

DRUG POLICY ALLIANCE

Lindesmith Library



ABOUT

The Library
DPA
Contact

SEARCH

Library Catalog

SHOP

Articles
Booklets
Books
Reports

SIGN UP

Email:

[Submit]

[More]

Methadone Maintenance Treatment

SIGN UP

Get information from our partner organization, the Drug Policy Alliance Network.

Email:

[Submit]

DONATE

Support the Drug Policy Alliance's work to promote drug policies based on science, compassion, health and human rights.

Donate Now

DPA NETWORK

For the latest drug policy reform news and action alerts, visit our partner organization, DPA Network.

Methadone, a long-acting synthetic narcotic analgesic, was first used in the maintenance treatment of drug addiction in the mid-1960s by Drs. Vincent Dole and Marie Nyswander of Rockefeller University. There are now 115,000 methadone maintenance patients in the United States, 40,000 of whom are in New York State and about half that many are in California. (1). Methadone is widely employed throughout the world, and is the most effective known treatment for heroin addiction. (2).

The goal of methadone maintenance treatment (MMT) is to reduce illegal heroin use and the crime, death, and disease associated with heroin addiction. Methadone can be used to detoxify heroin addicts, but most heroin addicts who detox—using methadone or any other method—return to heroin use. Therefore, the goal of MMT is to reduce and even eliminate heroin use among addicts by stabilizing them on methadone for as long as is necessary to help them avoid returning to previous patterns of drug use. The benefits of MMT have been established by hundreds of scientific studies, and there are almost no negative health consequences of long-term methadone treatment, even when it continues for twenty or thirty years.

The success of methadone in reducing crime, death, disease, and drug use is well documented. (3).

- **Methadone is the most effective treatment for heroin addiction.** Compared to the other major drug treatment modalities—drug-free outpatient treatment, therapeutic communities, and chemical dependency treatment—methadone is the most rigorously studied and has yielded the best results. (4)
- **Methadone is effective HIV/AIDS prevention. (5)** MMT reduces the frequency of injecting and of needle sharing. (6) Methadone treatment is also an important point of contact with service providers and supplies an opportunity to teach drug users harm reduction techniques such as how to prevent HIV/AIDS, hepatitis, and other health problems that endanger drug users. (7)
- **Methadone treatment reduces criminal behavior. (8)** Drug-offense arrests decline because MMT patients reduce or stop buying and using illegal drugs. Arrests for predatory crimes decline because MMT patients no longer need to finance a costly heroin addiction, and because treatment allows many patients to stabilize their lives and obtain legitimate employment.
- **Methadone drastically reduces, and often eliminates, heroin use among addicts. (9)** The Treatment Outcome Prospective Study (TOPS)—the largest contemporary controlled study of drug treatment—found that patients drastically reduced their heroin use while in treatment, with less than 10% using heroin weekly or daily after just three months in treatment. (10) After two or more years, heroin use among MMT patients declines, on average, to 15% of pretreatment levels. (11) Often, use of other drugs—including cocaine, (12) sedatives, (13) and even alcohol (14) — also declines when an opiate addict enters methadone treatment, even though methadone has no direct pharmacological effect on non-opiate drug craving.
- **Methadone is cost effective.** MMT, which costs on average about \$4,000 per patient per year, (15) reduces the criminal behavior associated with illegal drug use, promotes health, and improves social productivity, all of which serve to reduce the societal costs of drug addiction. Cost benefit analyses indicate savings of \$4 to \$5 in health and social costs for every dollar spent on MMT. (16) Incarceration costs \$20,000 (17) to \$40,000 (18) per year. Residential drug treatment programs are significantly more expensive than MMT, at a cost of \$13,000 to \$20,000 per year, though it should be noted that treatment stays are typically no more than one year in these programs. (19) Finally, given that only 5 to 10% of the cost of MMT actually pays for the medication itself, (20) methadone could be prescribed and delivered even less expensively, through physicians in general medical practice, low-service clinics, and pharmacies.

