Demographic Characteristics, Drug Use, and Sexual Behavior of IV Drug Users with AIDS in Bronx, New York

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Synopsis

Intravenous (IV) drug users are a key factor in the transmission of human immunodeficiency virus (HIV) infection, yet epidemiologic information about this population, especially those with acquired immunodeficiency syndrome, is scarce. The demographic characteristics, drug use behavior, and sexual practices of IV drug users who developed AIDS were prospectively studied at the Montefiore Medical Center from October 1984 to February 1988.

The early wave of IV drug users with AIDS was characterized by poverty, minority overrepresentation (more than 80 percent were black or Hispanic), and initiation of IV drug use at an early age (median age 19 years). Injection of drugs and sharing of needles was frequent.

Most had used so-called shooting galleries, but only for a minority of injection episodes. Heroin or cocaine use was almost universal, nearly always accompanied by abuse of another substance, usually alcohol or marijuana. Fewer than a third had ever participated in a methadone maintenance program, but more than 40 percent had been in prison since 1978. All patients had been sexually active, often with partners who were not IV drug users.

The research suggests a complex interaction existing between high-risk demographic characteristics, drug use practice, and certain types of sexual behavior, all of which contributed to the early spread of HIV infection in this population. Efforts that are directed toward interrupting IV drug user-related transmission of HIV need to include consideration of these characteristics.

INTRAVENOUS (IV) DRUG USERS are a key group in the transmission of the human immunodeficiency virus (HIV), and knowledge of their characteristics is important to understanding the acquired immunodeficiency syndrome (AIDS) epidemic in the United States.

Twenty-five percent of the 82,764 AIDS cases reported to the Centers for Disease Control as of December 1988 were among persons who had used IV drugs (*1*). Presently, among newly reported cases of AIDS, the proportion occurring among IV drug users is increasing, while the proportion attributed to homosexual bisexual men is declining (*2*). The importance of IV drug use as a factor in the AIDS epidemic extends beyond drug users (*3*). Among the 4 percent of adults with AIDS whose only known risk is heterosexual contact with persons with AIDS or at risk of HIV infection, 46 percent had sexual partners who were IV drug users (*4*). Moreover, 73 percent of infants with perinatally acquired AIDS were infected by a mother who either used drugs or was infected through heterosexual contact with an IV drug user (*4*).

Attempts to intercede in the spread of HIV that results from IV drug use need to be based on careful consideration of the demographic, drug use, and sexual behavior characteristics of this population. Although studies have described demographic and behavior characteristics among IV drug users who have tested positive for HIV infection, little descriptive information exists about those who have been diagnosed as having AIDS and, therefore, are likely to have been infected with HIV early in the epidemic.

Methods

To further characterize this population, the first wave of AIDS patients among IV drug users, we studied those IV drug users who were diagnosed with AIDS at Montefiore Medical Center, Bronx, NY, between Octo-

ber 1984 and February 1988. Hospitalized patients meeting the CDC clinical definition of AIDS were invited to participate in longitudinal studies of HIV transmission. After informed consent was obtained, patients participated in standardized interviews with trained research personnel regarding their AIDS related medical history, demographic factors, drug use, and sexual history.

Data was entered on standardized data collection forms and kept in a computerized data bank. In this study, frequency distributions are displayed for categorical data, summary statistics for continuous variables that meet the assumptions of normality are expressed in terms of means and standard deviations, and summary statistics for ordinal data or continuous variables that are not normally distributed are presented as medians and ranges. The two-tailed Fisher's Exact Test was used to test for statistically significant differences in sexual behavior practices by sex. The Wilcoxon rank sum test was used to compare the duration of heroin use versus cocaine use. The interquartile range was used to refer to values in which 50 percent of the samples lay.

Results

Demography. Table 1 summarizes the demographic characteristics of 112 AIDS patients with a history of IV drug use who agreed to participate, 81 men (72 percent) and 31 women (28 percent). Their mean age was 35.4 years (plus or minus 6.0 years) and most had been born in the New York metropolitan area. Thirty-five (31 percent) were born outside the continental United States, most in Puerto Rico. Ninety-two (80 percent) were black or Hispanic (predominately Puerto Rican heritage).

