

53. Screening for Drug Abuse

RECOMMENDATION

There is insufficient evidence to recommend for or against routine screening for drug abuse with standardized questionnaires or biologic assays. Including questions about drug use and drug-related problems when taking a history from all adolescent and adult patients may be recommended on other grounds (see *Clinical Intervention*). All pregnant women should be advised of the potential adverse effects of drug use on the development of the fetus. Clinicians should be alert to signs and symptoms of drug abuse in patients and refer drug abusing patients to specialized treatment facilities where available.

Burden of Suffering

The abuse of both illicit and legal drugs remains an important medical problem in the U.S. Although casual (i.e., occasional) use of illicit drugs declined steadily in the general population from 1979 to 1992, drug use appears to be increasing since then, especially among teenagers and young adults.^{1,2} Moreover, there has been little improvement in the numbers of persons using drugs on a regular basis.^{3,4} In a 1991 survey of over 8,000 persons aged 15–54 years, 3.6% met diagnostic criteria for drug dependence or drug abuse in the past year,⁵ and drug-related emergency visits in the U.S. reached all-time highs in 1993.⁶ An estimated 5.5 million Americans, half of whom are in the criminal justice system, are affected by drug abuse or dependence.⁷

In a national household survey in 1993, 14% of adults ages 18–25 and 3% of those over 35 reported using illicit drugs within the last month.² Occasional use of marijuana accounts for a large proportion of reported drug use, but many drug users used other illicit drugs (cocaine, heroin, phencyclidine, methaqualone, hallucinogens, etc.), legal drugs not prescribed by a physician (e.g., amphetamines, benzodiazepines, barbiturates, and anabolic steroids), or inhalants (amyl and butyl nitrite, gasoline, nitrous oxide, glue, and other solvents). An estimated 5 million Americans smoke marijuana regularly (at least once a week), almost 500,000 use cocaine weekly, and over 500,000 used heroin or other injectable drug in the past year.² Others have estimated that up to 500,000 Americans are addicted to heroin and 1–1.6 million currently use injection drugs.⁸ Drug use is more common among men, the unemployed, adults who have not

completed high school, and urban residents. The overall prevalence of drug use does not differ greatly among white, African American, and Hispanic populations, but patterns of drug use may differ.⁴

Adverse effects of drug use are greatest in heavy users and those dependent on drugs, but some can occur from even occasional drug use. Cocaine can produce acute cardiovascular complications (e.g., arrhythmias, myocardial infarction, cerebral hemorrhage, and seizures), nasal and sinus disease, and respiratory problems (when smoked).^{9,10} Dependence on cocaine produces diminished motivation, psychomotor retardation, irregular sleep patterns, and other symptoms of depression.¹¹ “Crack,” a popular and cheaper smokeable form of cocaine, is also highly addictive. Mortality among injection drug users (IDUs) is high from overdose, suicide, violence, and medical complications from injecting contaminated materials (e.g., human immunodeficiency virus [HIV] infection, hepatitis, bacterial endocarditis, chronic glomerulonephritis, and pulmonary emboli); in some cities, up to 40% of IDUs are infected with HIV.¹² Although the extent of adverse effects of marijuana use is controversial, chronic use may be associated with respiratory complications or amotivational syndrome.^{13,14} In a 1991 survey, 8% of cocaine users and 21% of marijuana users reported daily use for 2 weeks or more.¹⁵

The indirect medical and social consequences of drug use are equally important: criminal activities related to illegal drugs take a tremendous toll in many communities, use of injection drugs and crack are major factors in the spread of HIV infection^{16,17} (see Chapter 28), and drugs play a role in many homicides, suicides, and motor vehicle injuries (see Chapters 50, 57, and 59). Nearly half of all users of cocaine or marijuana reported having driven a car shortly after using drugs.^{13,15}

Drug Use During Pregnancy. A national probability sample of 2,613 women giving birth in 1992–1993 estimated that 5.5% used some illicit drug during pregnancy: the most frequently used drugs were marijuana (2.9%) and cocaine (1.1%).¹⁸ Anonymous urine testing of nearly 30,000 women giving birth in California in 1992 detected illicit drugs in 5.2%: marijuana (1.9%), opiates (1.5%), and cocaine (1.1%) were the most frequently detected substances.¹⁹ Prevalence of drug use is generally higher among mothers who smoke or drink, are unmarried, are not working, have public or no insurance, live in urban areas, or receive late or no prenatal care.^{18–20} Anonymous urine testing detected cocaine use in 7–15% of pregnant women from high-risk, urban communities^{21,22} and in 0.2–1.5% of mothers in private clinics and rural areas.^{23,24} The most important forms of substance abuse during pregnancy are the use of alcohol and tobacco, however (see Chapters 52 and 54).²⁵

