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Community-Based Outreach HIV Intervention for Street-Recruited Drug Users in Madras, India

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S Y N O P S I S

Objective. Community-based outreach to drug injectors is an important component of human immunodeficiency virus (HIV) prevention strategy. The purpose of this chapter is to evaluate the effectiveness of community-based outreach HIV intervention that has been implemented in two locations in the city of Madras, India, to reduce risk behaviors for HIV transmission.

Methods. Baseline data were collected for street-recruited injecting drug users (IDUs) at two outreach locations in Madras, India ($n = 250$), and follow-up data are available at 18 months ($n = 61$). Baseline ($n = 150$) and follow-up data ($n = 87$) were obtained from a control group of IDUs recruited from locations at which outreach services were not utilized.

Results. Significant decline in injecting risk behavior was noted at 18-month follow-up from baseline for the IDUs recruited from outreach locations.

Conclusion. Results indicate that outreach services for drug users produce significant changes in injecting risk behavior but that sexual risk behavior is difficult to change. There are problems in implementing and evaluating the interventions, and the research findings are limited because HIV serodata were not studied for all participants.

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Injecting drug use, in particular injecting opiates, is increasing in the Indian subcontinent. In some parts of India, like Manipur in northeastern India, a rapid increase in human immunodeficiency virus (HIV) infection has occurred.¹⁻³ Since 1983, Madras has experienced a serious heroin problem; since 1991, opiate injecting has steadily increased. Easy availability of injectable preparations like buprenorphine has certainly contributed to this escalation. There is an urgent need to develop and implement appropriate HIV prevention intervention strategies that should be monitored and evaluated rigorously.

HIV Prevalence among IDUs in Madras, India

HIV infection was first documented in Madras, India, in 1986 in a commercial sex worker; since then, the infection rates for HIV have shown a spiraling upward trend. Though heterosexual transmission of HIV is the predominant mode, escalating drug use, in particular injecting drug use, is causing concern. The absence of denominator populations of drug users, in particular drug injectors, clearly limits the methodological validity and reliability of HIV prevalence estimates in Madras. Injecting drug users (IDUs) are predominantly seen in certain geographic locations of the city. These areas have been identified using treatment data, ex-IDUs' knowledge, outreach work, arrest records, and narcotic raids and seizures. Prevalence estimates have been carried out on nonrandomized convenience samples from treatment centers,^{4,5} voluntary testing from drug users,⁶ and unlinked anonymous serosurveillance data from the

not-in-treatment, community-based samples. The samples have been smaller; nonetheless, it is remarkable that the prevalence estimates from the three samples have been 15% to 20% (see Table 1).

It also is important to observe that the prevalence of hepatitis B virus (HBV) also is high among IDUs and is estimated at 33% in a community-based sample.⁶ Findings from the community-based research initiatives show that many drug users are unaware of the existing HIV testing facilities at Madras and the majority of them are reluctant to test themselves. The number of agencies involved in testing and counseling is low, and existing facilities do not attract, access, or help drug users. There are at present no support groups for HIV-positive drug users.

HIV Risk Assessment for IDUs in Madras, India

In response to escalating drug abuse and its attendant health consequences, outreach services for drug users were established in 1993 in Vepery and Royapuram, India. These locations were chosen because of high prevalence of drug abuse as indicated from the treatment records and through street knowledge and greater involvement of church-based community development activities. The services were established and maintained by SAHAI Trust, a nongovernmental organization involved in drug abuse prevention and treatment of drug abusers; the Trust is supported by the Catholic Churches of Madras Diocese. A comprehensive assessment of HIV risk behavior⁷ among street-recruited IDUs was carried out in 1994 using ethnographic techniques, focus group interviews, and some indepth interviews with drug users. Studies assessing risk behavior were carried out on the treatment population.^{4,5} The following findings are derived from the above studies.

Injecting risk behavior.

