

ARTICLE

A Review of Recent Findings on Substance Abuse Treatment for Pregnant Women

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Abstract—Recent years have brought an increased interest in the treatment needs of pregnant substance abusers. This article reviews the literature on this subject, providing an overview of what is known about the prevalence of substance abuse during pregnancy; the factors in women's lives, especially pregnant women, that lead to substance abuse and that facilitate and impede treatment success; and the components of successful treatment programs. The prevalence of prenatal illicit drug use is known to be about 5% of all pregnant women nationwide, with higher rates for selected subgroups. Local studies have shown much higher rates. Substance abuse is associated with poverty, with the substance abuse of significant others, and with family violence. Perinatal substance abusers experience poorer birth outcomes. The negative consequences for babies do not stop at birth; home environments may be chaotic and often children are removed from their mother's care if substance abuse continues after birth. While the literature on prevalence, correlates, and outcomes of perinatal substance abuse is plentiful, there continues to be sparse information on successful treatment approaches. Sample sizes are small and there are few studies with adequate comparison groups. The small number of outcome studies we review suggest that, as with the broader treatment literature for other populations, success (as measured by abstinence) is associated with retention. Retention is facilitated by the provision of support services, such as child care, parenting classes, and vocational training. There is no clear empirical basis for concluding that one type of treatment (for example, residential treatment) is more effective than another. Published by Elsevier Science Inc.

Keywords—substance abuse; pregnancy; Medicaid substance abuse treatment.

INTRODUCTION

MANY RESEARCHERS HAVE documented the lack of substance abuse treatment options designed for and avail-

The authors acknowledge the helpful comments of Craig Thornton, PhD and Ira Chasnoff, MD on earlier versions of this work. Esther Alonzo, Sara Yang, and Miki Satake provided research assistance and Sharon Clark prepared the manuscript.

This work was supported by U.S. Government Contract Number 500-92-0049 with the Health Care Financing Administration for the Evaluation of Demonstrations to Improve Access to Care for Pregnant Substance Abusers. The Project Officers were Ed Hutton and Suzanne Rotwein.

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able to women, particularly mothers and pregnant women, and the corresponding lack of research on this topic (Finkelstein, 1990, 1993). Prior to the 1970s, few programs existed for women and few studies included or focused on women alone. In the 1970s, the National Institute on Drug Abuse (NIDA) began to sponsor some substance abuse treatment program development for women. Although NIDA funds initially supported program development and research, by the late 1970s few women-focused programs existed in the United States, and funds for these programs again began to shrink.

Finkelstein (1993) cites several studies conducted in the 1980s that document the shortage of substance abuse treatment services available to women, specifically mothers and pregnant women, at that time. For example, one

study in 1979 found only 25 programs nationally that were treating women (Beschner & Thompson, 1981). Another study (House of Representatives Congressional Hearing, 1989) found that two thirds of the major hospitals in fifteen cities had no place to refer pregnant women for substance abuse treatment.

By the late 1980s, the crack cocaine epidemic and its apparent costly effects of prenatal cocaine exposure on the newborn meant that new funding for treatment programs for pregnant women became available. Breibart, Chavkin, and Wise (1994) recently conducted a study to assess availability of substance abuse treatment programs to pregnant women in New York City and four other U.S. cities. They found that 80% of the 294 residential and outpatient programs surveyed in these five cities accepted pregnant women. Many, however, did not accept women on Medicaid or provide or arrange for child care. The researchers concluded that barriers to treatment remain for many pregnant women, and that many programs still did not provide the wide range of services that many women need.

The history of substance abuse treatment programs for women—especially mothers and pregnant women—is short and sparse. Research on this topic is similarly thin. Not until the NIDA began to fund the development of substance abuse treatment programs for women, did these programs begin to emerge and be studied. Program development and research remains limited although the crack cocaine epidemic, and its consequences for society, spurred new funding, treatment models, and research.

Medicaid Coverage for Pregnant Substance Abusers

The original Medicaid program design (late 1960s) did not address coverage of substance abuse treatment as a separate service since treatment services were not widely available. The treatment that was available for low-income people was provided by state or locally funded agencies, sometimes with federal support from the Alcohol, Drug Abuse and Mental Health Administration. As abuse of illicit drugs continued to increase and treatment options expanded, states began to cover some substance abuse treatment under existing Medicaid-mandated and optional services, such as inpatient hospital services (like detoxification), outpatient department services, clinic services, other practitioner services (such as those offered by psychologists), rehabilitative services, and case management.

However, most forms of residential treatment not provided in inpatient hospitals have been excluded from either mandatory or optional services. Services in institutions for mental disease (IMDs) are excluded for persons between 22 and 65 years of age. An IMD is any residential facility of more than 16 beds that specializes in psychiatric care (including substance abuse treatment). Services in facilities with fewer than 17 beds can be covered according to HCFA guidelines.

In addition to these exclusions, many states had not implemented optional benefits that could be provided to pregnant substance abusers. For example, according to HCFA data extracted from state Medicaid plans, only about half the states covered services for pregnant women in alcohol and substance abuse clinics in March 1992. While 28 states covered targeted case management for pregnant women, HCFA data do not indicate which management programs have a component (such as screening and referral to treatment) targeted to pregnant substance abusers (Department of Health and Human Services, 1992b). Authors of a General Accounting Office report that attempted to inventory Medicaid coverage for substance abuse treatment found it difficult to collect data on these services because of the variety of options used and coverage limitations (General Accounting Office, 1991).

In spite of the lack of well-developed literature on this topic there has been an expansion in services for this population. Also the implementation of welfare reform around the country has highlighted the need for more effective substance abuse treatment for young mothers, creating the need for a better understanding of the problem of substance abuse during pregnancy and how to treat it.

We have provided some background on the problem of pregnant substance abuse and consequences—its prevalence, correlates—followed by a summary of recent literature on the types of treatment programs and their impact.

METHODS

We searched the formal literature for all citations of substance abuse and pregnancy using the MEDLARS system of the National Library of Medicine. The articles reviewed here were culled from a larger set of citations. In general, we included articles from the 1980s and 1990s. Virtually every published article on substance abuse treatment in pregnancy that addressed how to get pregnant substance abusers into treatment and the outcomes of treatment was included in the review. On the other hand, we chose selectively from the articles on prevalence and correlates of substance abuse among pregnant women, since that literature is more abundant and more widely known. We also obtained and reviewed several monographs including those that identify model treatment programs for pregnant women and a comprehensive monograph on issues surrounding treatment of women. We contacted the evaluators of two major demonstration programs, the Pregnant and Postpartum Women's and Infants (PPWI) demonstrations of the Center for Substance Abuse Prevention and the "Perinatal 20" demonstrations of the NIDA (in the latter case we contacted all 20 principal investigators). We obtained either monographs, conference presentations, or published articles if they were available.

FINDINGS

Prevalence

Measuring the prevalence of substance abuse by pregnant women has been difficult because women may use a wide array of substances either singly or in combination. These substances include licit substances such as tobacco, alcohol, and prescription medication, as well as illicit substances such as marijuana, cocaine, heroin, or barbiturates.

Methods to identify drug use differ in the type of use they detect. For example, urine toxicology screening, which can detect use for a relatively short time period prior to a test, may identify abusers who are more likely than casual users to use drugs regularly. However, it may underidentify casual users. Another problem with toxicology screening is that such tests cannot measure frequency and intensity of use. Furthermore, health providers may conduct these screening tests selectively, basing their decisions to do so on subjective assessments of risk (Chasnoff, Landress, & Barrett, 1990). Because of these concerns, physicians have been urged to rely on a standard protocol for ordering these tests to avoid potential biases (Skolnick, 1990).