Drug use during pregnancy has been associated with a variety of adverse outcomes, but problems associated with drug use (e.g., use of alco-

hol or cigarettes, poverty, poor nutrition, and inadequate prenatal care) may be more important than the direct effects of drugs.^{26,27} Regular use of cocaine and opiates is associated with poor weight gain among pregnant women, impaired fetal growth, and increased risk of premature birth; cocaine appears to increase the risk of abruptio placentae.²⁸ The effects of social use of cocaine in the first trimester are uncertain.^{29,30} Cocaine has been blamed for some congenital defects,²⁷ but the teratogenic potential of cocaine has not been definitively established. Infants exposed to drugs in utero may exhibit withdrawal symptoms due to opiates, or increased tremors, hyperexcitability, and hypertonicity due to cocaine.^{27,31} Possible long-term neurologic effects of drug exposure are difficult to separate from the effects of other factors that influence development among disadvantaged children.^{27,32,33} The effects of marijuana on the fetus remain controversial.³⁴⁻³⁶

Drug Use in Children and Adolescents. Drug use and abuse remain important problems among adolescents.³⁷ After more than 10 years of decreasing trends, drug use among high school students increased in 1993 and 1994.^{1,38} Use of illicit drugs may interfere with school, increase the risk of injuries, contribute to unsafe sex, and progress to more harmful drug use. Among high school seniors in 1994, 22% reported using an illicit drug in the past month: marijuana (19%), stimulants (4%), inhalants (3%), and hallucinogens (3%) were more common than cocaine (1.5%) or heroin (0.3%).¹ Abuse of inhalants is a leading drug problem in younger adolescents¹ and can cause asphyxiation or neurologic damage with chronic abuse.³⁹ Abuse of anabolic steroids in adolescent boys and young men can cause psychiatric symptoms and has been associated with hepatic, endocrine, and cardiovascular problems.

Accuracy of Screening Tests

The diagnostic standard for drug abuse and dependence is the careful diagnostic interview.⁴⁰ Important information from the patient history includes the quantity, frequency, and pattern of drug use; adverse effects of drugs on work, health, and social relationships; and any symptoms of dependence.⁴¹ Clinicians often have trouble accurately identifying drug use and drug abuse among their patients in routine clinical encounters, however. Time may be too limited to take a careful history, some patients may not acknowledge drug problems due to denial, and many others are reluctant to admit to using drugs, for fear of discrimination by health care providers or concerns about confidentiality. It is common for adolescents to distrust authority figures such as clinicians, and young persons may be especially concerned about their drug use becoming known to family members, school officials, or the police.⁴²

There are few data to determine whether or not the use of standard-

ized screening questionnaires can increase the detection of potential drug problems among patients. Brief alcohol screening instruments such as the CAGE or MAST (see Chapter 52) can be modified to assess the consequences of drug use in a standardized manner,^{41,43} but these instruments have not been compared to routine history or clinician assessment. Questionnaires which include items about personal problems, outlook, and high-risk behaviors can identify adolescents at increased risk for drug use, but they have not been validated in prospective studies.⁴⁴ Other instruments such as the Addiction Severity Index⁴⁵ are useful for evaluating treatment needs but are too long for screening.

Toxicologic tests can provide objective evidence of drug use. The most common tests employ radioimmunoassays (RIA), enzymatic immunoassay (EIA), fluorescence polarization immunoassay (FPIA), or thin-layer chromatography (TLC) to measure concentrations of specific drugs and their metabolites in urine specimens.⁴⁶ Sensitivity of these tests is generally above 99% compared with reference standards;⁴⁷ sensitivity for detecting drug use in individuals, however, depends directly on timing of drug use and the urinary excretion of drug metabolites. Marijuana may be detected for up to 14 days after repeated use, but evidence of cocaine, opiates, amphetamines, and barbiturates is present for only 2–4 days after use. Various techniques may be employed by drug users who wish to avoid detection that further reduce the sensitivity of urine testing: water loading, diuretic use, ingestion of interfering substances, or adulterating urine samples. Most importantly, toxicologic tests do not distinguish between occasional users and individuals who are dependent on or otherwise impaired by drug use.