Drug transitions. The prevalence of injecting as the chief mode of administration for opiates, and heroin in particular, has been recent, and certain factors have facilitated the transition from "chasing" heroin to injecting heroin. Street scarcity of heroin occurred after the crackdown on Tamil militants in Madras, following the assassination of Rajiv Gandhi, the former Prime Minister of India, near Madras in 1991. This crackdown caused heroin users to shift to the easily available injectable preparation called buprenorphine. The use of buprenorphine by some physicians to treat the withdrawal symptoms of heroin abusers facilitated the belief that

Table 1. HIV prevalence estimates from three samples in Madras, India

Sample	Size	Prevalence estimate (Percent)
Convenience sample from treatment centers		
Institute of Mental Health, Madras ^a	100	16.0
Punarjeevan Drug Treatment Centre ^b	200	15.0
SAHAI Treatment Center, 1996 ^c	50	19.0
Voluntary testing		
SAHAI Field Station ^d	138	17.4

^aReference 4

^bReference 5

^cSource: SAHAI Treatment Center (unpublished data)

^dReference 6

buprenorphine was a good substitute for heroin, and moreover, the drug was economical and easily procured. Since 1991, buprenorphine abuse has escalated among opiate users, and when heroin was available in the illicit market again, many preferred to use heroin by injecting. At present, about three-fourths of the current users of opiates are IDUs. In addition, most new users are being initiated to opiates by injecting.

Levels of sharing. All the assessment studies on the out-of-treatment and in-treatment populations suggest that sharing of syringes and needles is very common. More than two-thirds of the injectors interviewed admitted to sharing injecting equipment in the past month.^{4,7} The syringes and needles available and used in Madras are two separate pieces that can be detached easily. These 2 milliliter or 5 milliliter syringes can be purchased from pharmacies without a prescription, and needles alone can also be bought separately. At times needles are not shared, but the syringes are shared. Sharing is customary among friends. Indiscriminate sharing—sharing with strangers and casual acquaintances that was prevalent at the beginning of the injecting epidemic in Madras (as extracted from the ethnographic diaries of researchers in the early 1990s)—has become infrequent in recent years.

Indirect sharing. Indirect sharing is very common. Use of common spoons, solutions, and cotton swabs as well as participating in “frontloading” are all common among heroin users; dipping the needles into the ampules is common among buprenorphine users.

Frequency of injecting. Heroin injectors injected frequently, and on average, they used the drug two to four times daily. Buprenorphine users injected less frequently because of the long-acting nature of the drug.

Social context of drug use. The heroin networks in Madras were more cohesive and functionally reinforcing than the buprenorphine networks. Most heroin users were in touch with other drug users, at least for purely functional reasons such as procuring the illicit substance. Their networks also were larger in size and consisted of more members who knew each other. Even though the ties and bonding changed over time, at any point in time heroin users had at least one drug user with whom they had a reciprocal relationship. In contrast, the buprenorphine networks were smaller, and most individuals had only one or two drug-using individuals in their network. Most drug users lived with their families; the mother, sister,

or spouse was always supportive of the drug user, and the family ties continued in spite of heavy drug use. Heroin users take the drug in chaotic street scenes, and purchasing venues facilitate sharing practices. Heroin users purchased the drug in the dealers' settings, where many drug users congregate to use the drug and where needle sharing is common. Drug users gather to shoot drugs at common shooting locations such as abandoned buildings and public toilets. All of these settings influence risk behavior.

Sex risk behavior. Because heroin users reported spending most of their time searching for the drug, their reported interest in sex was low. But a good many of them admitted to engaging in sex in the past year. Casual sex and commercial sex were frequent. Most were reluctant to use condoms, and the rate of condom use during their most recent sexual encounter was alarmingly low. Buprenorphine users reported more risky sexual behavior compared with heroin injectors.^{5,6} Sexually transmitted disease (STD) infections were frequent.

Outreach model. The outreach team, consisting primarily of ex-users and professional social workers, forms the backbone of HIV intervention activity. The outreach workers recruit IDUs from the street and provide various interventions at the street level. Apart from the face-to-face education about acquired immunodeficiency syndrome (AIDS) and its transmission, these individuals are provided with information on decontamination of syringes. Bleach and condoms are distributed by the outreach team. Advice on medical and social problems and service information also are provided, and outreach workers facilitate the use of addiction treatment services. Outreach activities are concentrated in two locations with a high prevalence of drug abuse in the city: Royapuram and Vepery. Though most outreach interventions were focused on individuals and on changing individual knowledge, opinion, and behavior, the focus is slowly shifting to changing the peer and social norms about risky behavior. Instead of targeting individuals, drug networks are increasingly being targeted.