Measures of socioeconomic status indicated a high prevalence of markers for poverty. Most patients lived below the poverty line, with 79 (73 percent) reporting total incomes of less than $10,000. The median number of persons supported by the patient's reported income was 2.0, and 23 percent supported 3 or more children. Forty-five percent had not completed high school. Information regarding occupation was available from 106 patients, about half of whom were unemployed; 50 percent reported receiving public assistance.

Forty-six (41 percent) had been in prison at least once since 1978. Of the 46 who had been incarcerated, 39 (85 percent) were men and 7 (15 percent) were women, making up 48 percent of men and 23 percent of women in the sample of 112. Forty-four percent of whites, 38 percent of blacks, and 42 percent of Hispanics in the sample had been in prison. Men were significantly more likely to have been in prison (P = 0.018), but there was no significant difference by race.

In the sample of 112 persons, only 35 persons (31 percent) had been enrolled in methadone treatment since 1978. Among those, 20 (57 percent) were men and 15 (43 percent) were women, representing 22 percent of men and 48 percent of women in the entire sample. There was a significant difference in the likelihood of methadone treatment by sex (P = 0.022), with a greater proportion of women in a methadone program, compared with men. Among the 35 persons enrolled in methadone treatment since 1978, 8 (23 percent) were white, 10 (29 percent) were black, and 17 (49 percent) were Hispanic. In the total sample, 50 percent of whites (not Hispanic) had been in methadone treatment, as had 27 percent of blacks, and 31 percent of Hispanics. Differences among racial groups with regard to the likelihood of methadone treatment were not statistically significant.

Drug and needle using behavior. The median age of the patients at the beginning of their IV drug use was 19

Table 1. Demographic characteristics of 112 IV drug users [1] with AIDS, Bronx, NY, 1984–88

Characteristic	Number	Percent
Sex:		
Men	81	72
Women	31	28
Place of birth:		
Bronx	21	19
Other boroughs of New York City	39	35
Metropolitan New York area	11	10
Outside New York City area	6	5
Outside continental United States	35	31
Racial or ethnic background:		
White, not Hispanic	16	14
Black, not Hispanic	37	33
Hispanic	55	49
Other	4	4
Did not complete high school	50	45
Income per year in dollars [2]:		
Less than $10,000	79	73
$10,000 to $20,000	19	18
$20,000 to $30,000	6	6
More than $30,000	4	4
Receiving public assistance[3]	52	50
Occupation [4]:		
Unemployed	54	50
Laborer, unskilled	12	9
Disabled	6	6
Laborer, skilled	6	6
Salesperson	3	3
Technical	3	1
Student	3	1
Other	24	22
In prison anytime from 1978	46	41
Enrolled in methadone program anytime from 1978	35	31

[1]Subjects' mean age was 35.4 years (SD = ± 6.0 years). Mean years of education completed was 11.7 years (SD = ± 2.5 years).
[2]Income reported by 108 subjects.
[3]Public assistance reported by 104 subjects.
[4] Occupation reported by 109 subjects. Other category includes 4 housewives, 2 teachers, 2 nurse's aides, 2 security guards, 2 counselors, 2 clerks, and 10 in miscellaneous occupations.

Table 2. Drug use reported by IV drug users with AIDS, Bronx, NY, 1984–88

Characteristic	Numer	Percent	Median number of years used
Heroin use	109	97	8
Cocaine use	106	95	5.5
Other	26	25	1
Drug injected at last use:			
Heroin only	26	23	
Cocaine only	7	6	
Both	79	71	
Frequency of drug injection:			
Several times per day	48	43	
Daily	21	19	
Every other day	14	13	
Weekly	11	10	
Fewer than weekly	18	16	

Table 3. Needle use behaviors from 1978 reported by IV drug users with AIDS, Bronx, NY, 1984–88