False-positive results from urine drug screening are possible due to cross-reaction with other medications or naturally occurring compounds in foods.⁴⁸ To prevent falsely implicating persons as users of illegal drugs, screen-positive samples are usually confirmed with more specific (and expensive) techniques such as gas chromatography-mass spectroscopy (GC-MS). These procedures reduce, but do not eliminate, the possibility of false-positive results due to cross-reactions, contamination, or mislabeled specimens. Proficiency testing of nearly 1,500 urine specimens sent to 31 U.S. laboratories produced no false-positive results and 3% false-negative results.⁴⁹ A similar study of 120 clinical laboratories in the U.K. demonstrated higher error rates (4% false-positive, 8% false-negative), largely due to laboratories that did not use confirmatory tests.⁵⁰

Screening Pregnant Women and Newborn Infants. A careful history taken by trusted clinicians remains the most sensitive means of detecting drug use and abuse,^{51,52} but many pregnant women conceal use of illicit drugs, since it may provide grounds for action by child welfare agencies. Clinicians often selectively screen for drug use, based on preconceptions of the typical drug-using mother. Studies using sensitive toxicologic tests suggest

that only one in four pregnant women who have used opiates, cocaine, or marijuana are identified as drug users in the medical record.⁵¹ Patient history identified only 40–60% of pregnant women with urine tests positive for illicit drugs.^{21,53} Detection of drug use is increased by use of a standard protocol for assessing drug use in patients, rather than screening based on the discretion of the clinician.^{54,55}

Testing of newborn specimens can identify infants exposed to drugs in utero. Assays of infant urine are most common but are not sensitive for drug use early in pregnancy. Among mothers admitting drug use during pregnancy, RIA of infant urine had a sensitivity of 52% versus 88% for RIA of meconium.⁵¹ Among 39 women who used cocaine, RIA of infant hair was more sensitive (78%) than RIA of infant urine (38%) or meconium (52%).⁵² These more sensitive tests are not widely available, however, and have not yet been sufficiently validated for screening purposes.⁵⁶ Moreover, clinical history may be more useful than toxicologic testing for identifying newborns at risk: among drug-exposed infants identified by meconium testing, adverse outcomes were limited to infants born to mothers who admitted to drug use.⁵¹

Adverse Effects of Screening. Drug testing is frequently performed without informed consent in the clinical setting on the grounds that it is a diagnostic test intended to improve the care of the patient. Because of the significance of a positive drug screen for the patient, however, the rights of patients to autonomy and privacy have important implications for screening of asymptomatic persons.⁵⁷ If confidentiality is not ensured, test results may affect a patient's employment, insurance coverage, or personal relationships.⁵⁸ Testing during pregnancy is especially problematic, because clinicians may be required by state laws to report evidence of potentially harmful drug or alcohol use in pregnant patients.

Effectiveness of Early Detection

Early intervention has the potential to avert some of the serious consequences of drug abuse, including injuries, legal problems, and medical complications. Although various treatments have been proven effective in drug-dependent patients (see below), they have largely been studied in patients who have already developed medical, social, or legal problems due to their drug use. There is much less evidence that systematic screening and earlier intervention is effective in improving clinical outcomes among asymptomatic persons, who may be less motivated to undergo treatment than more severely impaired drug users.

The evidence supporting the effectiveness of treatment for drug abuse and dependence was reviewed in 1990 by the Institute of Medicine.⁷ The

most consistent evidence supports the clinical benefits of methadone maintenance in persons addicted to heroin. Several studies, including two randomized controlled trials, have shown that heroin addicts who remain in methadone maintenance programs have reduced heroin consumption, lower rates of HIV infection, decreased criminality and unemployment, and lower mortality than subjects who are not treated or treated for only short periods.^{7,59} Over the short term, methadone treatment is associated with a 95% reduction in self-reported heroin use and a 57–68% reduction in self-reported cocaine use,⁶⁰ but some persons switch from heroin to other drugs while on treatment.⁶¹ Moreover, results may be biased due to reliance on patient self-report and loss to follow-up of patients who drop out of treatment.⁶²