The focus of the research described in this chapter is to evaluate the impact of community-based outreach HIV intervention on the risk behaviors of IDUs through a longitudinal study. The study examines the extent to which unsafe drug-injecting and sexual behaviors decreased between baseline and the time when drug users were interviewed at follow-up and whether or not the risk reduction was the result of the intervention.

METHODS

Community outreach group participants. Current injectors of drugs—defined as those who had injected drugs in the past two months—were recruited for this study; 125 consecutive IDUs were recruited from street outreach at each of the two locations. Baseline data were collected, and this sample was followed up after 18 months; 161 individuals were available for follow-up assessment. Semiannual follow-up assessments also were done.

Community-based outreach group intervention.

The community-based outreach intervention initiated by SAHAI Trust aims to facilitate improvement in health and reduction in risk of HIV transmission for drug users who are not effectively reached through existing services or through traditional health education channels. The drug users are reached in their own communities and local settings. Outreach is provided by recovering drug users, indigenous to the selected communities, who are familiar with the current users and their milieu.

The elements of outreach in our settings include providing AIDS education and distributing bleach and condoms. Outreach activity largely concerns raising awareness about drugs, HIV and AIDS in general, HIV transmission, and local drug treatment and HIV prevention activities. Outreach is offered one on one in private settings and is supported by promotional literature for literate clients. Tasks include contacting people to deliver bleach, distribute condoms, offer support and advice on social and medical problems, and facilitate the use of existing services. In our outreach model, clients are provided with at least three sessions in private settings:

- Session 1 raises awareness about drugs, HIV transmission, correct techniques for needle decontamination with bleach, and condom use.
- Session 2 reinforces the components of the first session and assists clients in identifying their own specific risk behaviors and understanding the strategies to reduce their HIV risk.
- Session 3 provides information about existing services and advice on social and medical problems. Clients at this stage also are encouraged to seek HIV antibody testing and counseling.

Since clients need to be transported to a different location for HIV antibody testing and counseling, the

response to this service was poor. Less than one-fourth ($n = 58$; 23.2%) of the clients recruited from outreach locations completed the HIV antibody testing, and less than one-eighth ($n = 30$; 12%) of the clients returned for their test results.

In the control locations, there were no outreach services. The outreach and control sites did not differ in other intervention programs, including needle exchange and network intervention.

Control group participants. A control group of current IDUs was recruited from locations at which no outreach services were available; a sample of 150 IDUs completed the baseline assessment. The primary means of recruitment was by word of mouth. After 18 months, 87 individuals were available for follow-up assessment.

Measures. Baseline assessments were performed for both groups, and data were collected, including socio-demographic information, patterns of drug abuse, and HIV-related risk behavior, both injecting and sexual.

After 18 months, follow-up data were available on drug use patterns, HIV risk behavior, and behavior change for 161 clients from outreach locations and 87 clients from the control group. The baseline and follow-up interviews were done by independent trained researchers, and the outreach interventions in the two outreach locations were carried out by outreach workers. The subjects recruited were not paid for the interviews, and when necessary, food, soft drinks, and medical assistance were provided for them. The intake period was from January to March 1995, and the follow-up period was from July to August 1996. The majority of the recruited sample did not receive HIV antibody testing and counseling; this was a serious limitation of this study.

Drug risk behavior was measured for the 30 days prior to the baseline interview and the 30 days prior to follow-up. This allowed for a comparable interval of time over which to measure behavior nearest to the baseline and follow-up interviews and, in the case of the follow-up interview, provided time for risk reduction to be expressed in the period between interviews. The time interval over which sexual behavior was measured was longer than for the drug risk behavior, thereby providing a sufficient interval to measure the sexual activity of subjects who had infrequent sexual encounters. Data on sexual behavior—numbers of sex partners, history of commercial sex, and history of STD infection—were measured 12 months prior to the baseline interview. Sexual risk behavior at follow-up

Table 2. Demographic characteristics of IDUs from outreach and control locations (N = 400)

Variable	IDUs from outreach locations (n = 250)		IDUs from control locations (n = 150)		P-value
		Percent		Percent	
Age					
18-24	45	18	31	21	NS
25-34	130	52	86	57	
35+	75	30	33	22	
Caste					
Scheduled	95	38	69	46	NS
Others	155	62	81	54	
Marital status					
Married	115	46	62	41	NS
Unmarried	135	54	88	59	
Education					
Illiterate	40	16	22	15	NS
Middle school	122	49	63	42	
High school	88	35	65	43	

was measured for the period between baseline and follow-up interviews.

