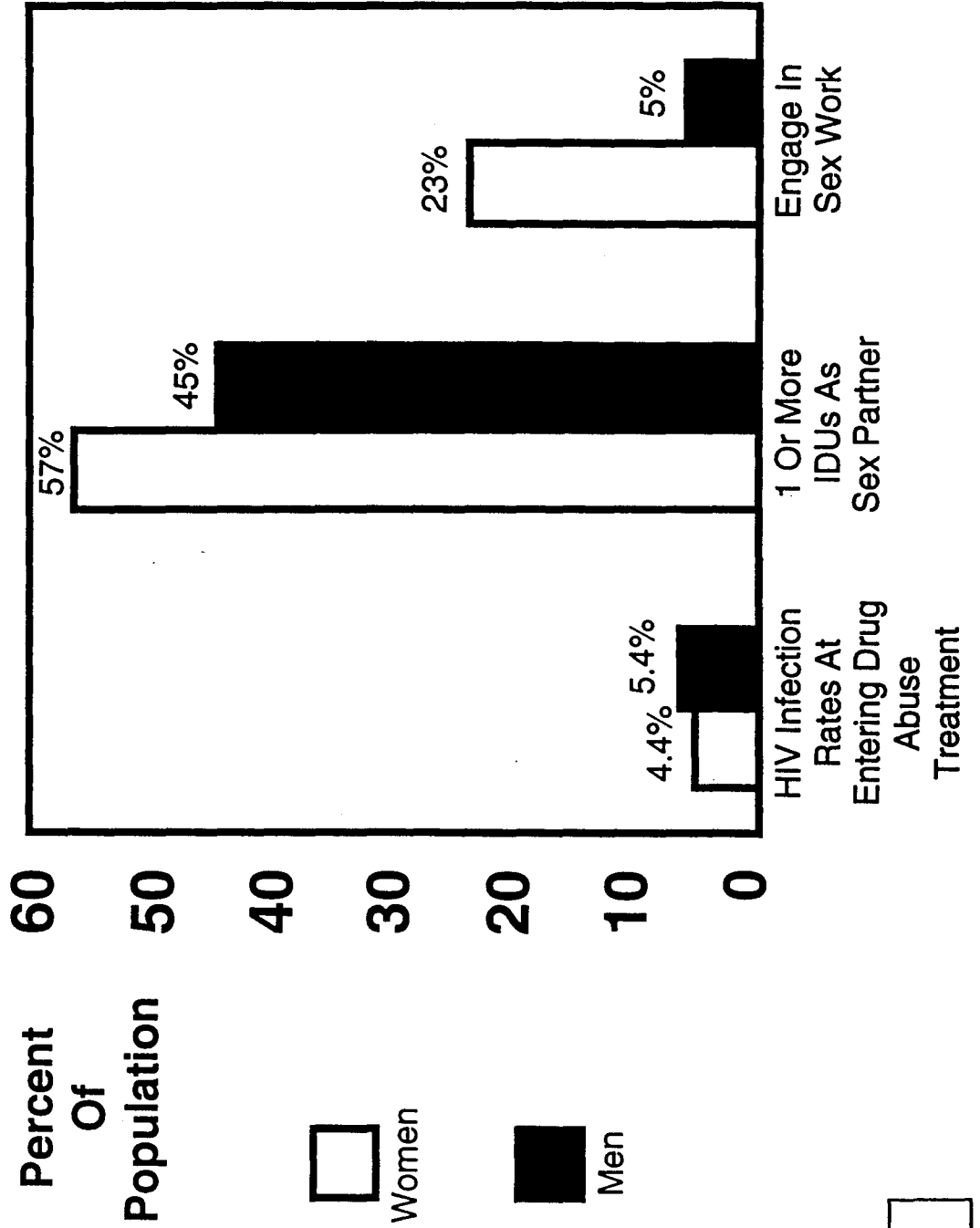


Figure 26

POTENTIAL TREATMENT ISSUES FOR WOMEN

Issues:

- Social Isolation
- Poor Self-Esteem
- Clinical Depression And Anxiety Disorders
- Physical And Sexual Abuse

Need for:

- Child Care
- Transportation To Treatment
- Non-Confrontational Therapy And Counseling
- Women-Specific Vocational Job Skills Training And Education