Surveys provide an opportunity to detect casual users and users of substances over a long period of time (for example, any time during the year prior to the survey). However, surveys may miss some abusers because of underreporting of recent or frequent use associated with guilt or reluctance to report illegal behavior. For example, researchers at RAND compared 1984 and 1988 responses provided through the National Longitudinal Survey Youth Cohort and found that women who were pregnant between the two survey waves were more likely than others to respond to questions about past use of cocaine and marijuana (Harrison, Haaga, & Richards, 1993) inconsistently from one survey to the next.

Because of the variations in the accuracy of different types of measurement methods, estimates of the number of pregnant women who use drugs also varies. Most of the national estimates are derived from surveys. Prevalence data from the National Household Survey on Drug Abuse, which is conducted annually by the NIDA, are available by age and sex. These data can be used to estimate the number of women of childbearing age and pregnant women who may be abusing substances of various types. The 1995 National Household Survey found that nationally 7.2% of women ages 15 to 44 years who were not pregnant used an illicit drug at least once during the past month, compared to 2.3% of pregnant women (Department of Health and Human Services, 1996a). Data on lifetime use do not show a difference in these two groups, suggesting women reduce substantially their use of drugs during pregnancy. Estimates from the National Pregnancy and Health Survey show 5.5% of pregnant women used an illicit substance some time during preg-

nancy and 18.8% used alcohol (Department of Health and Human Services, 1996b).

Another trend that has been observed in the annual NIDA household surveys is a general decline in the use of illicit drugs in recent years, although prevalence of the daily use of certain substances does not appear to have declined. For example, the rate of cocaine use declined from its peak in 1985 of 2.7% of the population to 0.6% in 1994; however, the rate of weekly cocaine use remained the same—0.3% of the population. Also, the average age of those using drugs, especially heavy users, is increasing as the cohort of heavy users from the 1970s ages. Consequently, drug-dependent pregnant women may be more likely to be older mothers (in their late twenties and early thirties), who have other children and a relatively long history of chronic drug use.

A particularly disturbing trend is the increased use of marijuana among youth in the 1990s, which is causing concern that a new cohort of regular drug users may be forming. In other words, a growing number of adolescent mothers may not yet be drug dependent but may be experimenting with drugs. If prevention programs reach these young mothers, it may be possible to prevent such casual use from becoming dependence.

Results from a very important one-time NIDA prevalence study (The National Pregnancy and Health Survey) have recently become available (Department of Health and Human Services, 1996b). The national survey, which was conducted in hospitals following delivery in 1992, showed that 5.5% of women used an illicit drug during pregnancy. The majority of those women (2.9%) used marijuana, while 1.1% used cocaine. (Estimates for other individual drugs are unreliable because of small sample sizes.) The survey also examined the prevalence of alcohol use (18.8%) and smoking cigarettes (20.4%) during pregnancy; use of these substances is known to be potentially harmful.

The study found that the rate of use for all substances declined starting the 3 months prior to pregnancy and throughout the pregnancy. However, such declines were less pronounced for cocaine (especially crack) and cigarettes than for alcohol and marijuana, indicating greater dependence on those substances for pregnant women and less ability to quit substance use during pregnancy. Another key result from the Pregnancy and Health Survey (which was consistent with the findings from the NIDA household survey) is that the rate of use of cocaine throughout pregnancy was higher for older mothers (over age 25), while the rate of use of marijuana was higher for younger mothers. The survey also found that the rates of use of cocaine and marijuana during pregnancy were significantly higher for women who were not married, currently not employed, had less education, or relied on public aid for payment to the hospital.

Another recent prevalence study, the National Longitudinal Alcohol Epidemiologic Survey of 1992, did not specifically examine the prevalence of substance use dur-

ing pregnancy, but it did provide estimates of rates of use for women enrolled in Medicaid, the publicly sponsored health-care program for certain low-income people, including all poor pregnant women (Grant & Dawson, 1996). In 1992, 4.3% of Medicaid women met the criteria for alcohol abuse or dependence and 1.9% met the criteria for drug abuse or dependence. The study noted that these prevalence rates did not differ substantially from the general population.

Prevalence estimates are also available from several one-time local studies. Table 1 summarizes the results of those studies. Findings from these studies performed in the late 1980s and early 1990s show that from 1.3 to 25.8% of pregnant women or their children were identified as drug-exposed, based on self-reported data, urine toxicology screening, or meconium testing. In these studies, from 1.0 to 28% of pregnant women or their children were exposed to marijuana, from 0.3 to 17% were exposed to cocaine, and from 0.2 to 6.7% were exposed to opiates. While these studies cannot be generalized to all pregnant women because they were confined to certain locations, hospitals, or demographic groups, they suggest that in certain high-risk groups the level of dependence on substances is much higher than the average use nationally.

A recent major review, "Substance Abuse and the American Woman," conducted by the National Center on Addiction and Substance Abuse (1996) (CASA) at Columbia University, summarizes many of the demographic and social factors that are associated with women's substance use and abuse. Their analysis of the 1993 NIDA household survey indicated that the percent of adult women who ever used illicit drugs was positively correlated with income, while the percent who used illicit drugs at least monthly was inversely correlated with income.

In terms of race/ethnicity, a higher percent of White women (36%) have used illicit drugs than African American women (29.1%) or Latinos (25.0%), while the percent of women who were monthly users is highest for African Americans (4.5%), followed by Latinos (3.4%) and Whites (3.0%). Argeriou and Daley (1997) observed variations in the types of drugs used by different ethnic groups in a sample of women admitted to detox facilities in Massachusetts. The drug of choice was more often cocaine for African American women, and heroin or alcohol for Latino or White women.

The CASA study found a declining gender gap in drug use in recent years, with an equal proportion of adolescent females and males using illicit drugs. An equal percentage of young men and young women drink heavily, compared to older women drinkers who still drink less often and less heavily than older men (Quinby & Graham, 1993).

Numerous studies over the past decade have pointed to additional special factors in women's lives that may increase their risk of substance abuse. Anglin, Hser, and Booth (1987) observed that women became addicted to

heroin over a shorter time period than men, and speculated that there may be biological and social reasons for this. Many women in their study were living with or closely connected to a man who was a heroin addict, which may have accelerated the women's own increased use. Women appear to become addicted to alcohol more quickly than men with lower consumption of alcohol, and to have more health associated problems than their male counterparts (Quinby & Graham, 1993). One recent major review (Finkelstein, 1996) pointed to troubled relationships in both the family of origin and in current relationships as a major contributing factor to substance abuse in women. These may lead to depression and poor self-esteem, both of which are strong risk factors for substance abuse.

Studies (Boyd, 1993; Rohsenow, Corbett, & Devine, 1988) have also shown a close association between childhood sexual abuse and substance use, implying that women often use drugs to soften the psychological pain associated with that abuse. From 61% to 75% of women in substance abuse treatment reported experiencing sexual abuse some time in their lifetime. However, sample sizes were small (about 100 cases in each study). Another study of 170 pregnant women in substance abuse treatment showed somewhat lower rates (15% had been "raped as a child," 21% had been "raped as an adult," and 28% had been "molested as a child"). However, differences could be affected by definitions of sexual abuse and methods of data collection (Regan, Ehrlich, & Finnegan, 1987). This study also noted an even higher rate of women reporting being "beaten as an adult" (70%) or "beaten as a child" (19%). Rates of these violent incidents were higher than rates for a comparison group of women who were not in drug treatment. Another study of violence showed a much closer relationship between being a victim of violence and rate of substance use than between demographic characteristics and use (Martin, English, Clark, Cilenti, & Kupper, 1996).