Drug abusers are frequently enrolled in residential treatment programs, often as part of a court order related to drug offenses. Patients entering such programs experience lower rates of drug use, imprisonment, and unemployment than drug users who do not enroll.⁷ Longer programs seem to be more effective than short (<3 months) programs.⁶³ However, attrition rates from residential programs can reach 75%,⁶⁴ and selection bias may contribute to the improved outcomes in subjects who complete programs.⁶⁵ Less intensive outpatient programs also seem to be effective for drug users, but the wide variation in interventions used limits the conclusions that can be drawn. Attrition is highest in outpatient, nonresidential programs.⁷ There are fewer data on long-term (>1 year) outcomes of drug treatment; recidivism is high and many patients suffer from other problems (psychiatric disorders, unemployment, homelessness) which reinforce drug use and are often not addressed by drug treatment.⁷

Treatment of adolescent substance abusers has been recently reviewed for nearly 1,500 primarily middle-class adolescents aged 12–19 years who entered inpatient or residential treatment programs.⁶⁶ Compared to use before treatment, there was a significant reduction in regular drug use (weekly or more) 1 year after treatment (85% vs. 29%), and 50% of teens had been abstinent for 6 months. Increasing parental participation in treatment was associated with greater levels of abstinence. High school primary prevention programs which emphasize “life skills” have reduced tobacco or alcohol use over the short term (1 year),⁶⁷ but long-term effects on illicit drug use have not been well studied. In a 6-year randomized trial among 3,597 high school students, a prevention curriculum delivered in grades 7–9 significantly reduced smoking and alcohol use, but not marijuana use, in high school seniors; a subgroup of students who received a more complete intervention were less likely to use marijuana regularly (5% vs. 9%).⁶⁸

Treatment of Pregnant Drug Abusers. There are few controlled trials of interventions for pregnant women who use illicit drugs. Women who use crack

and other forms of cocaine account for the largest group of pregnancies at risk from illicit drugs, but optimal treatment for cocaine users is uncertain. In two observational studies, risk of low birth weight decreased substantially with increasing number of prenatal visits.^{69,70} Women who reduced use of cocaine during pregnancy, or used cocaine infrequently, had outcomes similar to nonusers in several studies.^{30,34} Methadone maintenance is the usual treatment for pregnant women addicted to opiates: withdrawal during pregnancy is dangerous, and the regular contact required for methadone treatment may encourage women to receive regular prenatal care.²⁷ Methadone can be safely withdrawn after delivery but it prolongs withdrawal in the infant. Because the most seriously impaired drug users often present late for care, if at all, options for improving the course of drug-exposed pregnancies are often limited.

Recommendations of Other Groups

The American Medical Association (AMA)⁷¹ and the American Academy of Family Physicians (AAFP)⁷² advise physicians to include an in-depth history of substance abuse as part of a complete health examination for all patients. The AAFP,⁷² AMA Guidelines for Adolescent Preventive Services (GAPS),⁷³ Bright Futures recommendations,⁷⁴ and American Academy of Pediatrics^{75,76} suggest that clinicians discuss the dangers of drug use with all children and adolescents and include questions about substance abuse as a part of routine adolescent visits. The American College of Obstetricians and Gynecologists recommends that clinicians take a thorough history of substance use and abuse in all obstetric patients, and remain alert to signs of substance abuse in all women.^{77,78}

The AMA supports drug testing (in conjunction with rehabilitation and treatment) as part of preemployment examinations for jobs affecting the health and safety of others.⁷¹ The AMA and most other medical organizations endorse urine testing when there is reasonable suspicion of substance abuse, but none of these groups recommends routine drug screening in the absence of clinical indications.

Discussion

Many Americans face substantial health risks from illicit drugs and the nonmedical use of other drugs, but questions remain about appropriate methods for screening for drug abuse among asymptomatic patients. The routine use of screening instruments or laboratory tests has not yet been proven effective in reducing harmful drug use. Nonetheless, information about drug use is an important component of the medical interview, especially for adolescents and young adults, and a careful history remains the best way to identify those who need treatment. Despite frequent treatment

failures, the medical and social benefits of treating drug abuse are substantial for patients who achieve long-term abstinence. Reducing drug use is also likely to have important benefits to society in reducing criminal activity and the spread of HIV.⁷

Urine testing is sensitive and specific for recent drug use but has many limitations as a routine screening test: it does not distinguish occasional use from drug abuse or dependence; sensitivity and specificity vary with timing of drug use; and the effectiveness of early intervention has not been examined in asymptomatic drug users detected by toxicologic screening.⁷⁹ Routine screening in asymptomatic individuals also poses important risks: testing without informed consent may violate patient autonomy; the predictive value of positive test results may be low in populations with a low prevalence of drug use; and patients may be discriminated against if confidentiality of results is not ensured.