Figure 27

METHADONE SAFETY FOR PREGNANT WOMEN AND THEIR INFANTS

Methadone Maintenance:

- Reduces Adverse Pregnancy Outcomes
- Reduces Adverse Birth Outcomes
- Infant Withdrawal Is Treatable
- Shows No Long-Term Adverse Neurobehavioral Consequences To *In Utero* Exposure

Figure 28

METHADONE DOSAGE ADJUSTMENT DURING PREGNANCY

- Pregnancy Can Lower Methadone Blood Levels
- Lower Blood Levels Can Increase Relapse Risk
- Dosage Levels Should Be Evaluated And Individually Tailored To Reduce Risk Of Relapse And Stabilize Patient

Figure 29

COMMON SIDE EFFECTS AFTER 6 MONTHS TO 3 YEARS OF METHADONE MAINTENANCE TREATMENT

Symptoms And Signs	Intermediate Length Treatment		Long-Term, High-Dose Treatment
	(6 Months Or More; <40->80 mg/d)	(3 Years Or More; 80-120 mg/d)	
	Percent	Percent	Percent
Increased Sweating	47	47	48
Constipation	57	57	17
Libido Abnormalities	26	26	22
Orgasm Abnormalities	—	—	14
Sleep Abnormalities (Insomnia)	23	23	16
Appetite Abnormalities	19	19	4
Nausea	25	25	—
Drowsiness	23	23	—
Nervousness/Tension	21	21	—
Headaches	12	12	—
Body Aches And Pains	11	11	—
Chills	10	10	—

Figure 30

**PROGRAM CHARACTERISTICS
ASSOCIATED WITH SUCCESS
OF METHADONE MAINTENANCE TREATMENT**

Successful Programs Have:

- Comprehensive Services
- Integrated Medical, Counseling, And Administrative Services
- Individualized Treatment
- Adequate Dosing Policies
- Sufficient And Stable Staff
- Sufficient Staff Training

Figure 31
**ROLE OF PSYCHOSOCIAL SERVICES
 IN REDUCING ILLICIT OPIOID USE**
 (Adapted From McLellan et al., 1993)