Practice	Number responding	Number engaged in activity	Percent engaged in activity
Used drug with another person	112	99	88
Used drug in gallery	112	76	68
Used new needle	107	83	78
Used own used needle	109	86	79
Used another's needle	109	98	90
Booted drug	108	95	88
Shared needle with someone with AIDS	70	15	21
Shared needle with gay man	95	22	23
Shared needle with family member	111	31	28

Table 4. Frequency of drug use setting and needle use since 1978 reported by 112 IV drug users with AIDS, Bronx, NY, 1984–88

Characteristic	Median percent	Percent range
Setting:		
Alone	30	0–100
With others	30	0–100
In shooting gallery	5	[1]0–100
Needle:		
New	15	0–100
Own, used	40	0–100
Another's, used	25	0–100

[1]Interquartile range 0–25 percent.

years, ranging from 11 to 39 years, as shown in figure 1. Drug use and needle-sharing behavior is summarized in tables 2 and 3. Heroin was used by 97 percent of patients, and cocaine by 95 percent. The drug used for the longest time was heroin, used a median of 8 years. The length of time of cocaine use was shorter, a median of 5.5 years, as shown in figure 2 ($P = < 0.05$). The drug most likely to have been used during the patient's most recent injection episode was a combination of heroin and cocaine, used by 79 of the 112 patients (71 percent), regardless of the number of years of IV drug use. Sixty-nine patients (62 percent) injected drugs at least once daily, and most of these injected more than once daily. Eighty of 111 (72 percent) injected by repeatedly drawing blood into the syringe and reinjecting it (called booting).

Tables 3 and 4 show needle-using activities reported by IV drug user patients with AIDS. Of 109 patients responding, 98 (90 percent) had used another person's needle, and use of another person's needle occurred with a median of 25 percent of injections. Of 95 patients responding, 22 (23 percent) had shared a needle with a gay man, 15 of 70 (21 percent) had shared a needle with someone known to have AIDS, and 31 of 111 (28 percent) had shared a needle with a family member. There were no statistical differences between men and women in needle sharing with a person known to have AIDS, with homosexual men, or with family members. There was no association between race and having shared a needle with someone known to have AIDS, or with a homosexual man. There was a statistically significant association between race and sharing needles with a family member. Six percent of whites, 19 percent of blacks, and 38 percent of Hispanics had engaged in this practice ($P = < 0.05$).

Tables 3 and 4 show that of 112 patients, 76 (68 percent) had used drugs in a so-called shooting gallery. However, only a median of 5 percent, ranging from zero to 100 percent, of injection episodes occurred in shooting galleries. The proportion of shooting gallery injections was not equally distributed among the population. The interquartile range was zero to 25 percent for injections in this setting.

Table 5 shows that non-IV drug use was extensive. Cigarette smoking was reported by 103 of 112 respondents (92 percent). Marijuana smoking was common, being reported by 96 patients (86 percent). More than half of the marijuana users smoked it at least once daily, and 95 of 111 (86 percent) described some degree of alcohol consumption, with a median use period of 15 years. Of 95 reporting use of alcohol, 33 (35 percent) drank at least daily. Sixty-four of 112 (57 percent) had used mood altering drugs, and 32 (29 percent) had used stimulants.

Sexual behavior. All 112 patients described having at least one sexual encounter since 1978 (table 6). The median number of sexual partners in the preceding year was 1, ranging from none to 100. Among those who did not receive payment for sex, the median number of sex partners in the past year, as well as in a typical year

since 1978, was 1, ranging from none to 15 in the previous year and from none to 104 in a typical year.

The 19 persons who received payment for sex had a median of 1 sexual partner in the preceding year, ranging from none to 100. However, only 6 of the 19 persons (32 percent) considered their sexual activities during the past year to be typical of their sexual activities since 1978. For this group, the median usual number of sex partners in 1 year was 17, ranging from none to 500. The increased number of prostitution sex partners was statistically significant ($P = < 0.05$).

To address the issue of steady or long term sexual relationships, patients were asked with how many partners had they had 10 or more sexual encounters since 1978. Subjects reported a median number of 1, ranging from none to 16. There was no significant difference between men and women in numbers of steady sexual partners.