Consequences of Perinatal Substance Abuse

Recent research has also provided greater understanding of the short- and long-term consequences of substance abuse for mother and infants. A growing body of literature has documented the relationship between smoking and poor birth outcomes (Kleinman, Pierre, Madans, Land, & Schramm, 1988; Lincoln, 1986; Oster, Delea, & Colditz, 1988; Shiono, Klebanoff, & Rhoads, 1986). The heavy use of alcohol is known to be associated with fetal alcohol syndrome/fetal alcohol effect, which is associated with mental retardation and behavioral problems that have been shown to last throughout childhood and early adulthood (Streissguth, Barr, Kogan, & Bookstein, 1996).

While findings regarding the impact of smoking on reduced birthweight have been consistent across many

studies, the literature on the impact of substance abuse on birthweight and prematurity is inconclusive. Some studies show reduced birthweight or increased prematurity, and some show no effect. Table 2 summarizes the results from 17 empirical studies and two comprehensive literature reviews of the impact of perinatal substance abuse on birthweight or gestational age. Most studies focused on cocaine or cocaine combined with other drugs or alcohol. While the majority of studies showed reduced birthweight and shorter gestational age for infants of substance abusers, not all studies showed these effects. Conflicting results from human studies could be related to a lack of control for the amount of drug use, the type of drug use, or the timing of drug use during pregnancy. For example, Chasnoff, Griffith, MacGregor, Dirkes, and Burns (1989) found poorer birth outcomes among women who used cocaine throughout pregnancy compared with those who used only in the first trimester. Studies may also not have controlled sufficiently for other factors known to affect birthweight and gestational age, such as social problems or environmental issues that are often a part of a pregnant substance abuser's life.

It is easier to introduce controls in animal studies. Behnke and Eyler's review (1993) included 12 studies of controlled experiments studying the effect of perinatal exposure to cocaine in pregnant rats. Three of these animal studies showed a relationship between cocaine exposure and reduced birthweight, but none showed a relationship with gestational age or postnatal growth. However, there was a relationship with higher mortality for both the offspring and mothers, suggesting that other health problems other than prematurity or low birthweight were caused by drug use and were related to the deaths.

There are few studies of the long-term consequences of prenatal drug exposure. Some evidence suggests that the long-term physical and behavioral development of drug-exposed infants is impaired (Chasnoff, 1988; Chasnoff, Griffith, Freier, & Murray, 1992; Horgan, Rosenbach, Ostby, & Butrica, 1991; Howard, 1993). Many of these effects are difficult to study because the home environments of affected infants have serious negative impacts on child development.

In spite of the lack of empirical information, there is a strong societal belief that the children of substance abusers are at higher risk than other children. The adverse social consequences for children of maternal substance abuse may greatly outweigh the adverse physical consequences. For example, researchers have expressed concern about the parenting skills of substance abusers since they often lack role models for good parenting. The lives of many crack-addicted pregnant women have been described as chaotic (Kerson, 1988). Many of the most prominent stories of child abuse and neglect, such as the death of Elisa Izquierdo in 1995 (Besharov, 1996a), have been associated with crack use. One small study sample of 25 drug using women scored significantly higher on potential for child abuse than did 88 nondrug using

women in the same clinic (Williams-Petersen et al., 1994).

Besharov (1996b) documented that the number of children in foster care associated with the crack epidemic went up from 280,000 in fiscal year 1986 to 445,000 in fiscal year 1993. In New York City alone, the number grew from 20,000 in 1987 to 50,000 in 1991 (Sabol, 1994). These increased case loads have placed great strains on the child welfare system (Curtis & McCullough, 1993) and have placed many pregnant substance abusers in contact with the child protection system during pregnancy, at delivery (when most states require that child welfare be contacted if toxicology screens show evidence of substance abuse), or afterward if children are placed in foster care.

This situation has created a major policy debate about when women should be screened and tested for substance abuse, when such abuse should be reported, and when children should be removed from their parent's care if there is continuing substance abuse at home. The system does not seem to always work equitably, and African American and Latino women may be more frequently tested or have children removed more often (Neuspiel, Zingman, Templeton, DiStabile, & Drucker, 1993). Furthermore, testing and child welfare involvement can be a deterrent to prenatal care and other services (Poland, Dombrowski, Ager, & Sokol, 1993).

However, there is widespread ambivalence about this issue. Indeed, a substantial proportion of drug using women (46.5%) in one study felt that pregnant chemically dependent women should go to jail (Poland et al., 1993), and many child advocates feel strongly that the interest of the child should predominate. New York's Attorney General has recently advocated removing all newborns from mothers who have tested positive for cocaine or opiates at delivery, even though current New York policy only allows such a removal when there is other evidence of "imminent danger" to the child (Hammond, 1996). Policies in other states vary, as do policies within hospitals regarding which mothers and newborns should be screened for drug use.

In some cases, women may be motivated to enter and succeed at treatment to get custody of children who have been placed in foster care because of their drug use. Even women who are having their first child may end their drug use if they are concerned about losing custody of their babies. On the other hand, a woman may be reluctant to enter treatment if state laws indicate she could lose custody of her children (Chavkin, 1990, 1991; Colletti et al., 1992; Stevens, Arbiter, & Glider, 1989).

Women who are under the jurisdiction of the criminal justice system may be motivated to enter treatment to avoid having to return to jail. Although mandatory treatment may increase some women's participation in treatment and reduce their drug and alcohol use, there is a lack of rigorous research on the effect of mandatory treatment on long-term recovery (Chavkin, 1991).

TABLE 1
Local Prevalence Studies Pertaining to Substance Abuse During Pregnancy

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Prevalence
1. Bayatpour, Wells, & Holford (1992)	1985–1989	Fresno, CA	Toxicology screening performed on 352 pregnant teenagers enrolled in comprehensive prenatal clinic.	Any substance abuse at enrollment	3.6%
2. Center for Disease Control (1996)	1994	Georgia	Dried blood spots from 14,968 newborns submitted to Georgia Department of Human Resources and tested by CDC for cocaine metabolite.	Cocaine	Statewide prevalence rate of 4.9/1,000 newborns
3. Brunader, Brunader, & Kugler (1991)	May 1989– May 1990	Fort Ord, CA	Blinded cross-sectional study of 609 positive urine pregnancy tests from military community hospital.	Marijuana Cocaine	1.0% 0.7%
4. Chasnoff et al. (1990)	January– June 1989	Pinellas County, FL	Toxicologic screening performed on 715 pregnant women during prenatal care enrollment at both public and private providers.	Marijuana Cocaine Opiates	11.9% 3.4% .3%
5. Frank et al. (1988)	July 1984– September 1986	Boston, MA	Drug use during pregnancy assessed by self-reports and/or urine assays obtained prenatally and immediately postpartum from 679 urban women enrolled in prenatal care. Percentages refer to percentage of women who used drug at least once during pregnancy.	Any of the above Marijuana Cocaine Opiates Other illicit drugs	14.8% 28% 17% 4% 3%

continued

TABLE 1
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Prevalence
6. George, Price, Hauth, Barnette, & Preston (1991)	August 1989	Alabama	Urine screening of 2,019 nonpregnant and 2,970 pregnant women enrolled in public health maternity or family planning clinics or Obstetric Complications Clinic at University of Alabama.	Marijuana Nonpregnant Pregnant Cocaine Nonpregnant Pregnant Opiates Nonpregnant Pregnant Amphetamines Nonpregnant Pregnant Barbiturates Nonpregnant Pregnant Cocaine, amphetamines, or opiates	14.1% 9.3% 1.4% 1.4% 0.7% 0.2% 0.4% 0.2% 0.5% 0.7% 20.5%
7. Gillogley et al. (1990)	December 1, 1987– November 30, 1988	Sacramento, CA	Universal urine testing performed on 1,643 women admitted to obstetric service for 1-year period.		
8. Habel, Kaye, & Lee (1990)	1981–1987	New York, NY	Linked files of New York City birth and infant death certificates used to analyze reports of infants born to drug-abusing mothers.	Any drug (abuse of cocaine accounts for most of increase from 1981–1987) Any substance abuse	6.7/1,000 live births (1981); 20.3/1,000 live births (1987)
9. Marcenko, Spence, & Rohweder (1994)	NA	NA	225 pregnant women interviewed at inner-city hospital outpatient obstetrics clinic as part of randomized clinical trial. Addiction Severity Index used to determine substance abuse.		23%
10. Matera, Warren, Moomij, Fink, & Fox (1990)	November– December 31, 1988	New York, NY	Urine samples obtained from 509 women admitted to delivery suite at Sloane Hospital for women.	Cocaine	10%