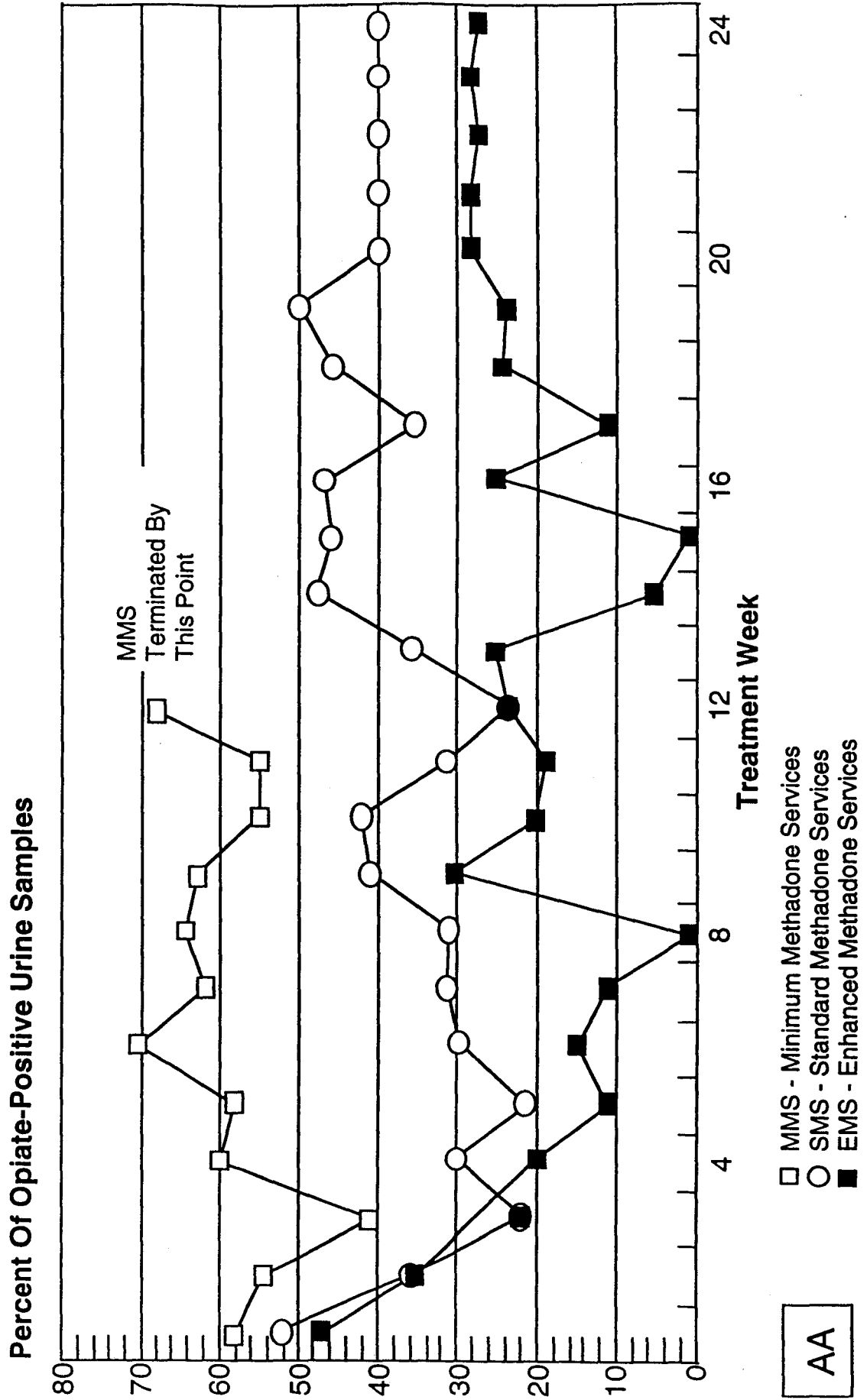


Figure 32

**PATIENT CHARACTERISTICS
ASSOCIATED WITH SUCCESS
IN METHADONE MAINTENANCE TREATMENT**

- Age: Older Than 25
- Minimal Criminal Involvement
- Short History Of Drug Abuse
- Mild To Moderate Drug Abuse Severity
- Emotional And Psychiatric Stability
- Intact Social Support Network
- Positive Employment History

Figure 33

COMPARISON OF TREATMENT AND SOCIETAL COSTS OF ACTIVE HEROIN ADDICTION

(Data From Harwood et al., 1988)