Sixty of 107 respondents (56 percent) reported having had sex with other IV drug users. Compared with men, women were significantly more likely to have had IV drug user sexual partners. Of 28 women responding, 25 (89 percent), and of 79 men, 35 (44 percent) ($P < 0.05$), reported sex with other IV drug users. Eight of 106 (8 percent) reported having had sex with a person with AIDS.

Among men, 14 of 81 (17 percent) reported sexual contact with another man. Among women, 3 of 22 (14 percent) had sex with a bisexual man. Seventeen of 112 patients (15 percent) reported having paid for sex, 15 of 81 (19 percent) of the men and 2 of 31 (6 percent) of the women. Nineteen of 112 (17 percent) received payment for sex, 32 percent of the women and 11 percent of the men ($P = 0.012$).

Those who received payment for sex were compared with regard to drug use to those who did not receive payment. Specifically, there was no statistical association between prostitution and the frequency of drug injections, the percent of injection episodes in a shooting gallery, or the length of time of heroin use. However, the duration of cocaine use was statistically associated with payment for sex ($P = < 0.05$). Among those who did not report receiving payment for sex, the median length of time that cocaine was used was 5 years, ranging from zero to 23 years, whereas, among those who did report receiving payment for sex, the median duration of cocaine use was 9 years, ranging from 2 to 22 years.

Other characteristics. Fifteen patients (13 percent) reported having received blood transfusions, 15 (13 percent) said they had tattoos, and 12 (11 percent) had undergone acupuncture since 1978. Foreign travel was infrequent, but since 1978, 31 (28 percent) had traveled to Puerto Rico, nearly all of whom were of Puerto Rican background. A substantial proportion of subjects had a history of significant medical illness, including tuberculous infection, sexually transmitted disease, and infection relating to IV drug use that required hospitalization (table 7).

Figure 1. Age at first use of IV drugs reported by 112 IV drug users with AIDS, the Bronx, NY, 1984–88

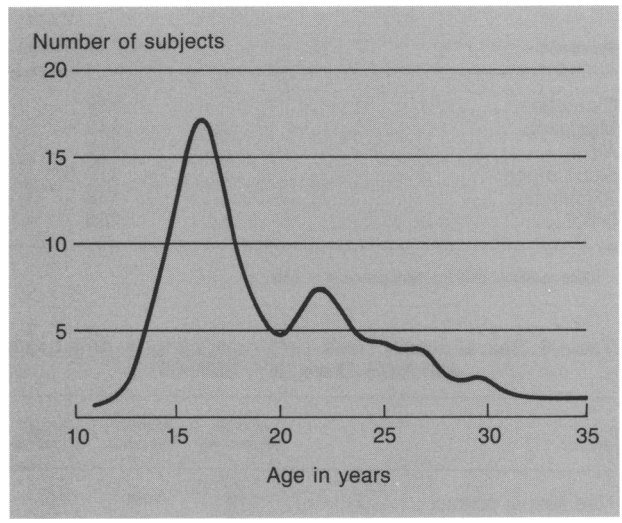
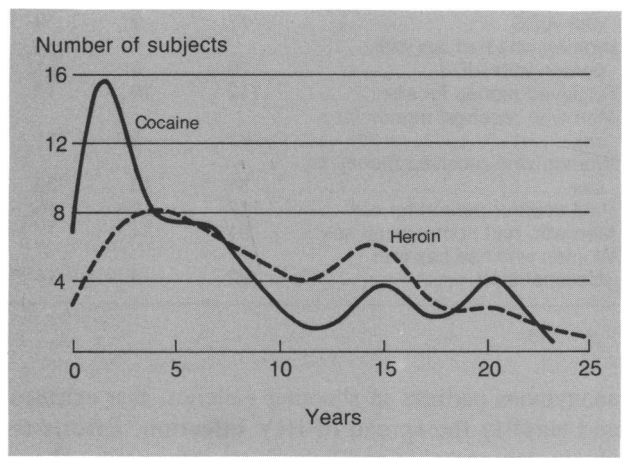


Figure 2. Length of time of IV drug use reported by IV drug users with AIDS, the Bronx, NY, 1984–88



NOTE: Heroin use reported by 108 subjects. Cocaine use reported by 104 subjects.