Methadone is effective outside of traditional clinic settings.

Methadone in the U.S. is generally restricted to specialized methadone clinics, which are subject to a host of counseling and other service requirements mandated by federal, state, and municipal regulators. Though limited, experiments with providing methadone through alternate means have had positive results.

- **Limited Service Methadone Maintenance.** Limited service MMT is a low-cost method of providing methadone treatment services to addicts who cannot or will not access comprehensive methadone programs. Though limited service programs may not be as effective as the best full service programs, their patients do substantially reduce drug use and typically fare better than do illicit drug users not enrolled in any program. (21)
- **Physician Prescribing.** MMT as part of general medical practice is increasingly common throughout Europe, Australia, New Zealand, and Canada, but is severely restricted in the U.S. A few "medical maintenance" experiments in the United States, which permitted some long-term methadone recipients to transfer from traditional methadone clinics to office-based physicians, have achieved excellent treatment results. (22) Medical maintenance is also cost-effective, and patients often prefer it over traditional methadone clinics. (23)

Questions about methadone:

- **How does methadone work?** Methadone is an opiate agonist which has a series of actions similar to those of morphine and other narcotic medications. (24) Heroin addicts are physically dependent on opiate drugs and will experience withdrawal symptoms and narcotic craving if the concentration of opiates in the body falls below a certain level. The proper dose of methadone both wards off acute withdrawal symptoms and markedly reduces chronic narcotic craving by stabilizing blood levels of the drug and its metabolites, thereby permitting "normal" functioning. (25) In MMT, tolerance is deliberately induced to a stable dose of methadone that is sufficiently high to block the narcotic and euphoric action of methadone and other opiates. (26)
- **Does methadone make patients "high" or interfere with normal functioning?** No. Used in maintenance treatment, in proper doses, methadone does not create euphoria, sedation, or analgesia. (27) Methadone has no adverse effects on motor skills, mental capacity, or employability. (28)
- **What is the proper dose of methadone?** Doses must be individually determined, due to differences in metabolism, body weight, and opiate tolerance. (29) The proper maintenance dose is one at which narcotic craving is averted—without creating euphoria, sedation, or analgesia—for 24 to 36 hours. (30) Doses of 60 to 100 mg, and sometimes more, are required for most patients; (31) doses below 60 mg are almost always insufficient for patients who wish to abstain from heroin use. (32)
- **Is methadone more addictive than heroin?** Physical dependence and tolerance to a drug are part of addiction, but they're not the whole story. Addiction is characterized by compulsive use of a drug despite adverse consequences. (33) The MMT patient is no more an addict than the terminal cancer patient who is physically dependent on morphine, or the diabetic who is dependent on insulin. They do not seek out the drug in the absence of withdrawal symptoms or pain, and their lives do not revolve around drug use.
- **Is methadone harder to kick than heroin?** Symptoms of abrupt withdrawal are qualitatively similar when the amount of drug used is pharmacologically equivalent, but withdrawal from heroin tends to be intense and fairly brief, while methadone withdrawal is less acute and longer lasting. (34) Withdrawal symptoms can be ameliorated by tapering the dose over an extended period of time. (35)
- **Is methadone maintenance treatment for life?** Some patients remain in methadone treatment for more than ten years, and even for the rest of their lives, but they constitute a minority (5 to 20%) of patients. (36)
- **How long should treatment last?** Generally, the length of time spent in treatment is positively related to treatment success. (37) The duration of treatment should be individually and clinically determined, and treatment should last for as long as the physician and the individual patient agree is appropriate. (38) Federal, and often state, regulations require annual evaluation of patients to determine whether they should continue in MMT. (39)
- **Is methadone a desirable street drug, with high potential for abuse?** Though methadone is sometimes sold on the illicit drug market, most buyers of diverted methadone are active heroin users who won't or can't get into a methadone program. (40) The extent of abuse associated with diverted methadone is small relative to heroin and cocaine, and primary addiction to methadone is rare. (41) While improper use of methadone, like that of almost any drug, can lead to overdose, overdose deaths attributed to methadone alone are few compared to heroin deaths. In its 1994 sample of emergency room incidents, the Drug Abuse Warning

Network noted 15 methadone deaths, 251 heroin/morphine deaths, and 13 aspirin deaths. (42) Finally, not all methadone overdose deaths are necessarily caused by illicitly purchased methadone; some are undoubtedly the result of accidental or inappropriate consumption of legally obtained methadone, often in combination with alcohol or other drugs.