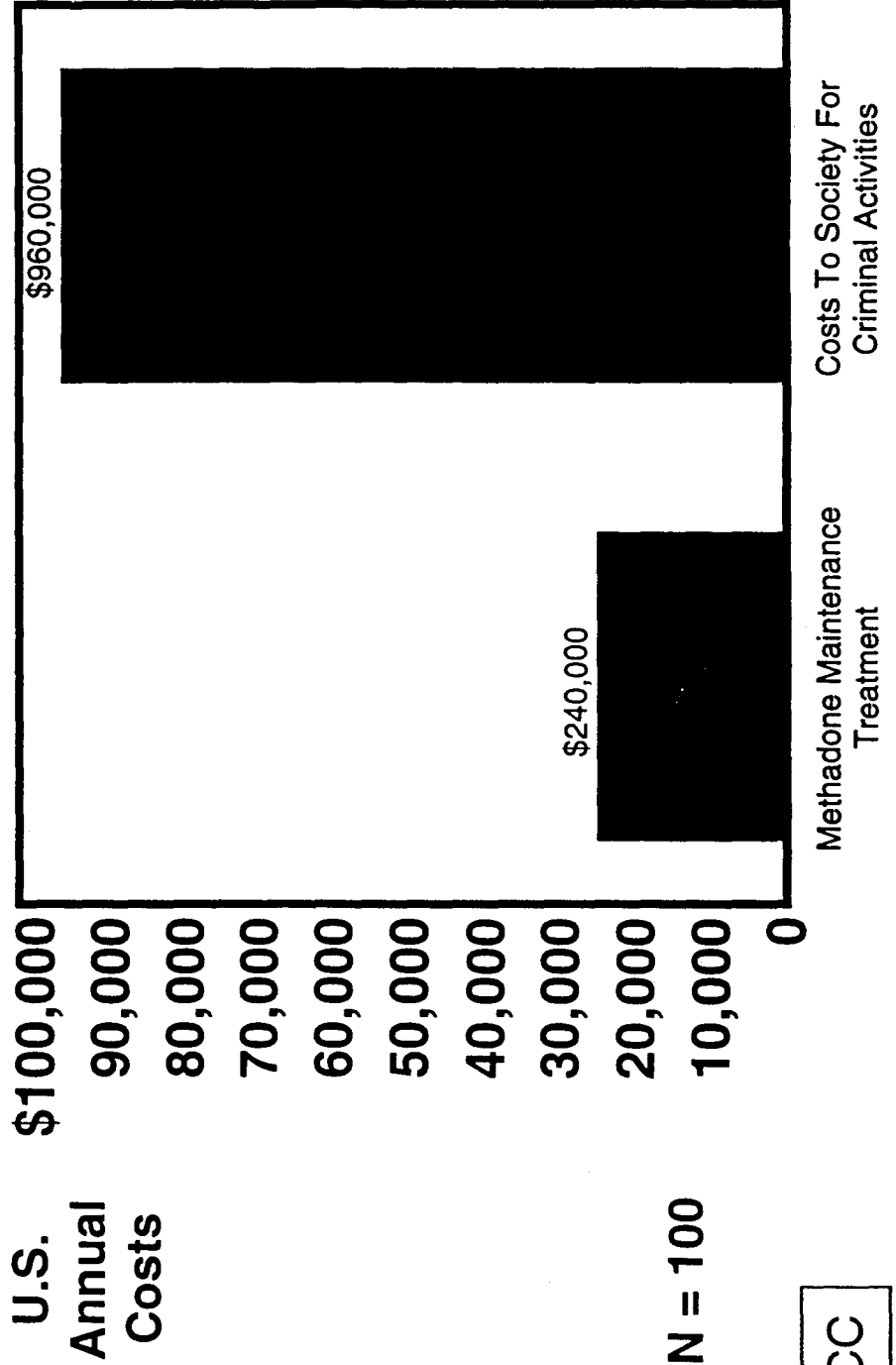


Figure 34

AVERAGE COSTS PER YEAR FOR 1 HEROIN ADDICT

(Adapted From New York State Division Of Substance Abuse Services, 1991, By Dole And DesJarlais)