Discussion

Tightly interwoven relationships between drug use, sexual behavior, and demographic factors are involved in HIV transmission among IV drug users. Mostly poor, under-educated persons of minority backgrounds, living in inner city areas of major urban centers, IV drug users form a subculture in which certain behaviors have evolved, such as needle sharing with multiple

Table 5. Use of substances other than IV drugs reported by IV drug users [1] with AIDS, Bronx, NY, 1984–88

Substance	Number responding	Users		Years of use		Used once or more per day[1]	
		Number	Percent	Median	Range	Number	Percent
Cigarettes	112	103	92	17	2–33	...	...
Marijuana	112	96	86	10	1–35	52	54
Alcohol	111	95	86	15	1–31	33	34
Mood drugs	112	64	57	...	...	...	...
Stimulants	112	32	29	...	...	...	...
Other	105	26	25	...	...	...	...

[1]Data available only for marijuana and alcohol use.

Table 6. Sexual activity since 1978 reported by IV drug users with AIDS, Bronx, NY, 1984–88

Activity	Number responding	Number engaging	Percent engaging
Had sexual contact	112	112	100
Had sex with IV drug user	107	60	56
Men who had sex with IV drug user	79	35	[1]44
Women who had sex with IV drug user	28	25	89
Had sex with person with AIDS	106	8	8
Men who had sex with person with AIDS	77	2	3
Women who had sex with person with AIDS	29	6	21
Received money for sex	112	19	17
Men who received money for sex	81	9	[1]11
Women who received money for sex	31	10	32
Paid another person for sex	112	17	15
Men who had homosexual sex	81	14	17
Women who had sex with bisexual man	22	3	14

[1]$P < 0.05$.

anonymous partners in shooting galleries, that enhance and amplify the spread of HIV infection. Efforts to obtain demographic and behavioral information about IV drug users have been hampered by the inherently illegal nature of IV drug use, and by the social, racial, and cultural differences between IV drug users and members of the health care professions attempting to limit HIV transmission. The data collected in this study serves to further define this population of critical importance in the AIDS epidemic process.

The population was predominantly of minority race and ethnic background, with only 14 percent of the patients describing themselves as non-Hispanic whites. While this, in part, reflects the demography of Bronx itself, it also reflects the disproportionate prevalence of HIV infection in blacks and Hispanics, acquired largely through IV drug use, and the particularly heavy prevalence of the infection in the Northeast, where 80 percent of all cases of IV drug users with AIDS in 1988 occurred among blacks or Hispanics (*4*). The overrepresentation of minorities in the patient population underscores a need to better understand the sociocultural conditions which underlie HIV transmission, and to design appropriate, culturally sensitive intervention strategies (*5*).

The low socioeconomic status of the patients is apparent in that more than 70 percent described a total income of less than $10,000 per year. Additionally, a large proportion were unemployed, and many of those working were performing unskilled labor. The patient population represents a substantially different socioeconomic stratum than do homosexual males with AIDS, as suggested by a comparison with the socioeconomic status of a population of San Francisco homosexual AIDS patients described in a 1984 AIDS Foundation study (*6*). In that study group, 44 percent had pretax earnings of $25,000 per year and 57 percent had college degrees.

There are important socioeconomic and public health-related implications in these differences. One issue concerns the allocation of governmental health care resources. The average cost to the Medicaid system of providing care for an AIDS patient has been estimated to be as high as $75,000 per person-year (*7*). Most IV drug users who are AIDS patients are dependent upon publicly financed health care, provided through the Medicaid Program, and thus, the continuing provision of adequate resources, as their number grows, is problematic.

Another issue is the effort to develop approaches to decreasing HIV transmission in the IV drug user population. The cornerstone of such efforts is educational programs. However, prospects for success are diminished by a lack of stable sites at which the population may be reached, such as workplaces, and the population's low educational levels. Success in risk reduction programs within the setting of drug treatment programs has been reported recently (*8*).