- **Does methadone interfere with good health?** Scientific studies have shown that the most significant health consequence of long-term methadone treatment is a marked improvement in general health. (43) Concerns about methadone's effects on the immune system (44) and on the kidneys, liver, and heart (45) have been laid to rest. Methadone's most common side effects—constipation and sweating—usually fade with time and are not serious health hazards. (46)
- **Is it safe to take methadone during pregnancy?** MMT during pregnancy does not impair the child's developmental and cognitive functioning, indeed it is the medically recommended course of treatment for most opiate-dependent pregnant women. (47)
- **Is methadone maintenance appropriate for all drug users?** No. Methadone is a treatment for opiate dependence, and is not appropriate for individuals who use heroin but are not, and have not been, dependent. (48) There are also drug-free treatment options and, increasingly, other medications—including buprenorphine, LAAM, and naltrexone—that may be appropriate for some users. (49) Outside the United States, some active drug users are being prescribed heroin, codeine, morphine, and injectable methadone. (50)

[para español](#)

Notes

1. Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995:170, 174.
2. Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:187.
3. See, for example: Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995; Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:187; Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag; 1991; Dole VP, Nyswander M, Warner A. Successful treatment of 750 criminal addicts. *JAMA: Journal of the American Medical Association*. 1968;206:2708-2711; Anglin MD, McGlothlin WH. Outcome of narcotic addict treatment in California. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:106-128; Hubbard RL, Rachal JV, Craddock SG, Cavanaugh ER. Treatment Outcome Prospective Study (TOPS): Client characteristics and behaviors before, during, and after treatment. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:42-68; See also the primary randomized controlled studies of methadone's effectiveness: Dole VP, Robinson JW, Orraca J, Towns E, Searcy P, Caine E. Methadone treatment of randomly selected criminal addicts. *New England Journal of Medicine* 1969;280:1372-1375; Newman RG, Whitehill WB. Double-blind comparison of methadone and placebo maintenance treatments of narcotic addicts in Hong Kong. *Lancet*. 1979;8141:485-488; Gunne L, Grönlund L. The Swedish methadone maintenance program: A controlled study. *Drug and Alcohol Dependence*. 1981;7:249-256.
4. See: Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:187; The TOPS study of over 11,000 drug users found that retention in treatment is the best predictor of treatment success, and found that methadone had the best retention rates of all three treatment modalities studied (methadone maintenance, therapeutic communities, and drug-free outpatient treatment). Hubbard RL, Rachal JV, Craddock SG, Cavanaugh ER. Treatment Outcome Prospective Study (TOPS): Client characteristics and behaviors before, during, and after treatment. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:42-68; Hubbard RL, et al. *Drug Abuse Treatment: A National Study of Effectiveness*. Chapel Hill: University of North Carolina Press; 1989; See also discussion in: Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University