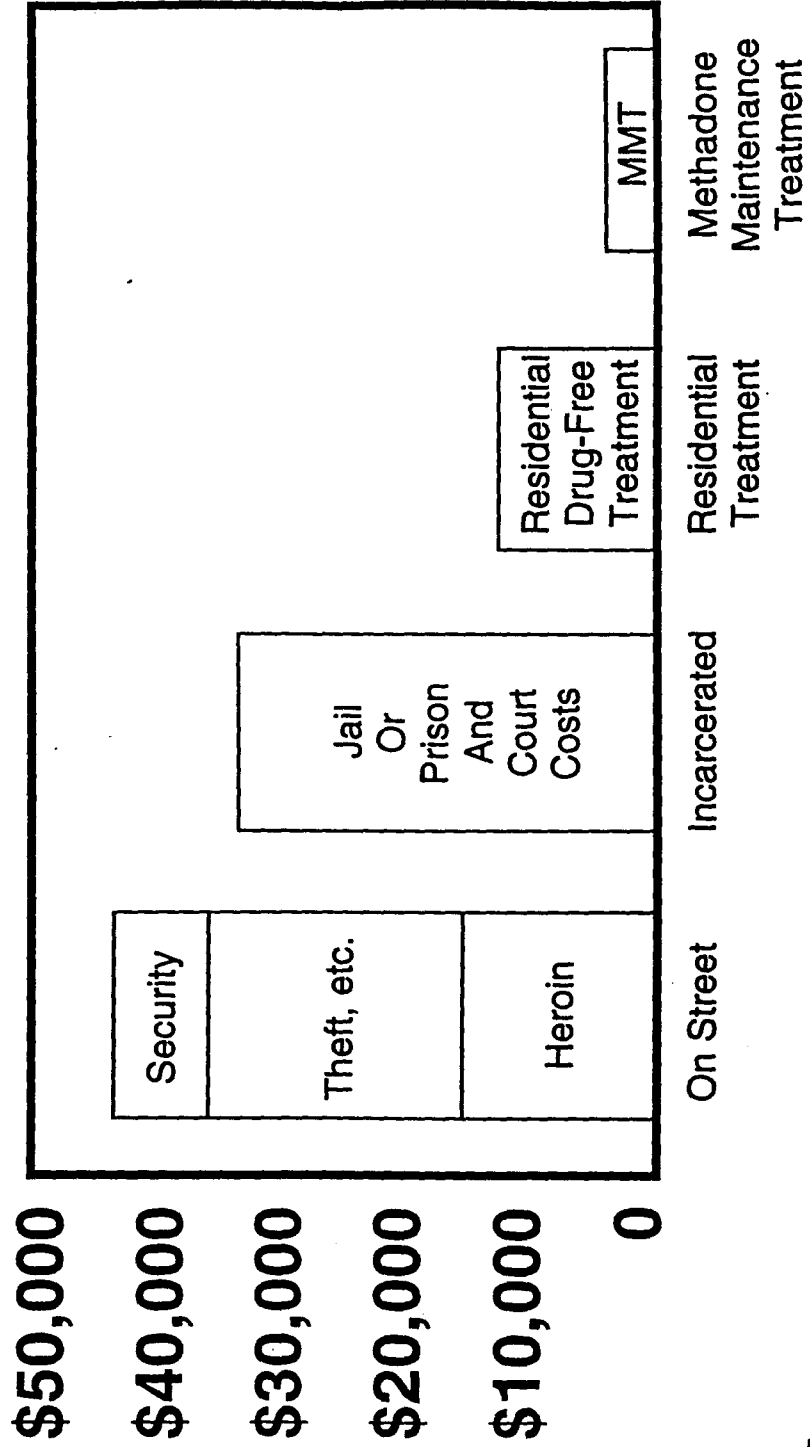


Figure 35
**ONE-YEAR TREATMENT RETENTION RATES
 FOR 3 LARGE STUDIES**

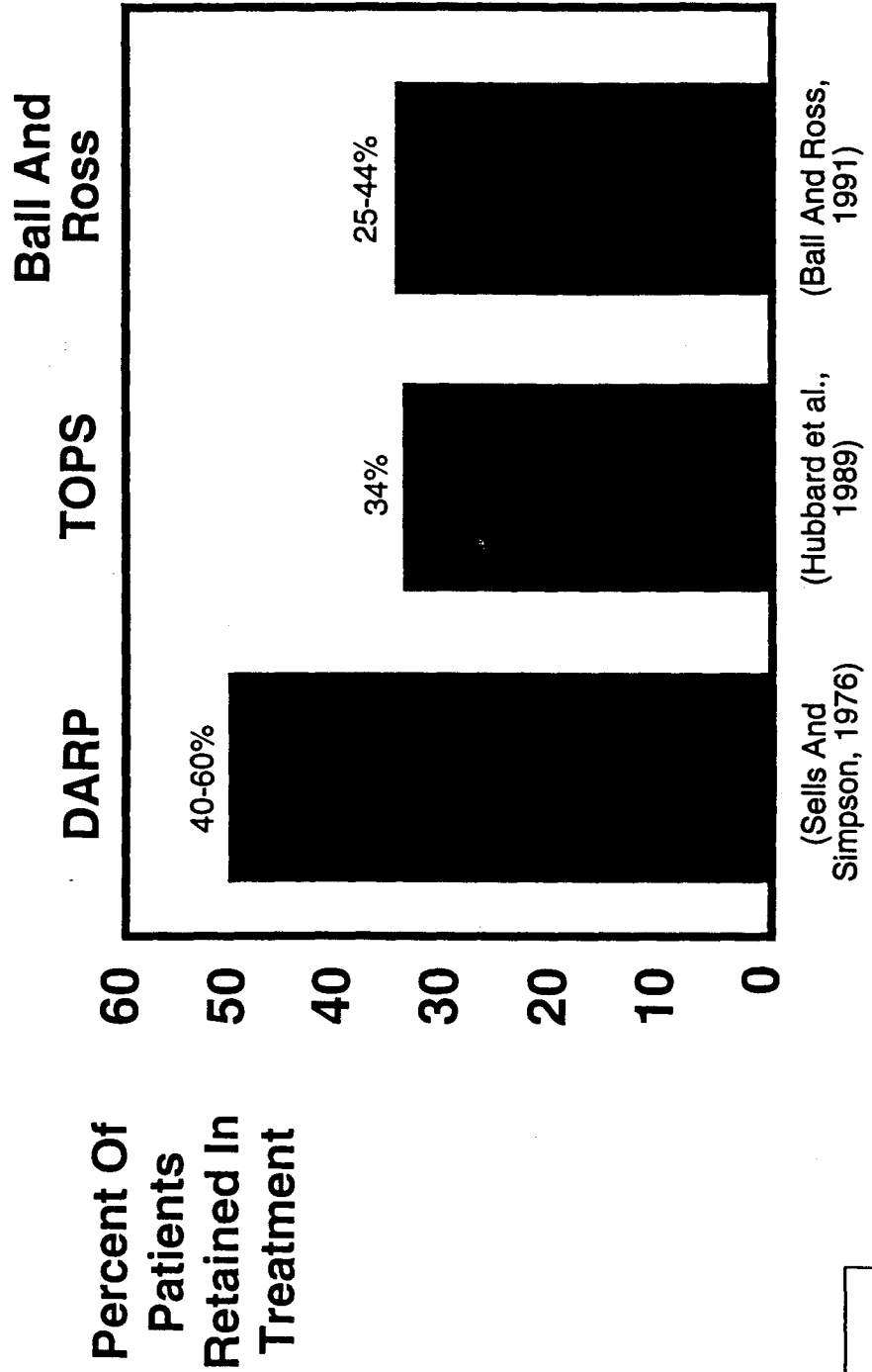


Figure 36

PREDICTORS OF RETENTION FOR METHADONE MAINTENANCE TREATMENT

(Condelli And Dunteman, 1993)

Program variables:

- Prompt, High-Quality Social Services
- Accessibility Of Program