Efforts to screen for drug use in pregnancy have been prompted by concern about the adverse effects on the developing fetus, the impact of parental drug use on child safety and welfare, and the realization that many drug-using mothers go undetected by routine patient history. Use of standardized clinical assessment in all pregnant women can increase the identification of drug use, but there is little evidence that routine urine screening in asymptomatic women reduces drug use during pregnancy or results in better perinatal outcomes. Treatment services for pregnant, drug-abusing women are often scarce, testing may not identify those pregnancies at highest risk, and positive tests have direct legal and social consequences for the mother and child.⁸⁰ Where clinicians must report drug use in pregnancy, routine testing may lead some women to avoid needed prenatal care.

CLINICAL INTERVENTION

There is insufficient evidence to recommend for or against routine screening for drug abuse with standardized questionnaires or biologic assays ("C" recommendation). Including questions about drug use when taking a history from adolescent and adult patients may be recommended on other grounds, including the prevalence of drug use and the serious consequences of drug abuse and dependence. Clinicians should be alert to signs and symptoms of drug abuse and ask about the use of illicit drugs and legal drugs of abuse (e.g., sedatives, stimulants); use of inhalants should be considered in older children, adolescents, and young adults. The quantity, frequency, patterns of consumption, and adverse consequences of drug use (e.g., interference with school or work, evidence of dependence) should be assessed for all patients who report drug use. Clinicians should establish a trusting relationship with patients, approach discussion of drug use in a nonjudgmental manner, and respect the patient's concerns about the confidentiality of disclosed information.

All pregnant women should be advised about the potential risks to the fetus of drug use during pregnancy and the potential to transmit drugs to infants through breastfeeding. Routine drug testing of urine or other body fluids is not recommended as the primary method of detecting drug use in pregnant women or other asymptomatic adults. Selective use of urine testing during pregnancy may be appropriate when the possibility of drug use is suggested by clinical signs and symptoms (e.g., growth retardation, inadequate weight gain, inadequate prenatal care); periodic testing can also help monitor and encourage abstinence in women who have used drugs. Pregnant women who abuse drugs should be advised of the importance of regular prenatal care and be referred for treatment, where available.

Patients should give consent prior to drug testing and be informed of any legal obligations on the part of the clinician to report drug use to child protective agencies or other authorities. Both positive and negative results should be interpreted with understanding of the kinetics of drug metabolism and the limitations of testing methods, and positive screening tests should be confirmed by more reliable methods.

All patients who report potentially harmful use of drugs should be informed of the risks associated with their drug use and advised to cut down or stop. Decisions about treatment should be based on evidence of drug abuse or drug dependence obtained through careful patient interview, including discussion with friends or family members where appropriate. A treatment plan should be developed for the patient and family that is tailored to the drug of abuse and the needs of the patient. Patients with evidence of drug dependence should be referred to appropriate drug-treatment providers and community programs specializing in the treatment of drug dependencies. Persons who continue to inject drugs should be screened periodically for HIV infection and advised of measures that may reduce the risk of infections due to drug use: use a new sterile syringe with each use, never share or re-use injection equipment, use clean (sterile, if possible) water to prepare drugs, clean the injection site with alcohol prior to injection, and safely dispose of syringes after use (see Chapters 28 and 62). Drug-using patients should be informed of available resources for sterile injection equipment.

The draft update of this chapter was prepared for the U.S. Preventive Services Task Force by David Atkins, MD, MPH.

REFERENCES

1. National Institute on Drug Abuse. Monitoring the Future Study, 1975–1994: national high school senior drug abuse survey. NIDA Capsules, November 1994. Rockville, MD: National Institute on Drug Abuse, 1994.
2. Substance Abuse and Mental Health Services Administration. National Household Survey on Drug Abuse: population estimates, 1993. Rockville, MD: Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, 1994. (DHHS Publication no. (SMA) 94-3017.)