Follow-up interviews were conducted on 161 (64.4%) subjects from outreach locations and 87 (58%) control subjects. The characteristics of the individuals who were and were not followed were compared for demographics, drug use, and HIV risk behavior; there was no significant difference between the groups on any of these variables.

The outcome was assessed using HIV-related drug and sexual risk behaviors such as frequency of injecting, sharing needles (receptive or distributive sharing), number of sex partners, history of commercial sex, and alcohol use. Frequency of injecting was evaluated as one to six times per week and among daily users as one to three times daily or four or more times daily; a change in the frequency of injecting at follow-up compared with baseline is indexed as increase, decrease, or no change. Sharing of syringes or needles was assessed as no sharing, sharing less than once a month, sharing less than once a week, or sharing very often; a change in the frequency of sharing at follow-up was recorded as increase, decrease, or no change. Number of sex partners in the past year was recorded as no partner, one partner, or two or more partners; change during follow-up interview was indicated as increase, decrease, or no change. Similarly, history of commercial sex was obtained for the past year, and change at follow-up was indicated. Alcohol use was evaluated as no use of alcohol or occasional use of alcohol in social settings with a frequency not exceeding once a week, use of alcohol one to seven times a week, and use of alcohol on a daily basis. A change in the frequency of

alcohol use at follow-up was indexed as increase, decrease, or no change.

RESULTS

Comparison of subjects from outreach locations and control locations. Participants recruited from all locations were male. Outreach has not been able to identify female drug users, and it is common knowledge that the prevalence of opiate use among women in Madras is disproportionately small. After several years of outreach activity in a variety of geographical locations, we have identified only two female IDUs. The data from treatment centers in Madras also indicate a negligible number of female IDUs in treatment. Hence it was decided to recruit only male IDUs for the current study.

At baseline, there were no significant differences between the participants from the outreach and control locations on demographic data like age, caste, marital status, and educational status (Table 2). Comparisons were made between the two groups for drug use patterns and HIV-related drug and sex risk behavior. The IDUs in both groups were primarily using heroin or buprenorphine. In our sample, 59.4% of IDUs from the combined outreach and control sites, 57.6% of IDUs from outreach locations, and 61.3% of IDUs from the control locations were injecting heroin primarily. Significant differences were observed at baseline for needle use frequency ($P = 0.0168$), needle use frequency among daily injectors ($P = 0.0095$), and commercial sex ($P = 0.0214$) (Table 3). The IDUs at the outreach locations exhibited high risk behavior in both injecting and sexual practices. About three-fourths

Table 3. Drug use and other HIV-related risk behaviors of IDUs from outreach and control locations, at baseline (N = 400)

Variable	IDUs from outreach locations (n = 250)		IDUs from control locations (n = 150)		P-value
		Percent		Percent	
Type of drug					
Heroin	144	57.6	92	61.3	
Buprenorphine	106	42.4	58	38.7	NS
Needle use (past 30 days)					
1-6 times/week	65	26.0	56	37.3	$\chi^2 = 5.71$
Daily users	185	74.0	94	62.7	$P = 0.0168$
Needle use among daily users (past 30 days)					
1-3 times/day	129	69.7	79	84.0	$\chi^2 = 6.73$
4 or more times/day	56	30.3	15	16.0	$P = 0.0095$
Sharing (past 30 days)					
No sharing	25	10.0	27	18.0	NS
Sharing, less than once a month	40	16.0	26	17.3	
Sharing, less than once a week	85	34.0	48	32.0	
Sharing very often	100	40.0	49	32.7	
Sex partners (past 12 months)					
None	57	22.8	27	18.0	NS
1	100	40.0	51	34.0	
2 or more	93	37.2	72	48.0	
Commercial sex (past 12 months)					
Yes	80	32.0	32	21.3	$\chi^2 = 5.29$
No	170	68.0	118	78.7	$P = 0.0214$
History of STD (past 12 months)					
Yes	49	19.6	24	16.0	NS
No	201	80.4	126	84.0	
Alcohol use (past 30 days)					
No misuse	87	34.8	63	42.0	$\chi^2 = 5.67$
1-7 times/week	122	48.8	55	36.7	$P = 0.0588$
Daily	41	16.4	32	21.3	