continued

TABLE 1
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Prevalence
11. McCalla et al. (1991)	October 18, 1988– March 1, 1989	New York, NY	Urine specimens from 1,111 pregnant women tested anonymously at municipal hospital.	Marijuana Cocaine Opiates Methadone Any drug	1.2% 11.5% 1.1% .3%
12. Ney et al. (1990)	July 1, 1988– December 15, 1988	Chicago, IL	141 patients first seen at Northwestern Memorial Hospital in suspected preterm labor and comparison group of 108 patients with full-term pregnancies who had urine toxicology screening performed.	Cocaine	17% (patients with suspected preterm labor) 2.8% (comparison group) 10% (patients with suspected preterm labor) <1% (comparison group)
13. Nalty et al. (1991)	November 1990– April 1991	South Carolina	Anonymous urine specimens collected from women giving birth in 24 hospitals, as well as anonymous meconium specimens from newborns in 3 hospitals.	Alcohol and drugs	12.1%(urine) 22.4% (meconium) 25.8% (both testing methods)
14. General Accounting Office (1990)	1986–1988	Boston, MA; Chicago, IL; Los Angeles, CA; New York, NY; San Antonio, TX	Medical records reviewed in two hospitals at each location. 10 hospitals accounted for 44,655 births in 1989. Four different criteria used to identify drug-exposed infants including positive urine toxicology results for mother or infant.	Marijuana Cocaine Opiates Barbiturates Drug-exposed infants Cocaine-exposed infants	8.3% 5.8% 6.7% 9.8% Range of 1.3–18.1% (depending on hospital) Range of .3–11.6% (depending on hospital)

continued

TABLE 1
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Prevalence
15. Valanis, Waage, Dworkin, & Romig (1998)	NA	Portland, OR	250 consecutive deliveries at one hospital. Use of illicit drugs identified through urine specimens, medical records, and self-reports on a questionnaire.	Marijuana Cocaine Opiates Amphetamines Barbiturates Benzodiazepines PCP	7% 1% 5% <1% 0% 0% 0%
16. Vega, Kolody, Hwang, & Noble (1993)	March–October 1992	California	Urine samples collected from 29,494 women at delivery in 202 hospitals according to multistage probability sampling design.	Marijuana Cocaine Opiates Amphetamines Alcohol Any drugs	1.9% 1.1% 1.5% 0.7% 6.7% 5.2%

Costs

Some cost studies have focused on alcohol and drug abuse during pregnancy. Using California Medicaid data, Ellwood, Adams, Crown, & Dodds (1993) found that substance-exposed infants cost 47.3% more than other infants in the late 1980s. A related study of Maryland newborns (Norton, Zarkin, Calingaert, & Bradley, 1996) found an even larger difference in the cost of drug-exposed and nonexposed infants and observed that the higher cost was attributable to longer stays rather than higher charges per day. This study also found a much stronger relationship to cost for drug exposure than for alcohol exposure. A study in one inner-city hospital found a difference of more than \$5,000 in newborn costs between cocaine-exposed and nonexposed infants (Phibbs, Bateman, & Schwartz, 1991). Joyce, Racine, McCalla, and Wehbeh (1995), using data on New York City newborns at one hospital in 1991 and 1992, found that infants exposed to cocaine and other drugs were three times more costly than nonexposed infants, while those exposed only to cocaine were 44% more costly, and infants exposed to other drugs but not cocaine were no more costly than nonexposed infants.

These studies point to the higher infant hospital costs of perinatal substance abuse. However, the studies rely on diagnosis codes from claims, discharge abstracts, or toxicology results to identify pregnant substance abusers. If hospital personnel are more likely to include drug abuse codes for high-cost cases or to do urine tests only on mothers and infants already identified as problem cases, then cost results will be biased upward.

Model Programs

Many experts have recognized that more traditional treatment programs designed primarily for men may not be appropriate for many women, especially pregnant women (Department of Health and Human Services, 1992a; Finkelstein, 1996).

Indeed, prior to the early 1990s, there was little consensus on the appropriate content of care during the prenatal period for women with substance abuse problems. While health-care providers widely agreed on the importance of prenatal care, substance abuse treatment services were seldom included in the package of services offered by or through prenatal care providers. Historically, separate service delivery systems and funding streams for prenatal care and drug treatment further interfered with links and coordination between health and substance abuse treatment providers.

The federal Center for Substance Abuse Treatment (CSAT) helped to address this through the *Treatment Improvement Protocol (TIP) for Pregnant, Substance-Using Women* (Mitchell, 1993). This was followed by two related monographs: *Practical Approaches in the Treatment of Women Who Abuse Alcohol and Other Drugs* (Department of Health and Human Services, 1994) and

TABLE 2
Recent Studies on the Effect of Substance Abuse on Birthweight and Gestational Age

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Impact on Birthweight and/or Gestational Age
1. Chasnoff et al. (1992)	2-year follow-up	Chicago, IL	Two-year growth and developmental outcome study on three infant groups. Group 1 exposed to cocaine and marijuana and/or alcohol ($n = 106$); Group 2 exposed to marijuana and/or alcohol ($n = 45$); Group 3 exposed to no drug during pregnancy.	Cocaine, marijuana, and/or alcohol	Significant decreases in birthweight initially; after 1 year, mean weight caught up to that of control group. No difference in birthweight.
2. Tabor, Smith-Wallace, & Yonekura (1990)	January 1, 1982–June 30, 1988	Torrance, CA	Retrospective study of 37 PCP-intoxicated pregnant women matched with 37 cocaine-intoxicated pregnant women.	PCP, cocaine	Infants exposed to PCP in utero more likely to have meconium-stained amniotic fluid but less likely to be born prematurely than infants exposed to cocaine.
3. MacGregor et al. (1987)	January 1983–September 1986	Chicago, IL	Perinatal outcome data for 70 women receiving care at Perinatal Center for Chemical Dependence with pregnancies complicated by cocaine abuse compared to those of matched control subjects.	Cocaine	Cocaine use during pregnancy associated with lower gestational age at delivery, lower birthweights, and delivery of small-for-gestational-age infants.
4. Chasnoff, Burns, Schnoll, & Burns (1985)	January 1983–September 1984	Chicago, IL	23 cocaine-using women enrolled in perinatal addiction program divided into two groups (cocaine only and cocaine plus narcotics); compared to women who used narcotics in past and were maintained on methadone during pregnancy and with another group of drug-free women.	Cocaine, cocaine/methadone, or control	No statistically significant difference in birthweights among infants in four groups.