Our examination of the use of drugs administered by other than IV showed polysubstance abuse to be common in the population. Eighty-six percent of the patients described marijuana use, with more than half reporting at least daily use. Marijuana has been

described as a gateway drug in a study that found frequent use in adolescence to be the single best predictor of the eventual use of cocaine (*9*). While our data does not provide insight into the precise relationship between marijuana use and the use of IV drugs among the patients, the levels of marijuana use found is likely not to be a chance occurrence. More than one-third of the respondents reported at least daily use of alcohol. Educational efforts targeted to preventing IV drug use must address the issue of marijuana and alcohol abuse as well.

IV drug use of heroin and cocaine combined was 71 percent in our study group and started at an early age. The median age of onset of IV drug use was 19 years. This finding suggests that intervention strategies need to be directed at teenagers and preteens, as well as adults. Cocaine use was for a shorter time than heroin use, suggesting that IV drug use usually began with heroin in this population, with subsequent switching to or adding cocaine. The importance of the use of cocaine in the transmission of HIV has been emphasized in several studies (*5, 10*).

Chaisson described a strong association between seropositivity for HIV and a history of current or prior injection of cocaine. The association transcended the actual frequency of cocaine injection, or any concomitant or independent use of heroin (*10*). In Schoenbaum's study of HIV seropositive drug users, however, the year and setting of drug use was more predictive of HIV infection than the type of drug used (*5*).

Our subjects, persons with AIDS and consequently with long standing HIV infection, likely placed themselves at increased risk of HIV infection in the earliest stages of its spread through the IV drug user community. In addition to prolonged duration of usage in our patients, the pattern of drug injection was characterized by frequent use, with almost 50 percent injecting drugs several times a day. Increasing frequency of drug injection has been shown to be significantly associated with HIV infection among IV drug users (*5, 10, 11*).

Shooting gallery use was common but not universal, nor was it proportionately the predominant mode of drug use. A minority of injection episodes took place in this setting. Two-thirds of the population had used shooting galleries, although only a median of 5 percent of all drug use occurred in this setting. The proportion of injections in shooting galleries has been shown to be a significant independent risk factor for acquiring HIV infection among IV drug users (*5*). The use of shooting galleries was likely a major factor contributing to HIV infection in our study population. However, since shooting gallery attendance and needle-sharing behavior was not universal among the participants, it is possible that other routes of HIV transmission, such as sexual activity, may have contributed to HIV transmission in this population (*5*).

Table 7. Medical history from 1978 reported by IV drug users[1] with AIDS, Bronx, NY, 1984–88

History	Median number of episodes	Number reporting	Percent
Condition:			
Tuberculous infection	...	19	17
Hepatitis	1.0	49	44
Gonorrhea	1.9	38	34
Syphilis	1.0	16	14
Herpes	2.0	13	12
Pubic lice	...	27	24
Hospitalization:			
Endocarditis	...	20	18
Pneumonia	...	9	8
Skin abscess	...	11	10
Hepatitis	...	1	1

[1]Median number of episodes since 1978.

The relative importance of sexual activity and needle sharing in the transmission of HIV among the patients in this study remains unknown, as it is for IV drug users nationwide (*12*). Our subjects were sexually active even in the year before their diagnosis of AIDS. IV drug-using women were significantly more likely (89 percent) than men (44 percent) to have had sex with another IV drug user ($P < 0.05$) and may be at greater risk of becoming infected by sex than men, a finding recently reported by Schoenbaum and coworkers (*5*). Conversely, men were significantly more likely (56 percent) than women (11 percent) to have had sex with a person who was not an IV drug user ($P < 0.05$), emphasizing the particular risk of heterosexual spread to non-IV drug using women. Thirty-two percent of women had received payment for sex, a proportion identical to that described by Des Jarlais and coworkers (*13*). Seventeen percent of the men in the study group reporting having sex with other men, an unexpectedly high rate, but a result consistent with the report by Marmor and coworkers who found homosexuality to be a significant independent risk factor for HIV infection among IV drug using men (*11*).