(74.0%) of IDUs from outreach locations used needles daily, and 62.7% of IDUs recruited for the control group used needles daily. Among the daily needle users from the outreach locations, 30.3% injected four or more times daily; 16.0% of the daily needle users from the control locations injected four or more times daily. Forty percent of the IDUs from the outreach locations shared needles and syringes very often, and only 10.0% did not share; from the control locations, 32.7% of the IDUs shared needles and syringes very often, and 18.0% did not share. In the total sample of 400 from the combined outreach and control sites, 37.3% were sharing syringes or needles (receptive or distributive sharing) very often. Alcohol use is common among IDUs, and 65.2% of IDUs from outreach locations and 58.0% of IDUs from the control locations used alcohol. Nearly one-third (32.0%) of IDUs from outreach locations and 21.3% of IDUs in the control group admitted to having commercial sex in the past 12 months. In the total sample of 400, 41.3% of IDUs had two or more sex partners in the past year, and 18.3%

of IDUs had a history of STDs in the past year. The high levels of risk behavior observed in Vepey and Royapuram were among the primary reasons for establishing outreach services in these two locations.

Behavior change between baseline and follow-up.

At 18 months, follow-up data were available for 161 IDUs from outreach locations and 87 IDUs from the control locations. Comparison was made using the change in risk behavior at follow-up. This comparison reveals that the participants from the outreach locations engaged in significant protective behavior and practiced injecting risk reduction behaviors (Table 4). Because there were statistically significant differences in three of the HIV-related risk behaviors—(1) needle use in the past month, (2) needle use among daily users in the past month, and (3) commercial sex in the past year—between individuals recruited from outreach locations and control locations at baseline (Table 3), change scores were used to index change in the level of risk behavior at the 18-month

Table 4. Change from baseline to follow-up for HIV-related risk behaviors of IDUs from outreach (O) and control (C) locations (N = 248)

Variable	n	Increase	Percent	No change	Percent	Decrease	Percent	P-value
Needle use frequency	O = 161	37	23.0	63	39.0	61	38.0	0.0146
	C = 87	35	40.2	24	27.6	28	32.2	
Sharing	O = 161	18	11.2	68	42.2	75	46.6	0.011
	C = 87	22	25.3	35	40.2	30	34.5	
Sex partners	O = 161	32	19.9	92	57.1	37	23.0	NS
	C = 87	14	16.1	54	62.1	19	21.8	
Commercial sex	O = 161	26	16.1	104	64.6	31	19.3	NS
	C = 87	16	18.4	50	57.5	21	24.1	
Alcohol use	O = 161	44	27.3	99	61.5	18	11.2	0.0431
	C = 87	12	13.8	61	70.1	14	16.1	

follow-up. To assess change in each risk behavior, participants were categorized as decreasing the frequency of the behavior, increasing the frequency of the behavior, or not changing the frequency of the behavior.

A chi-square test was used to interpret the change in each risk behavior and participation in outreach activities. Needle use frequency declined significantly ($P = 0.01$), and sharing also decreased significantly ($P = 0.01$) among participants from outreach locations compared to IDUs from control locations. From the outreach locations, 46.6% of IDUs decreased sharing needles and syringes compared to 34.5% from the control locations. Alcohol use increased significantly ($P = 0.04$) among those from the outreach locations (27.3%) compared with the control locations (13.8%). At 18-month follow-up, whereas only 10.3% of the control-group IDUs always cleaned syringes and needles with bleach before use, 29.8% of individuals from outreach locations always cleaned syringes and needles before use. There was no significant difference between the two groups in sexual risk behavior; more than half of the IDUs in both locations did not exhibit sexual risk behavior change.

DISCUSSION

Outreach has provided substantial opportunities to contact and work with the hard-to-reach IDU population. This is a relatively new field in India. Manipur plus a few other northeastern India locations have outreach activities for drug users,⁸ and other outreach programs are operating in Calcutta, New Delhi, and Madras. Results of outreach activities demonstrate that IDUs are capable of positive behavior change. This study indicates that behavior change is unfortunately confined to injecting risk behavior only; outreach programs do not appear to

induce changes in sexual risk behavior. The next steps for outreach require clear definitions of the various activities and selection of activities that are situationally appropriate. The social networks through which HIV is transmitted are the same social networks that can be co-opted for HIV prevention.⁹ It is to these networks that future outreach services must turn to encourage behavior changes in communities of injectors.