continued

TABLE 2
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Impact on Birthweight and/or Gestational Age
5. Pettiti and Coleman (1990)	January 1, 1987– December 31, 1987	Alameda County, CA	Population-based case-control study of singleton infants born in Alameda County during study period. Infants identified using birth certificates; selected those weighing 500 to 2,499 g. Controls chosen at random from infants weighing 3,000 or more g.	Cocaine	Cocaine use estimated to account for 10% of cases of low-birthweight babies born to Black women in Alameda County.
6. Feldman, Minkoff, McCalla, & Salwen (1992)	October 18, 1988– May 1, 1989	New York, NY	1,111 inner-city parturients anonymously tested for perinatal illicit drug use.	Cocaine, marijuana, opiates, or methadone	Drug users were at 3.3 times greater risk of giving birth to child weighing less than 2,500 g independent of other factors.
7. Chasnoff et al. (1989)	January 1986 – February 1988	Chicago, IL	75 cocaine-using women enrolled in perinatal care program divided into two groups: those who used cocaine only in first trimester of pregnancy ($n = 23$) and those who used cocaine throughout pregnancy ($n = 52$). Outcomes of these pregnancies compared to outcomes of matched group of obstetric patients with no history of substance abuse. Urine specimens obtained at admission and at each prenatal obstetric visit.	Cocaine	Mean birthweight for term infants reduced in only second group of infants. Group 2 women had increased rate of preterm delivery and low birthweight infants. Group 1 women had rates of these complications similar to drug-free group.

continued

TABLE 2
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Impact on Birthweight and/or Gestational Age
8. Goldfarb et al. (1991)	1988	Pennsylvania, PA	Sample of 217 deliveries for HealthPASS (a Medicaid case management program) compared to matched sample of deliveries at same hospital for whom payor was traditional fee-for-service Medicaid program. Data abstracted from medical records.	Cocaine	Cocaine use not a significant predictor of birthweight.
9. Burkett, Yasin & Palow (1990)	April 1985–September 1986	Miami, FL	Obstetric outcomes reviewed for 139 women who volunteered information on cocaine abuse during pregnancy after 20-week gestation.	Cocaine	Mean birthweight of infants significantly lower than that of general hospital population. Low birthweight occurred in 36.2% of cases, and small size for gestational age occurred in 32.4% of cases. Marijuana or cocaine use associated with impaired fetal growth. Infants of mothers with positive urine assays for marijuana had 79 gm decrease in birthweight. Elevated risk for delivery of low-birthweight, preterm, or small-for-gestational-age infant among White women reporting regular marijuana use but not among non-White users.
10. Zukerman et al. (1989)	July 1984–June 1987	Boston, MA	Prospective study of 1,226 mothers recruited from general prenatal clinic, and their infants. Interviews or urine toxicology tests conducted prenatally or postpartum.	Marijuana or cocaine	
11. Hatch and Bracken (1986)	1980–1982	New Haven, CT	Prospective study of 3,857 pregnancies ending in singleton live births at Yale-New Haven Hospital. Majority of interviews conducted at 20th week of gestation. Pregnancy outcomes obtained from medical records.	Marijuana	

continued

TABLE 2
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Impact on Birthweight and/or Gestational Age
12. Spence et al. (1991)	NA	Philadelphia, PA	Urine screening for cocaine metabolite in 500 consecutive women admitted to labor and delivery unit at Hahnemann University Hospital.	Cocaine	Women with positive urine samples four times as likely to have preterm labor and twice as likely to have premature delivery or 1-minute APGAR score of 6 or lower.
13. Kliegman, Madura, Kiwi, Eisenberg, & Yamashita (1994)	Spring of 1990–1991	Cleveland, OH	Anonymous urine toxicology screening of 425 women enrolled at time of delivery in either delivery suite or postpartum unit.	Cocaine and marijuana	Cocaine use detected at birth found to be significant predictor of premature or low-weight birth.
14. Shiono et al. (1995)	1984–1989	Oklahoma City, OK; New York, NY; New Orleans, LA; San Antonio, TX; Seattle, WA	7,470 women who received prenatal care from one of seven university-based clinical centers interviewed at 23 to 26 weeks gestation. Data on drug exposure obtained from self-report and urine toxicologies.	Cocaine and marijuana	Cocaine use during pregnancy not associated with low birthweight or preterm birth but strongly associated with abruptio placentae. Marijuana use during pregnancy not associated with low birthweight, preterm birth, or abruptio placentae.
15. Broekhuizen, Utrie, & Mullem (1992)	Jan. 1, 1983–Dec. 31, 1990	Milwaukee, WI	Computerized database of 23,926 deliveries at Sinai-Samaritan Medical Center, University of Wisconsin. Data consisted of information used for birth certificates, quality assurance, and clinical research projects.	Cocaine, marijuana, opiates, amphetamines, and PCP	Women with drug use had two-to-three-times higher incidence of low birthweight and perinatal death. Drug use with inadequate care associated with three times higher incidence of low birthweight and perinatal death. Drug use with more than five prenatal visits had minimal effect on pregnancy outcomes.

continued

TABLE 2
Continued

Study Citation	Date of Data Collection	Location	Sample Size/Method of Selection	Substance	Impact on Birthweight and/or Gestational Age
16. Racine, Joyce, & Anderson (1993)	1988–1990	New York, NY	Population-based retrospective analysis of 7,934 single gestation live births to White non-Hispanic, Black non-Hispanic, and Hispanic residents with positive indication for cocaine on birth certificates.	Cocaine	Receipt of prenatal care among cocaine users associated with significant improvements in birthweight. Adjusted mean birthweight differences between users with four or more prenatal visits and users with none were 262 g for Blacks, 247 g for Whites, and 317 g for Hispanics. Mean gestational age = 38.5 weeks; mean birthweight = 2,858 g. Association between cocaine use and prematurity.
17. Soepatmi (1994)	1974–1983	Amsterdam, Netherlands	91 infants of drug-dependent mothers delivered at Amsterdam University Hospital.	Opiates	Association between cocaine use and prematurity.
18. Finnegan (1994)	NA	NA	Literature review	Cocaine	Association between high levels of alcohol exposure and poor fetal growth.
19. Behnke & Eyer (1993)	NA	NA	Literature review	Alcohol	Association between high levels of alcohol exposure and poor fetal growth.
				Marijuana	Inconsistent findings on relationship between prenatal marijuana use and poor fetal growth.
				Opiates	Prenatal opiate use associated with poorer pregnancy outcomes including low birthweight and intrauterine growth retardation.
				Cocaine	Increase in preterm delivery and small infant size at birth among pregnant cocaine users.

Treatment of the Pregnant Addict (Center for Chemical Dependency Treatment, 1994). These documents—developed by experts in medicine, substance abuse treatment, and social services—include guidelines for appropriate prenatal care and substance abuse treatment, as well as ways to ensure that women receive necessary ancillary and support services. Important legal and ethical issues related to the reporting of information on drug use, including reports to child protective services, are also discussed.

These materials on model programs emphasize that programs for pregnant, substance-abusing women must be family-centered, comprehensive, and staffed by an interdisciplinary team of professionals who provide services in a nonjudgmental, nonpunitive, nurturing, and culturally and linguistically appropriate manner (Chavkin & Paone, 1991; Department of Health and Human Services, 1992a; Kumpfer, 1991). Programs must address mental health problems and provide appropriate assistance and support, recognizing that the more confrontational techniques often used in treatment for men may not work as well with many women. For mothers who do seek treatment, the unavailability of child care and transportation often poses barriers to care. Treatment during pregnancy must therefore be integrated and coordinated with child care and transportation services.

Outreach and Screening

Most programs that have served pregnant substance abusers have confronted the difficult problem of identifying their target population. Programs have discovered that implementing an effective outreach, screening, and referral process in nontreatment settings requires sensitivity to the issues facing this population, as well as the cooperation of different individuals across the social service, prenatal care, and substance abuse treatment delivery systems. Pregnant women may be especially hesitant to volunteer information about drug use because of fears about losing custody of their children, being prosecuted, or being alienated socially (Finkelstein, 1994). These fears are greatest in states that report suspected substance abuse to child welfare or other authorities.