- Press; 1992:29-32.
5. Novick DM, Joseph H, Croxson TS, et al. Absence of antibody to Human Immunodeficiency Virus in long-term, socially rehabilitated methadone maintenance patients. *Archives of Internal Medicine*. 1990;150:97-99. Abdul-Quadar AS, Friedman SR, des Jarlais D, Marmor MM, Maslansky R, Bartelme S. Methadone maintenance and behavior by intravenous drug users that can transmit HIV. *Contemporary Drug Problems*. 1987;14:425-434; Chu A, Brown LS, Banks S, Nemoto T, Primm BJ. Intravenous heroin use: Its association with HIV infection in patients in methadone treatment. In: Harris LS, ed. *Problems of Drug Dependence 1989: Proceedings of the 51st Annual Scientific Meeting, The Committee on Problems of Drug Dependence*. NIDA Research Monograph 95. Rockville, MD: U.S. Department of Health and Human Services; 447-448; Chaisson RE, Bacchetti P, Osmond D, Brodie B, Sande MA, Moss AR. Cocaine use and HIV infection in intravenous drug users in San Francisco. *JAMA: Journal of the American Medical Association*. 1989;261:561-565.
 6. Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag; 1991;166-170; Ball JC, Lange WR, Myers CP, Friedman SR. Reducing the risk of AIDS through methadone maintenance treatment. *Journal of Health and Social Behavior*. 1988;29:214-226. See also: Selwyn PA, Feiner C, Cox CP, Lipshutz C, Cohen RL. Knowledge about AIDS and high-risk behavior among intravenous drug users in New York City. *AIDS*. 1987;1:1289-1294; Darke S, Hall W, Heather N, Ward J, Wodak A. The reliability and validity of a scale to measure HIV risk taking behavior among intravenous drug users. *AIDS*. 1991;5:181-185; Both discussed in: Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:56.
 7. Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:46-61.
 8. Hubbard RL, Rachal JV, Craddock SG, Cavanaugh ER. Treatment Outcome Prospective Study (TOPS): Client characteristics and behaviors before, during, and after treatment. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:42-68; Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag; 1991:195-211; Joseph H. The criminal justice system and opiate addiction: A historical perspective. In: Leukefeld CG, Tims FM, eds. *Compulsory Treatment of Drug Abuse: Research and Clinical Practice*. NIDA Research Monograph 86. Rockville, MD: U.S. Department of Health and Human Services; 1988:117; Newman RG, Peyser N. Methadone treatment: Experiment and experience. *Journal of Psychoactive Drugs*. 1991;23:115-121.
 9. Hubbard RL, Rachal JV, Craddock SG, Cavanaugh ER. Treatment Outcome Prospective Study (TOPS): Client characteristics and behaviors before, during, and after treatment. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:42-68; Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag; 1991:160-176; Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:136-153; Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995:22; Newman RG. *Methadone Treatment in Narcotic Addiction*. New York: Academic Press; 1977.
 10. Hubbard RL, Rachal JV, Craddock SG, Cavanaugh ER. Treatment Outcome Prospective Study (TOPS): Client characteristics and behaviors before, during, and after treatment. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:42-68.
 11. Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995:22.
 12. Magura S, Siddiqi Q, Freeman RC, Lipton DS. Changes in cocaine use after entry to methadone treatment. In: *Cocaine, AIDS, and Intravenous Drug Use*. New York: Haworth Press; 1991; Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag; 1991:160-175; Hartel D, et al. Temporal patterns of cocaine use and AIDS in intravenous drug users in methadone maintenance [Abstract]. Presented at the 5th International Conference on AIDS; June 1989; Montreal, Canada; Cited in: Lowinson JH, Marion IJ, Joseph H, Dole, VP. Methadone maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:550-561.
 13. Fairbank A, Duntzman GH, Condelli WS. Do methadone patients substitute other drugs for heroin? Predicting substance use at 1-year follow-up. *American Journal of Drug and Alcohol Abuse*. 1993;19:465-474. Discussed in: Bertschy G. Methadone maintenance treatment: An update. *European Archives of Psychiatry and Clinical Neuroscience*. 1995;245:114-124; Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag;