- Disclosure Of Dose

Patient variables:

- Use Of Marijuana
- Age

MANDATED METHADONE MAINTENANCE TREATMENT AND 3 TREATMENT OUTCOMES

(Adapted From Anglin, Brecht, And Maddahian, 1990)

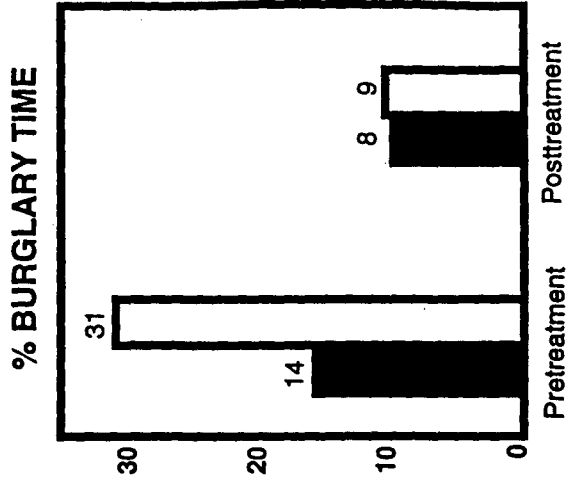
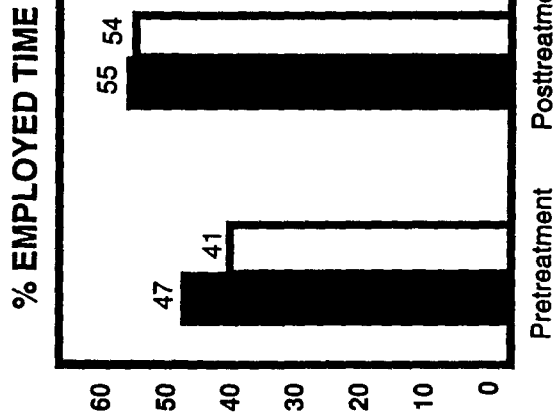


Figure 39

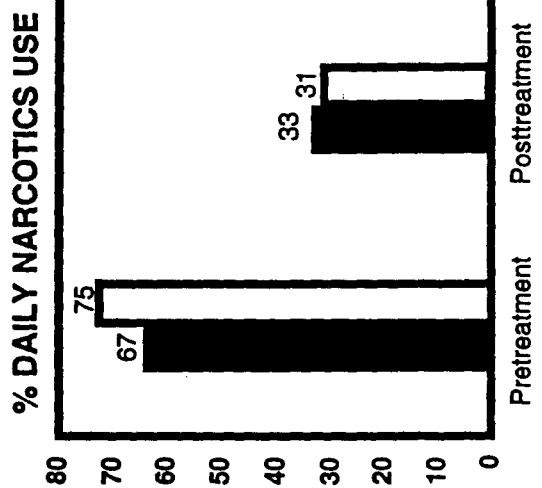


Figure 39

(Total N = 297)