When women receive prenatal care, they have an opportunity to work with support service providers to address substance abuse as part of the continuum of care. Several screening questionnaires have been developed in a variety of settings by persons with minimal substance abuse training (Babor, Ritson, & Hodgson, 1986; Department of Health and Human Services, 1993; Smith et al., 1987; WHO Brief Intervention Study Group, 1996). For example, the Short Michigan Alcoholism Screening Test (SMAST) contains 13 questions to screen for lifetime dependence symptoms, alcohol-related problems, medical consequences, and previous treatment. The CAGE Questionnaire identifies lifetime alcohol use through only four questions. The “Four Ps” is a similar four-question in-

strument oriented toward pregnant women (Department of Health and Human Services, 1993). Such brief screens followed by counseling have been shown to encourage pregnant women to reduce their drinking during pregnancy (Reynolds, Coombs, Lowe, Peterson, & Gayoso, 1995). While these were developed for alcohol screening, they have been adapted for screening for drug use.

Although physicians should screen routinely for alcohol and other drug abuse problems, this practice is still not widespread (Clement, 1986; Kitchens, 1994; Wenrich, Paauw, Carline, Curtis, & Ramsey, 1995). Studies have documented negative attitudes toward pregnant substance abusers among prenatal care providers (Clement, 1986) and substance abuse treatment providers (Finkelstein, 1993; Nurco et al., 1987). These negative attitudes and feelings of anger toward pregnant substance abusers may deter women from confiding about their substance abuse.

A study by Li, Olsen, Kvigne, and Welty (1995) investigated the barriers to implementing a prenatal substance abuse screening program in the Aberdeen Area Indian Health Service facilities in South Dakota. The study identified administrative and patient barriers. Major administrative barriers to implementing a screening program included the absence of staff training in screening for maternal substance abuse, failure to designate staff to administer the screening instrument, insufficient staff to administer the questionnaire, and an insufficient referral protocol. Another qualitative study of a screening program among nurse midwives documented the training process that helped midwives feel more comfortable asking questions about substance abuse (Corse, McHugh, & Gordon, 1995). In addition to the importance of ongoing training, this study and others have emphasized the necessity of improving referral linkages to increase screening effectiveness since providers do not want to identify substance abusers unless they can readily provide help for them (American College of Obstetrics and Gynecology Technical Bulletin, 1994).

Policies regarding urine testing in prenatal care settings or at delivery are not standardized around the country. In a national survey of obstetric and pediatric training programs conducted in 1990, physicians were questioned about their opinions and formal policies regarding cocaine screening methods and protocols (Pelham & DeJong, 1992). Routine universal urine screening of mothers or newborns was the policy in only 9% of obstetric programs and 7% of pediatric programs, although 38% of the obstetricians and 33% of the pediatricians favored universal screening.

It is not possible to identify all pregnant substance abusers through screening programs in prenatal care or other service settings. Studies have shown that many pregnant substance abusers receive no prenatal care (McCalla et al., 1991). To be successful, programs must use a variety of additional outreach and recruitment strategies (Laken & Hutchins, 1996). For example, community-

based outreach in places outside service settings (such as homes, schools, or streets) may be needed. However, research has also shown that these outreach strategies are difficult to implement (Argeriou, Piedade, Finkelstein, & Shearer, 1996).

Treatment

The recent expansion in substance abuse treatment services for pregnant women has been accompanied by some limited research on the outcomes of treatment for this population. To date, few studies with rigorous research designs of these treatment programs have been published in peer-reviewed journals, and much of the literature is descriptive in nature.¹ Numerous studies, still in preliminary stages, promise increased evidence about treatment effectiveness for pregnant substance abusers, but currently available evidence is still quite limited.

Table 3 highlights major design features and findings from a small number of recent outcome studies of treatment for pregnant women. These studies show that findings are consistent with the broader treatment outcome literature (Gerstein & Harwood, 1990; Hubbard et al., 1989; McGlothlin & Anglin, 1981; Simpson, Joe, Lehman, & Sells, 1986; Simpson & Sells, 1983; Wickizer et al., 1994; Woody et al., 1983). Women who complete treatment have a greater likelihood of reducing their substance use than those who do not complete treatment. Retention is improved by more intensive treatment and by the provision of an enriched package of services, such as child care. Studies that compare different types of treatment (for example, residential versus outpatient) are inconclusive—most show little or no difference in outcomes by type of treatment. The lack of random assignment to treatment combined with small sample sizes limits the conclusions we can draw from these studies.

An evaluation of the Center for Substance Abuse Prevention's Pregnant and Postpartum Women and their Infants (PPWI) Demonstration Program (Macro International, Inc., 1993) reviewed more than 130 treatment and prevention programs that received grants to introduce and enhance treatment options for pregnant women with alcohol and other drug problems. The evaluation findings, which are qualitative and descriptive, suggest that the PPWI program strengthened the capacity of the treatment system in providing appropriate services through its funding of a large number of small, women-oriented treatment programs around the country. Data from the 26 programs that collected some person-level data showed that about 40% of the participating women had negative

drug tests at delivery and that most PPWI women received intermediate (43.5%) or adequate (35.8%) levels of prenatal care. The lack of any comparison group precluded any conclusions about treatment effectiveness from the PPWI results.

Because methadone has been shown to be effective for opiate addiction generally, methadone has been used to treat pregnant women. Many doctors consider it appropriate to continue a woman on her pre-pregnancy dose of methadone (Jarvis & Schnoll, 1995). However, use of methadone during pregnancy remains controversial, and many providers are opposed to exposing the fetus to methadone. The outcomes of different methadone programs vary considerably and seem to depend on the dose of methadone and other factors.

Four small studies of pregnant women in methadone maintenance programs found that those on methadone remain in treatment longer than opiate-dependent women not on methadone, consistent with findings from the broader literature on methadone treatment. An enhanced methadone maintenance program (incorporating relapse prevention and therapeutic child care) led to greater abstinence and improved birth outcomes in one small study (Chang, Carroll, Behr, & Kosten, 1992). Another small study of pregnant women receiving methadone found that women in the program were more likely to receive prenatal care and were less likely to use cocaine or alcohol during pregnancy. However, a high percentage of women continued to abuse drugs and there were no significant differences in the birth outcomes for methadone-maintained women and other polydrug using pregnant women not in a methadone maintenance program (Edelin et al., 1988).

These studies were limited by small sample sizes and possible problems related to selection bias. Also, since opiate dependence is not the most prevalent form of substance abuse among women of childbearing age, methadone maintenance is appropriate for only a small proportion of pregnant substance abusers.

Studies of residential treatment suggest that tailoring programs to the specific needs of women in order to improve retention can improve outcomes. One study (Stevens & Arbiter, 1995) of pregnant women in a residential program found that outcomes for women completing the program, including drug use, were better than those for noncompleters. For example, measures of 6-month post-treatment outcomes showed that only 31% of completers were again using drugs, compared to 64% of non-completers.

Several studies of enhancing residential programs also report positive results. One study of a residential treatment for Alaskan Native pregnant substance abusers that incorporated mental health treatment, as well as other support services such as parenting and vocational planning, experienced a 68% abstinence rate (Namyniuk, 1995). Camp and Finkelstein (1995) investigated the implementation and effectiveness of a parenting component

¹The findings from 20 NIDA-funded demonstrations (known as the "Perinatal 20" studies), many of which had randomized designs, have not been published by NIDA; however, some findings from these studies have been published independently, presented in project reports, or reported at conferences. These are included in this review.