- 1991:160-175.
14. Fairbank A, Dunteman GH, Condelli WS. Do methadone patients substitute other drugs for heroin? Predicting substance use at 1-year follow-up. *American Journal of Drug and Alcohol Abuse*. 1993;19:465-474. Discussed in: Bertschy G. Methadone maintenance treatment: An update. *European Archives of Psychiatry and Clinical Neuroscience*. 1995;245:114-124; Ball JC, Ross A. *The Effectiveness of Methadone Maintenance Treatment*. New York: Springer-Verlag; 1991:160-175.
 15. Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:151-152; Swan N. Research demonstrates long-term benefits of methadone treatment. *NIDA Notes*. 1994;9.
 16. California Department of Alcohol and Drug Programs. *Evaluating Recovery Services: The California Drug and Alcohol Treatment Assessment (CALDATA): General Report*. Sacramento, CA: California Department of Alcohol and Drug Programs; 1994; Harwood HJ, Hubbard RL, Collins JJ, Rachal JV. The costs of crime and the benefits of drug abuse treatment: A cost benefit analysis using TOPS data. In: Leukefeld CG, Tims FM, eds. *Compulsory Treatment of Drug Abuse: Research and Clinical Practice*. NIDA Research Monograph 86. Rockville, MD: U.S. Department of Health and Human Services; 1988:209-235; Swan N. Research demonstrates long-term benefits of methadone treatment. *NIDA Notes*. 1994; Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:151-152.
 17. Criminal Justice Institute. *The Corrections Yearbook: Instant Answers to Key Questions in Corrections*. New York: Criminal Justice Institute; 1995.
 18. Godshaw G, Koppel R, Pancoast R. Anti-drug law enforcement efforts and their impact. Washington, DC: U.S. Customs Services, Department of the Treasury; 1989. Cited in: Swan N. Research demonstrates long-term benefits of methadone treatment. *NIDA Notes*. 1994.
 19. Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:189.
 20. Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995:162.
 21. Yancovitz SR, Des Jarlais DC, Peyser NP, et al. A randomized trial of an interim methadone maintenance clinic. *American Journal of Public Health*. 1991;81:1185-1191; Newman RG. Narcotic addiction and methadone treatment in Hong Kong. *Journal of Public Health Policy*. 1985;6:526-538; Buning EC, Coutinho RA, van Brussel GH, van Santen GW, van Zadelhoff AW. Preventing AIDS in drug addicts in Amsterdam. *Lancet*. 1986;8495:1435; See also: McClellan AT, Arndt IO, Metzger D, Woody G, O'Brien CP. The effects of psychosocial services in substance abuse treatment. *JAMA: Journal of the American Medical Association*. 1993;269:1953-1959. Though this study concluded that minimal service methadone treatment was ineffective, patients who received minimal services did substantially reduce their heroin use.
 22. Novick DM, Pascarelli EF, Joseph H, et al. Methadone maintenance patients in general medical practice. *JAMA: Journal of the American Medical Association*. 1988;259:3299-3302; Novick DM, et al. Medical maintenance: A new model for continuing treatment of socially rehabilitated methadone maintenance patients. *JAMA: Journal of the American Medical Association*. 1988;259:3299-3302; Novick DM, Joseph H, Salsitz EA, et al. Outcomes of treatment of socially rehabilitated methadone maintenance patients in physicians' offices (Medical maintenance). *Journal of General Internal Medicine*. 1994:127-130; Novick DM, Joseph H. Medical maintenance: The treatment of chronic opiate dependence in general medical practice. *Journal of Substance Abuse Treatment*. 1991;8:233-239; Senay EC, Barthwell A, Marks R, Bokos PJ. Medical maintenance: An interim report. *Journal of Addictive Diseases*. 1994;13:65-69.
 23. Novick DM, Pascarelli EF, Joseph H, et al. Methadone maintenance patients in general medical practice. *JAMA: Journal of the American Medical Association*. 1988;259:3299-3302; Novick DM, Joseph H, Salsitz EA, et al. Outcomes of treatment of socially rehabilitated methadone maintenance patients in physicians' offices (Medical maintenance). *Journal of General Internal Medicine*. 1994:127-130; Novick DM, Joseph H. Medical maintenance: The treatment of chronic opiate dependence in general medical practice. *Journal of Substance Abuse Treatment*. 1991;8:233-239; Senay EC, Barthwell A, Marks R, Bokos PJ. Medical maintenance: An interim report. *Journal of Addictive Diseases*. 1994;13:65-69.
 24. Newman RG. The pharmacological rationale for methadone treatment of narcotic addiction. In: Tagliamonte A, Maremmani I, eds. *Drug Addiction and Related Clinical Problems*. New York: Springer-Verlag; 1995:109-118.
 25. Drucker E. Harm reduction: A public health strategy. *Current Issues in Public Health*. 1995;1:64-70.
 26. Dole VP, Nyswander ME, Kreek MJ. Narcotic blockade. *Archives of Internal Medicine*. 1966;118:304-309.