3. Substance Abuse and Mental Health Services Administration. Preliminary estimates from the 1992 National Household Survey on Drug Abuse. Advance Report no. 3. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, 1993.
4. National Institute on Drug Abuse. Epidemiologic trends in drug abuse. Vol. I–II. Rockville, MD: National Institute on Drug Abuse, National Institutes of Health, 1994. (NIH Publication nos. 94-3745, 3746.)
5. Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Arch Gen Psychiatry* 1994;51:8–19.
6. Substance Abuse and Mental Health Services Administration. Preliminary estimates from the Drug Abuse Warning Network: 1993 preliminary estimates of drug-related emergency department episodes. Advance Report no. 8. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, 1994.
7. Gerstein DR, Harwood HJ, eds. Treating drug problems. Committee for the Substance Abuse Coverage Study, Institute of Medicine. Washington, DC: National Academy Press, 1996.
8. Centers for Disease Control and Prevention, Division of STD/HIV Prevention. 1993 annual report. Atlanta: Centers for Disease Control and Prevention, 1994.
9. Perper JA, Van Thiel DH. Cardiovascular complications of cocaine abuse. *Recent Dev Alcohol* 1992;10:343–361.
10. Warner EA. Cocaine abuse. *Ann Intern Med* 1993;119:226–235.
11. Gold MS, Washton AM, Dackis CA. Cocaine abuse: neurochemistry, phenomenology, and treatment. *Natl Inst Drug Abuse Res Monogr Ser* 1985;61:130–150.
12. National Center for Infectious Diseases, Division of HIV/AIDS. National HIV Serosurveillance summary—results through 1992. Vol 3. Atlanta: Centers for Disease Control and Prevention, 1993. (Publication no. HIV/NCID/11-93/036.)
13. Schwartz RH. Marijuana: an overview. *Pediatr Clin North Am* 1987;34:305–317.
14. Jones RT. Marijuana: health and treatment issues. *Psychiatr Clin North Am* 1984;7:703–712.
15. Keer DW, Colliver JD, Kopstein AN, et al. Restricted activity days and other problems associated with use of marijuana or cocaine among persons 18–44 years of age: United States, 1991. Advance data from vital and health statistics; no 246. Hyattsville, MD: National Center for Health Statistics, 1994.
16. Centers for Disease Control and Prevention. Update: acquired immunodeficiency syndrome—United States, 1994. *MMWR* 1995;44:64–67.
17. Edlin BR, Irwin KL, Faruque S, et al. Intersecting epidemics—crack cocaine use and HIV infection among inner-city young adults: Multicenter Crack Cocaine and HIV Infection Team. *N Engl J Med* 1994;331:1422–1427.
18. National Institute on Drug Abuse. NIDA press briefing, September 12, 1994. Rockville, MD: National Institute on Drug Abuse, 1994.
19. Vega WA, Kolodny B, Hwang J, Noble A. Prevalence and magnitude of perinatal substance exposures in California. *N Engl J Med* 1993;329:850–854.
20. Moser JM, Jones VH, Woody ML. Use of cocaine during immediate prepartum period by childbearing women in Ohio. *Am J Rev Med* 1993;9:85–91.
21. Colmorgen GHC, Johnson C, Zazzarino MA, et al. Routine urine drug screening at the first prenatal visit. *Am J Obstet Gynecol* 1992;166:588–590.
22. Schulman M, Morel M, Karmen A, et al. Perinatal screening for drugs of abuse: reassessment of current practice in a high-risk area. *Am J Perinatol* 1993;10:374–377.
23. Sloan LB, Gay JW, Snyder S, et al. Substance abuse during pregnancy in a rural population. *Obstet Gynecol* 1992;79:245–248.
24. Burke MS, Roth D. Anonymous cocaine screening in a private obstetric population. *Obstet Gynecol* 1993;81: 354–356.
25. Chasnoff IJ, Landress HJ, Barrett ME. The prevalence of illicit-drug or alcohol use during pregnancy and discrepancies in mandatory reporting in Pinellas County, Florida. *N Engl J Med* 1990;322:1202–1206.
26. Mayes LC, Granger RH, Bornstein MH, et al. The problem of prenatal cocaine exposure. A rush to judgment. *JAMA* 1992;267:406–408.
27. Robins LN, Mills JL, eds. Effects of in utero exposure to street drugs. *Am J Public Health* 1993;83 (suppl):1–32.