Only 31 percent of the patients in this study had ever participated in a methadone treatment program. While the reasons for this were not specifically delineated, it has been shown that limited financial support for these programs has resulted in the nonavailability of drug treatment for the majority of IV drug users at any given time (*6*). Participation in drug treatment programs may be associated with diminished risk for HIV infection. Marmor and coworkers found that patients enrolled in methadone maintenance programs were less likely to be seropositive than those patients enrolled in drug detoxification programs (*11*). Schoenbaum and coworkers found that longer duration of methadone treatment was

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associated with negative HIV seropositivity (*5*). The clear need for an increased number of treatment slots in methadone maintenance programs and the importance of making drug treatment available on demand to any IV drug user have been frequent and consistent themes in the literature of AIDS and IV drug use (*5, 11–15*). In this light, it is an unfortunate reality that a greater proportion of the patients in this study had been in prison (41 percent) than had participated in methadone treatment (31 percent).

The patients participating in this study represent the first wave of IV drug users to develop AIDS. They illustrate the complex interactions between high risk demographic characteristics, drug use practice, and sexual behavior in the population. Until a protective vaccine is developed, the reduction of IV drug related HIV transmission requires intensive, targeted educational efforts and an expansion in the numbers and functions of drug treatment programs.

The problem of IV drug user associated AIDS transcends both IV drug use and AIDS. The poverty, minority overrepresentation, and the youth of the population described is a magnified image of the population inhabiting large areas within our major urban centers. Ultimately, a commitment to reversing the economic, social, and structural decay in these areas is required to spare the next generation from HIV infection.

References

1. Centers for Disease Control: Update: acquired immunodeficiency syndrome—United States, 1981–1988. MMWR 38: 229–236, April 14, 1989.
2. Centers for Disease Control: First 100,000 cases of acquired immunodeficiency syndrome—United States. MMWR 38: 561–563, Aug. 18, 1989.
3. Friedland, G. H.: Parenteral drug abuse. *In* Epidemiology of AIDS, edited by R.A. Kaslow and D. Francis. Oxford University Press, New York, NY, 1989, pp. 153–178.
4. Centers for Disease Control: Update: acquired immunodeficiency syndrome associated with intravenous drug use—United States, 1988. MMWR 38: 165–170, Mar. 17, 1989.
5. Schoenbaum, E. E., et al.: Risk factors for HIV infection among intravenous drug users. New Engl J Med 321: 874–879, Sept. 28, 1989.
6. Drucker, E.: AIDS and addiction in New York City. Am J Drug Alcohol Abuse 12: 165–181 (1986)
7. Andrulis, D. P., Weslowski, V. B., and Gage, L. S.: The 1987 hospital AIDS survey. JAMA 258: 1343–1346, Aug. 11, 1989.
8. Schoenbaum, E. E., Hartel, D., and Friedland, G. H.: Intravenous drug use and HIV infection. Curr Opin Infect Dis 3: 80–93 (1990).
9. Kandel, D. B., Murphy, D., and Karus, D: Cocaine use in young adulthood: patterns of use and psychosocial correlates. Research Monograph Series 61. National Institute on Drug Drug Abuse, Washington, DC, 1985, p. 76.
10. Chaisson, R. D., et al.: Cocaine use and HIV infection in intravenous drug users in San Francisco. JAMA 261: 561–565, Jan. 27, 1989.
11. Marmor, M., et al: Risk factors for infection with human immunodeficiency virus among intravenous drug abusers in New York City. AIDS 1: 39–44 (1987).
12. Haverkos, H., and Edelman, R.: The epidemiology of acquired immunodeficiency syndrome among heterosexuals. JAMA 260: 1922–1929 (1988).
13. Des Jarlais, D. C., Friedman, S. R., and Stoneburner, R. L.: HIV infection and intravenous drug use: critical issues in transmission dynamics, infection outcomes, and prevention. Rev Infect Dis 10: 151–158 (1988).
14. Schuster, C. R: Intravenous drug use and AIDS prevention. Public Health Rep 103: 261–266, May-June 1988.
15. Brickner, P. W., et al.: Recommendations for control and prevention of human immunodeficiency virus (HIV) infection in intravenous drug users. Ann Intern Med 110: 833–837 (1989).