27. Lowinson JH, Marion IJ, Joseph H, Dole VP. Methadone maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:552.
28. *Regarding Methadone Treatment: A Review*. New York: New York State Committee of Methadone Program Administrators; 1995:7; Lowinson JH, Marion IJ, Joseph H, Dole VP. Methadone maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:553-54; Newman RG. The pharmacological rationale for methadone treatment of narcotic addiction. New York: Springer-Verlag; 1995.
29. Lowinson JH, Marion IJ, Joseph H, Dole VP. Methadone maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:552-53; Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:86-115.
30. Lowinson JH, Marion IJ, Joseph H, Dole VP. Methadone maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:552-53; Payte JT, Khuri ET. Principles of methadone dose determination. In: Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993:47-58.
31. Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993:18-19; Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:149-50; Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:96-104.
32. Lowinson JH, Marion IJ, Joseph H, Dole, VP. Methadone maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:552-53; Payte JT, Khuri ET. Principles of methadone dose determination. In: Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993; Hargreaves WA. Methadone dosage and duration for maintenance treatment. In: Cooper JR, et al., eds. *Research on the Treatment of Narcotic Addiction: State of the Art*. Rockville, MD: U.S. Department of Health and Human Services; 1983; Cooper JR, Altman F, Keeley K. Discussion summary of: Hargreaves WA: Methadone dosage and duration for maintenance treatment. In: Cooper JR, et al., eds. *Research on the Treatment of Narcotic Addiction: State of the Art*. Rockville, MD: U.S. Department of Health and Human Services; 1983; Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:86-115; Payte JT, Khuri ET. Principles of methadone dose determination. In: Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993:47-58; Caplehorn JRM, Bell J. Methadone dosage and retention of patients in maintenance treatment. *Medical Journal of Australia*. 1991;154:195-99.
33. Institute of Medicine. Federal Regulation of Methadone Treatment. Washington, DC: National Academy Press; 1995:210.
34. Velten E. Myths about methadone. In: *National Alliance of Methadone Advocates Education Series*. New York: National Alliance of Methadone Advocates; 1992; Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:196-215; Byrne A. *Methadone in the Treatment of Narcotic Addiction*. Redfern, Australia: Tosca Press; 1995:53-54.
35. Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:29-32.
36. Bertschy G. Methadone maintenance treatment: An update. *European Archives of Psychiatry and Clinical Neuroscience*. 1995;245:114-124.
37. Simpson DD. The relation of time spent in drug abuse treatment to post-treatment outcome. *American Journal of Psychiatry*. 1979;136:1449-1453; Simpson DD. Treatment for drug abuse: Follow-up outcomes and length of time spent. *Archives of General Psychiatry*. 1981;38:875-880; Hubbard RL, Rachal JV, Craddock SG, Cavanaugh ER. Treatment Outcome Prospective Study (TOPS): Client characteristics and behaviors before, during, and after treatment. In: Tims FM, Ludford JP, eds. *Drug Abuse Treatment Evaluation: Strategies, Progress, and Prospects*. NIDA Research Monograph 51. Rockville, MD: U.S. Department of Health and Human Services; 1984:42-68; All discussed in: Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:29-32.
38. Payte JT, Khuri ET. Treatment duration and patient retention. In: Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991.