TABLE 3
Review of Recent Studies on Treatment Effectiveness for Pregnant Postpartum Substance Abusers

Study Citation	Sample Size/Description	Comparisons	Findings															
PPWI demonstration programs Macro International, Inc. (1993)	Findings from 26 CSAT PPWI demonstration grantees, including 3,641 women reviewed. Most programs included substance abuse prevention and treatment, case management, prenatal care, outreach, home visiting, parenting classes, and support services.	Substance abuse at delivery compared to use at program entry.	37% of women with drug test at delivery had negative results for illicit drugs.															
Methadone Maintenance Anderson et al. (1996)	Study of pregnant women treated under two different methadone protocols. One group received 3-day methadone taper followed by abstinence-based treatment ($n = 22$); other group placed on methadone maintenance ($n = 16$).	Comparison of pregnant women in methadone maintenance program and those in abstinence-based program.	At 40 days postadmission, a higher proportion of women in methadone maintenance program (69%) remained in treatment than women in abstinence-based program (10%).															
Chang et al. (1992)	Enhanced treatment provided to six pregnant methadone-maintained opiate-dependent pregnant women. Enhanced treatment consisted of weekly prenatal care, relapse prevention groups, thrice-weekly urine toxicology screening with positive contingency awards for abstinence, and therapeutic child care during treatment visits.	Outcomes for six pregnant methadone-maintained opiate-dependent women in enhanced treatment compared to those of six women receiving conventional methadone maintenance treatment (daily methadone medication, counseling, and random urine toxicology screening).	Enhanced treatment group had fewer positive urine toxicology screens, more prenatal visits, and heavier infants. <i>Outcomes for Comparison/Enhanced Treatment Groups:</i> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Outcome</th> <th>Comparison</th> <th>Treatment</th> </tr> </thead> <tbody> <tr> <td>Positive urine toxicology screens =</td> <td>76%</td> <td>59%</td> </tr> <tr> <td>Prenatal care visits =</td> <td>2.7 visits</td> <td>8.8 visits</td> </tr> <tr> <td>Gestational age =</td> <td>35.7 wks</td> <td>38.2 wks</td> </tr> <tr> <td>Birthweight =</td> <td>2,344 g</td> <td>2,959 g</td> </tr> </tbody> </table>	Outcome	Comparison	Treatment	Positive urine toxicology screens =	76%	59%	Prenatal care visits =	2.7 visits	8.8 visits	Gestational age =	35.7 wks	38.2 wks	Birthweight =	2,344 g	2,959 g
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Birthweight =	2,344 g	2,959 g																

continued

TABLE 3
Continued

Study Citation	Sample Size/Description	Comparisons	Findings
Edelin et al. (1988)	Retrospective analysis of pregnancy outcomes for 26 opiate-dependent women enrolled in methadone maintenance program.	Pregnancy outcomes for 26 women in methadone maintenance program compared with outcomes for 37 pregnant polydrug users not in program but who delivered during same 12-month period (June 1985–July 1986) and comparison group of all pregnant women who delivered in January–May 1986 ($n = 716$).	88% of women in methadone maintenance program continued to use drugs during pregnancy. 56% had positive toxicology screen at labor. Compared to other pregnant substance abusers, women enrolled in methadone maintenance program had more prenatal care visits, and more adequate prenatal care. However, no significant differences in birthweight or APGAR scores between these groups were found. Significant differences in birth outcomes were found between the two pregnant substance abuser groups and comparison group, with comparison group having better outcomes.
Svikis et al. (1996) ^a	Treatment participation decisions and treatment retention examined for 224 pregnant primary opiate or cocaine-dependent women seeking first admission to intensive day-treatment program with on-site child care and transportation between November 1992 and October 1993.	Treatment retention compared for opiate-dependent women in methadone maintenance, opiate-dependent women not in methadone maintenance, and nonopiate-dependent women.	Women in methadone maintenance remained in treatment significantly longer than other two groups.
Camp & Finkelstein (1995)	Study of 170 pregnant and parenting chemically dependent women at two urban residential treatment programs between March 28, 1990 and August 31, 1993 in Massachusetts that examined effectiveness of a parenting component and aftercare services.	Measures of program participants' parenting skills, self-esteem, and other outcomes compared before and after program. Birth outcomes also examined. Measures of retention for program participants compared to those of nonparticipants.	<p><i>Women's outcomes:</i> Women improved considerably in parenting knowledge and attitudes associated with positive parenting behavior. They also experienced dramatic improvements in self-esteem.</p> <p><i>Birth outcomes:</i> Relatively few infants exhibited poor birth outcomes as measured by birthweight (average 3,117 g), gestational age (90% full term), and APGAR scores (89% with 1-minute APGAR's 7–10).</p> <p><i>Program participation, program retention, and relapse:</i> Completion of parenting program positively related to longer periods of abstinence with average estimated time to relapse being 14.7 months for completers and 9.4 months for non-completers.</p>

continued

TABLE 3
Continued

Study Citation	Sample Size/Description	Comparisons	Findings
Hughes et al. (1995) ^a	Between April 1990 and October 1992, 53 women with children were randomly assigned to standard residential treatment ($n = 22$) or demonstration residential treatment, which allowed children to live with the women ($n = 31$).	Standard treatment compared with demonstration treatment that allowed one-to-two children to live with clients.	Women in demonstration group remained in treatment significantly longer than women with standard treatment. Mean length of stay: Demonstration group: 300.4 days Standard treatment group: 101.9 days
Namyniuk (1995)	Study of residential treatment program for substance-abusing pregnant Alaskan Native women. Model focused on mental health and substance abuse treatment and addressed barriers to entry into treatment, medical care, parenting, family and relationship issues, and vocational planning. Relapse considered part of recovery process; women may be re-admitted into program after relapse.	Analysis of abstinence rates and drop-out rates compared with national rates.	In four years of operation, program showed 68% abstinence rates and 7% drop-out rate, compared to national rates of 50% and 12% respectively. 50% of women readmitted into the program after a relapse episode graduated.
Schinka et al. (1999) ^a	46 cocaine-dependent women treated at therapeutic community that included many features addressing women's special needs. Women could keep children with them while in treatment.	Comparison of depression measures at baseline and 12 months after discharge.	Mean core on Beck Depression Scale was 16.0 at baseline and 10.5 at follow-up. Score of 16 or greater suggested moderate to-severe depression.
Stevens & Arbiter (1995) ^a	Outcomes for 57 substance-abusing pregnant women who entered long-term residential program between November 1990 and September 1994 examined. Program allowed children to live with clients.	Women who completed treatment ($n = 13$) compared to those who dropped out of treatment ($n = 44$) based on 6- and 12-month posttreatment follow-up interviews with each group.	Outcomes (e.g., drug use, criminal activity, employment) better for completers than noncompleters. Alcohol/drug use within 6 months post-treatment: Completers: 31% Noncompleters: 64%