28. Volpe JJ. Effect of cocaine use on the fetus. *N Engl J Med* 1992;327:399–407.
29. Graham K, Dimitrakoudis D, Pellegrini E, et al. Pregnancy outcomes following first trimester exposure to cocaine in social users in Toronto, Canada. *Vet Hum Toxicol* 1989;31:143–148.
30. Chasnoff IJ, Griffith DR, MacGregor S, et al. Temporal patterns of cocaine use in pregnancy. *JAMA* 1989;261: 1741–1744.
31. Hutchings DE. Methadone and heroin during pregnancy: a review of behavioral effects in human and animal offspring. *Neurobehav Toxicol Teratol* 1982;4:429–434.
32. Frank DA, Bresnahan K, Zuckerman BS. Maternal cocaine use: impact on child health and development. *Adv Pediatr* 1993;40:65–99.
33. Chasnoff IJ, Griffith DR, Freier C, Murray J. Cocaine/polydrug use in pregnancy: two year follow-up. *Pediatrics* 1992;89:284–289.
34. Zuckerman B, Frank DA, Hingson R, et al. Effects of maternal marijuana and cocaine use on fetal growth. *N Engl J Med* 1989;320:762–768.
35. Day NL, Richardson GA. Prenatal marijuana use: epidemiology, methodologic issues, and infant outcomes. *Clin Perinatol* 1991;18:77–91.
36. Bell GL, Lau K. Perinatal and neonatal issues in substance abuse. *Pediatr Clin North Am* 1995;42:261–281.
37. O'Malley PM, Johnston LD, Bachman JG. Adolescent substance abuse: epidemiology and implications for public policy. *Pediatr Clin North Am* 1995;42:241–260.
38. National Institute of Drug Abuse. National survey results on drug use from Monitoring the Future Study, 1975–1992. Vol 1. Secondary school students. Washington, DC: Government Printing Office, 1993. (Publication no. NIH 93-3597.)
39. Sharp CW. Introduction to inhalant abuse. Inhalant abuse: a volatile research agenda. *Natl Inst Drug Abuse Res Monogr* 1992;129:1–10.
40. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed. Washington, DC: American Psychiatric Association, 1994.
41. Trachtenberg AI, Fleming MF. Diagnosis and treatment of drug abuse in family practice. American Family Physician monograph, Summer 1994. Kansas City, MO: American Academy of Family Physicians, 1994.
42. Cogswell BE. Cultivating the trust of adolescent patients. *Fam Med* 1985;17:254–258.
43. Skinner HA. The drug abuse screening test. *Addict Behav* 1982;7:363–371.
44. Schwartz RH, Wirtz PW. Potential substance abuse. Detection among adolescent patients. *Clin Pediatr* 1990;29: 38–43.
45. McLellan AT, Luborsky L, Woody GE, et al. An improved diagnostic evaluation instrument for substance abuse patients. The Addiction Severity Index. *J Nerv Ment Dis* 1980;168:26–33.
46. Catlin D, Cowan D, Donike M, et al. Testing urine for drugs. *Clin Chim Acta* 1992;207:S13–S26.
47. Armbruster DA, Schwarzkoff RH, Hubster EC, et al. Enzyme immunoassay, kinetic microparticle immunoassay, radioimmunoassay, and fluorescence polarization immunoassay compared for drugs-of-abuse screening. *Clin Chem* 1993;39:2137–2142.
48. ElSohly HN, ElSohly MA. Poppy seed ingestion and opiates urinalysis: a closer look. *J Anal Toxicol* 1990;14:308–310.
49. Frings CS, Bataglia DJ, White RM. Status of drugs-of-abuse testing in urine under blind conditions: an AACC study. *Clin Chem* 1989;35:891–894.
50. Burnett D, Lader S, Richens A, et al. A survey of drugs of abuse testing by clinical laboratories in the United Kingdom. *Ann Clin Biochem* 1990;27:213–22.
51. Ostrea EM, Brady M, Gause S, et al. Drug screening of newborns by meconium analysis: a large-scale, prospective epidemiologic study. *Pediatrics* 1992;89:107–113.
52. Callahan CM, Grant TM, Phipps P, et al. Measurement of gestational cocaine exposure: sensitivity of infants' hair, meconium, and urine. *J Pediatr* 1992;120:763–768.
53. McCalla S, Minkoff HL, Feldman J, et al. Predictors of cocaine use in pregnancy. *Obstet Gynecol* 1992;79:641–644.
54. Chasnoff IJ. Drug use and women: establishing a standard of care. *Ann NY Acad Sci* 1989;562:208–210.
55. Slutsker L, Smith R, Higginson G, et al. Recognizing illicit drug use by pregnant women: reports from Oregon birth attendants. *Am J Public Health* 1993;83:61–64.
56. Ostrea EM, Welch RA. Detection of prenatal drug exposure in the pregnant woman and her newborn infant. *Clin Perinatol* 1991;18:629–645.