- Rockville, MD: U.S. Department of Health and Human Services; 1993:119.
39. *Regarding Methadone Treatment: A Review*. New York: New York State Committee of Methadone Program Administrators; 1995:15.
 40. Center for Substance Abuse Treatment. State Methadone Treatment Guidelines. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993:6; Spunt B, Hunt D, Lipton D, Goldsmith D. Methadone diversion: A new look. *Journal of Drug Issues*. 1986;16:569-583.
 41. Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995:114.
 42. These are all deaths which can be directly attributed to the named drug alone. Excluded are incidents involving multiple drugs, physiological condition, external physical events, and medical disorders that distort the actual cause of death. Substance Abuse and Mental Health Services Administration, Office of Applied Studies. *Data from the Drug Abuse Warning Network (DAWN) Medical Examiner Data*; Rockville, MD: U.S. Department of Health and Human Services; 1995:Table 2.10.
 43. Kreek MJ. Health consequences associated with the use of methadone. In: Cooper JR, et al., eds. *Research on the Treatment of Narcotic Addiction: State of the Art*. NIDA Treatment Research Monograph Series. DHHS Pub. No. (ADM) 83-1281. Rockville, MD: U.S. Department of Health and Human Services; 1983.
 44. Kreek MJ. A personal retrospective and prospective viewpoint. In: Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993:138.
 45. National Institute on Drug Abuse. *Medical Evaluation of Long-Term Methadone-Maintained Clients*. NIDA Services Research Monograph Series. DHHS Publication No. (ADM) 81-1029. Rockville, MD: U.S. Department of Health and Human Services; 1980.
 46. Lowinson JH, Marion IJ, Joseph H, Dole VP. Methadone Maintenance. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:550-561.
 47. Kaltenbach K, Silverman N, Wapner R. Methadone maintenance during pregnancy. In: Center for Substance Abuse Treatment. *State Methadone Treatment Guidelines*. DHHS Publication No. (SMA) 93-1991. Rockville, MD: U.S. Department of Health and Human Services; 1993:85-93; Finnegan LP. Treatment issues for opioid-dependent women during the perinatal period. *Journal of Psychoactive Drugs*. 1991;23:191-201; Finnegan LP. Clinical perinatal and developmental effects of methadone. In: Cooper JR, et al., eds. *Research on the Treatment of Narcotic Addiction: State of the Art*. Rockville, MD: U.S. Department of Health and Human Services; 1983; Institute of Medicine. *Federal Regulation of Methadone Treatment*. Washington, DC: National Academy Press; 1995:203-4; Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:235-56; Jarvis MAE, Schnoll SH. Methadone treatment during pregnancy. *Journal of Psychoactive Drugs*. 1994;26:155-61.
 48. Ward J, Mattick R, Hall W. *Key Issues in Methadone Maintenance Treatment*. New South Wales, Australia: New South Wales University Press; 1992:65-85; Institute of Medicine. *Treating Drug Problems, vol. 1: A Study of the Evolution, Effectiveness, and Financing of Public and Private Drug Treatment Systems*. Washington, DC: National Academy Press; 1990:136.
 49. See, for example: Institute of Medicine. . Washington, DC: National Academy Press; 1995; Cowan A, Lewis JW, eds. *Buprenorphine: Combatting Drug Abuse with a Unique Opioid*. New York: Wiley-Liss; 1995; Greenstein RA, Fudala PJ, O'Brien CP. Alternative pharmacotherapies for opiate addiction. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance Abuse: A Comprehensive Textbook*. 2d ed. Baltimore, MD: Williams and Wilkins; 1992:562-573; O'Brien CP. Opioids: Antagonists and partial agonists. In: Galanter M, Kleber HD, eds. *The American Psychiatric Press Textbook of Substance Abuse Treatment*. Washington, DC: American Psychiatric Press; 1994:223-236.
 50. Nadelmann E, McNeely J, Drucker E. International Perspectives. In: Lowinson J, Ruiz P, Millman, RB, eds. *Substance Abuse: A Comprehensive Textbook*. 3rd ed. Baltimore: Williams and Wilkins; 1997.