continued

TABLE 3
Continued

Study Citation	Sample Size/Description	Comparisons	Findings												
Comfort, Kumaraswamy, & Kaltenbach (1997)	38 pregnant and parenting women enrolled at least 8 months in comprehensive outpatient substance abuse treatment.	Comparison of women at baseline and after 8 months of treatment.	Significant declines occurred in self-reported 30-day substance use.												
Laudet, Magura, & Whitney (1997)	184 women with drug exposed newborns in New York City admitted to outpatient program with intensive case management component.	Comparisons between those completing treatment, those still in treatment, and dropouts.	<table border="1"> <thead> <tr> <th></th> <th>Completed Program</th> <th>Still Enrolled</th> <th>Dropped Out</th> </tr> </thead> <tbody> <tr> <td>Cocaine/crack use at follow-up</td> <td>6%</td> <td>17%</td> <td>35%</td> </tr> <tr> <td>Self-report</td> <td>40%</td> <td>60%</td> <td>75%</td> </tr> </tbody> </table>		Completed Program	Still Enrolled	Dropped Out	Cocaine/crack use at follow-up	6%	17%	35%	Self-report	40%	60%	75%
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Knisely et al. (1995) ^a	133 pregnant/postpartum women randomly assigned to time-limited ($n = 78$) or self-paced ($n = 55$) intensive outpatient programs; 23 women not interested in participating recruited as a comparison group. Duration of treatment was 5 months for time-limited group and 5–18 months for self-paced group.	Comparisons were made between time-limited group and comparison group. Changes in program design meant outcomes for self-paced program could not be examined due to small sample sizes. Information collected at intake, during treatment, at discharge, and at 6-month intervals for 2 years after.	Women in time-limited program showed significant reductions in alcohol and drug use. Women receiving no treatment experienced no such improvements.												
Strantz & Welch (1995) ^a	Study of retention/completion for postpartum women in enhanced day treatment ($n = 151$) and traditional intensive outpatient treatment ($n = 141$); women discharged in January 1995. Enhanced day treatment consisted of intensive 7-day-a-week program.	Comparison of women in enhanced outpatient program (including, for example, parenting education and personal development activities) with those in traditional outpatient program.	Treatment completion higher for women in enhanced program (45%) compared to women in traditional program (21%). Program type, infant custody, and number of children in home were strongest predictors of treatment retention/completion.												
Comfort & Kaltenbach (in press) ^a	Outcomes study of 64 cocaine-dependent pregnant women referred to "Family Center" in Philadelphia, PA between February 1991 and December 1993.	Comparisons between women in residential treatment ($n = 32$) and women in outpatient programs ($n = 32$).	Comparison of outcomes for women in residential treatment and those in outpatient treatment showed no significant differences in birth outcomes (birthweight, gestational age, head circumference, and length of full-term infants) and total months of substance abuse treatment.												
Marques et al. (1995) ^a	163 cocaine-dependent postpartum women randomly assigned to residential treatment before outpatient, outpatient treatment only, or no treatment.	Comparisons of women by type of treatment at 2 years posttreatment.	Treatment compliance poor—fewer than 25% more effective than other groups in reducing average cocaine use over 2-year posttreatment period. Women with better baseline characteristics and who took best advantage of resources gained the most.												

continued

TABLE 3
Continued

Study Citation	Sample Size/Description	Comparisons	Findings															
Schrager et al. (1995)	Retrospective study of pregnant and postpartum substance abusers delivering in Washington state from July 1, 1991–June 30, 1992 and receiving publicly funded substance abuse treatment services during prenatal period (<i>n</i> = 716). Four groups defined based on type of substance abuse treatment received: residential and outpatient treatment (<i>n</i> = 99), residential treatment only (<i>n</i> = 129), outpatient treatment only (<i>n</i> = 358), and minimal treatment (less than 18 days of outpatient and less than 7 days of residential) (<i>n</i> = 130).	Comparisons of outcomes for (a) substance abusers and other women delivering in same time period, (b) women in treatment and those not in treatment, and (c) women in treatment by type of treatment.	Women who received only residential treatment had poorer birth outcomes than women in other treatment programs. <table border="1"> <thead> <tr> <th>Treatment</th> <th>Preterm Birth</th> <th>Low Birthweight</th> </tr> </thead> <tbody> <tr> <td>Residential/ outpatient</td> <td>13.4%</td> <td>9.4%</td> </tr> <tr> <td>Residential/ only</td> <td>20.5%</td> <td>11.0%</td> </tr> <tr> <td>Outpatient only</td> <td>14.8%</td> <td>9.5%</td> </tr> <tr> <td>Minimal treatment</td> <td>16.8%</td> <td>9.7%</td> </tr> </tbody> </table>	Treatment	Preterm Birth	Low Birthweight	Residential/ outpatient	13.4%	9.4%	Residential/ only	20.5%	11.0%	Outpatient only	14.8%	9.5%	Minimal treatment	16.8%	9.7%
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CSAT = Center for Substance Abuse Treatment; NIDA = National Institute on Drug Abuse; PPWI = Pregnant and Postpartum Women's and Infants.
^aNIDA Perinatal 20 study.

for substance-abusing mothers and pregnant women that was added to the treatment protocol in two residential treatment facilities. Using pre- and posttest measures, the results suggest that the parenting component contributed to increased self-esteem and parenting knowledge among the women. Completion of the program also resulted in longer periods of abstinence.

The issue of the availability of child care is particularly important for women. Hughes et al. (1995) conducted a randomized controlled evaluation within one long-term residential program that permitted cocaine-using women to live with their children in the treatment facility. The study found that women who lived with their children remained in treatment significantly longer than women who did not live with their children during treatment.

Two studies of outpatient programs suggest that outpatient treatment for pregnant women can also improve outcomes. Knisely, Dawson, and Schnoll (1995) found that women in a 5-month intensive outpatient program had greater abstinence than women with no treatment. Enhancing outpatient programs with other services, such as parenting training, education about drug abuse, and personal development activities, may improve outcomes. Strantz and Welch (1995) found that women in an enhanced outpatient treatment program were more likely to complete the program than women in a conventional outpatient program. Forty-five percent of women in the enhanced program completed treatment, while only 21% in the conventional program did so.

Three recent studies compare outcomes in residential treatment to those in outpatient settings. In general, these studies did not find significant difference in outcomes for women in different treatment programs. However, one study did find that residential treatment was marginally more effective than other programs.

A randomized controlled study by Marques, Tippetts, and Branch (1995) tested the impact of three types of treatment protocols for pregnant substance abusers: (a) residential before outpatient, (b) outpatient only, and (c) no active treatment. Although compliance was poor, residential treatment followed by outpatient treatment was the best predictor of decreased cocaine use. Schrager, Joyce, and Cawthon (1995), in a retrospective study, observed that women who received residential treatment combined with outpatient treatment had better birth outcomes and lower infant Medicaid expenditures than women who received residential treatment only. A study by Comfort and Kaltenbach (in press) found no significant differences between women in residential treatment and those in outpatient treatment programs.

SUMMARY

This review has shown evidence of a substantial prevalence of substance abuse during pregnancy. Estimates of prevalence vary widely, but nationally about 5% of pregnant women used an illicit drug during pregnancy. In ad-

dition to the adverse consequences of such use for young women, the literature shows poorer birth outcomes and higher cost for drug exposed infants, although evidence is mixed due to the lack of control for type of drug and amount of exposure in most of the studies. Still the literature is convincing that there has been and continues to be a need for programs that effectively identify and treat pregnant substance abusers.

One of the most challenging tasks confronting those developing programs for pregnant substance abusers is to identify them and persuade them to obtain treatment services. We have described some screening instruments that have been used successfully in prenatal care settings, but these require cooperative providers who are willing to screen and refer women. Similarly, these programs require effective, regular communication between prenatal care and treatment providers to assure that a woman who is identified can be quickly counseled, assessed, and admitted to treatment if she needs it and agrees.

A consensus has developed regarding the components of model treatment programs for pregnant substance abusers, and a small body of research has generally supported the recommendations that treatment programs for pregnant substance abusers should address the needs of children (through parenting programs and child care), provide transportation, and address women's social and mental health needs. As with the broader treatment literature on effectiveness, retention is the major predictor of success (as measured by abstinence), and the program components described above seem to lead to improved success through their effect on increased retention.

There is a lack of evidence that residential care is necessarily more effective than intensive outpatient care. However, there are few studies, and more work with larger samples and random assignment to treatment alternatives is needed before this important public policy question can be addressed. This is important because many of the programs that have been developed through recent federal demonstration programs have been residential programs, and the residential programs are more costly. New forms of reimbursement through Medicaid and managed care initiatives will demand evidence of effectiveness before residential programs are covered. We conclude that a larger number of well-designed studies is needed to identify the most critical treatment program components and their settings.

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