Figure 40
**TREATMENT MODALITY SELECTION DECISION TREE
 FOR BUPRENORPHINE, LAAM, OR METHADONE**

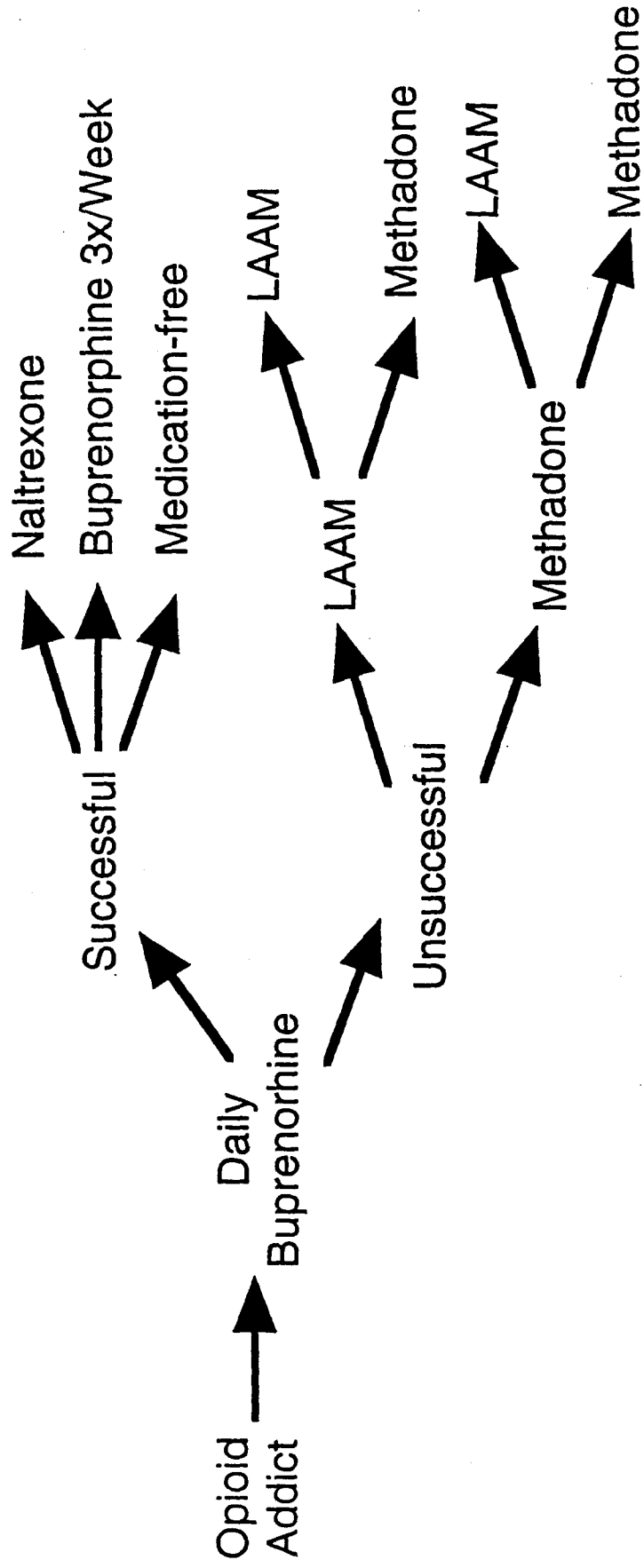


Figure 41

CLIENT AND PROVIDER BENEFITS OF LAAM

- Three-Times-Per-Week Clinic Visits
- No Take-Home Medication Preparation
- Fewer Take-Home Conflicts
- Less Weekend Staffing
- Less Paperwork
- Less Clinic Crowding
- Attracts New Patients Who Are Opposed To Methadone
- Less Potential For Street Diversion

Figure 42

POTENTIAL BENEFITS OF BUPRENORPHINE

- Low Abuse Potential
- Low Overdose Profile
- Relatively Mild Withdrawal Symptoms
- Eases Transfer To Opioid Antagonist Treatment