57. Merrick JC. Maternal substance abuse during pregnancy. Policy implications in the United States. *J Legal Med* 1993;14:57-71.
58. Rosenstock L. Routine urine testing for evidence of drug abuse in workers: the scientific, ethical, and legal reasons not to do it. *J Gen Intern Med* 1987;2:135-137.
59. Gunne LM, Gronbladh L. The Swedish methadone maintenance program: a controlled study. *Drug Alcohol Depend* 1981;7:249-256.
60. Chaisson RE, Bacchetti P, Osmond D, et al. Cocaine use and HIV infection in intravenous drug users in San Francisco. *JAMA* 1989;261:561-565.
61. Condelli WS, Fairbank JA, Dennis ML, et al. Cocaine use by clients of methadone programs: significance, scope, and behavioral interventions. *J Subst Abuse Treat* 1991;8:203-212.
62. Greenstein RA, Resnick RB, Resnick E. Methadone and naltrexone in the treatment of heroin dependence. *Psychiatr Clin North Am* 1984;7:671-679.
63. Charuvastra VC, Dalali ID, Cassuci M, et al. Outcome study: comparison of short-term vs. long-term treatment in a residential community. *Int J Addict* 1992;27:15-23.
64. Wickizer T, Maynard C, Atherly A, et al. Completion rates of clients discharged from drug and alcohol treatment programs in Washington state. *Am J Public Health* 1994;84:215-221.
65. Power R, Hartnoll R, Chalmers C. Help-seeking among illicit drug users: some differences between a treatment and non-treatment sample. *Int J Addict* 1992;27:887-904.
66. Bergmann PE, Smith MB, Hoffman NG. Adolescent treatment: implications for assessment, practice guidelines, and outcome management. *Pediatr Clin North Am* 1995;42:453-472.
67. Botvin GJ, Botvin EM. School-based and community based prevention approaches. In: Lowinson JH, Ruiz P, Millman RB, eds. *Substance abuse: a comprehensive textbook*. Baltimore: Williams & Wilkins, 1992:910-927.
68. Botvin GJ, Baker E, Dusenbury L, et al. Long-term follow-up results of a randomized drug abuse prevention trial in a white, middle-class population. *JAMA* 1995;273:1106-112.
69. Racine A, Joyce T, Anderson R. The association between prenatal care and birth weight among women exposed to cocaine in New York City. *JAMA* 1993;270:1581-1586.
70. Feldman J, Minkoff HL, McCalla S, et al. A cohort study of the impact of perinatal drug use on prematurity in an inner-city population. *Am J Public Health* 1992;82:726-728.
71. American Medical Association. *Drug abuse in the United States: a policy report*. Report of the Board of Trustees. Chicago: American Medical Association, 1988.
72. American Academy of Family Physicians. *Age charts for periodic health examination*. Kansas City, MO: American Academy of Family Physicians, 1994. (Reprint no. 510.)
73. American Medical Association. *Guidelines for adolescent preventive services (GAPS): recommendations and rationale*. Chicago: American Medical Association, 1994.
74. Green M, ed. *Bright Futures: national guidelines for health supervision of infants, children, and adolescents*. Arlington, VA: National Center for Education in Maternal and Child Health, 1994.
75. American Academy of Pediatrics. Screening for drugs of abuse in children and adolescents. *Pediatrics* 1989;84:396-398.
76. American Academy of Pediatrics, Committee on Substance Abuse. Role of the pediatrician in prevention and management of substance abuse. *Pediatrics* 1993;91:1010-1013.
77. American College of Obstetricians and Gynecologists. *Substance abuse*. Technical Bulletin no. 194. Washington, DC: American College of Obstetricians and Gynecologists, July 1994.
78. American College of Obstetricians and Gynecologists. *Substance abuse in pregnancy*. Technical Bulletin no. 195. Washington, DC: American College of Obstetricians and Gynecologists, July 1994.
79. Greenblatt DJ, Shader RI. Say "no" to drug testing. *J Clin Psychopharmacol* 1990;10:157-159.
80. Chavkin W. Mandatory treatment for drug use during pregnancy. *JAMA* 1991;266:1556-1561.