While there is some reason for optimism that HIV risk reduction among IDUs is occurring by way of reduced frequency of needle sharing and needle use, there is no significant change in sexual risk behavior in this data set with this intervention. Given the complexities of the sexual relationships of IDUs, it is likely that there are multiple reasons why sexual risk behavior change is difficult to encourage, and it is unlikely that any sudden breakthroughs will change that outlook.¹⁰ Interventions to achieve greater levels of risk reduction therefore need to be more effective. Previous research has indicated that peer pressure may be important in determining the degree of sexual risk reduction,¹¹ which suggests that interventions need to harness social relationships to influence safer sex. In the case of drug risk behavior, evidence indicates that outreach projects that involve the target population and encourage a collective response to behavior change may be more effective than interventions that restrict their focus to individuals.^{12,13} Community-oriented models aim to improve health by changing norms at the community level: they are geared to "encouraging subcultural changes,"¹⁴ in which individual behavior change is facilitated by the behaviors and attitudes of peers.

Many IDUs are known to be alcohol dependent.¹⁵ Calsyn and colleagues¹⁶ report in a study of patients receiving or taking methadone treatment that "use of alcohol to intoxication" increased frequency of heroin and cocaine

use in men and women and that increased frequency of alcohol use in women was associated with "unsafe" sexual behavior. Latkin and colleagues¹⁷ observed that drinking alcohol once a day or more was associated with risky sexual practices independent of the use of cocaine and heroin. Their study highlighted the need for more intense HIV prevention and other drug and alcohol treatment programs for IDUs. Alcohol use was high in subjects from outreach locations—48.8% used alcohol one to seven times weekly, and 16.4% used alcohol daily. At 18-month follow-up, 27.3% of the subjects in the outreach locations had increased their alcohol consumption. The increase in alcohol use might be part of a compensatory change dynamic in which participants in the outreach sites reduced high risk drug-injecting behaviors but increased their alcohol use as part of a compensatory totality. Hence it is important to consider alcohol abuse prevention and treatment in outreach intervention programs for IDUs.

Many problems and obstacles were faced during the HIV intervention implementation in Madras. The problem of injecting drug use is not a priority area for AIDS intervention in general, and the focus is only on heterosexual transmission and targets commercial sex workers and long-distance truck drivers. Many agencies involved with drug abuse do not consider HIV intervention an urgent issue. This problem has been overcome by the creation of an umbrella organization called the Society for Prevention, Research and Education on Alcohol and Drugs (SPREAD), which brought all the drug agencies under one roof. SPREAD focuses on issues of consensus, with its main function to educate all the agencies about the significance and urgency of HIV risk reduction. Initial community resistance to HIV intervention efforts was overcome by the formation of a community advisory board

composed of locally influential opinion leaders. All the proposed intervention efforts were discussed at advisory group meetings and were endorsed by the board before being implemented. Addicts were identified by the police if they were in possession of a syringe, so many drug users stopped carrying syringes when they went out in search of drugs. This compelled sharing practices at places outside of IDUs' houses and, in particular, at dealers' locations. When this was brought to the attention of the advisory board, the issue was taken up with the police, who agreed not to harass addicts who possessed personal syringes. This policy change has facilitated carrying of personal syringes by IDUs in the community.

One of the areas in which we need to concentrate is sexual risk behavior. There is a large group of buprenorphine injectors in Madras¹⁸ that may require different intervention strategies. Easy availability of injectable preparations like buprenorphine, diazepam, and chlorpheniramine maleate (Advil) has significantly contributed to the prevalence of injecting in Madras. Many drug users prefer a combination of the above drugs popularly referred to as "CAT" (Calmpose-Diazepam, Advil, and Tidigesic-Buprenorphine), and there is an urgent need for rigorous control measures in Madras. Outreach workers are pressured to assist with the medical problems of IDUs, and strengthening primary medical care is an emerging concern. There is an urgent need to improve and expand HIV testing and counseling facilities. Our outcome evaluation is extremely limited by the absence of data on seroprevalence, even though the literature shows that self-reported behavior changes have proved to be reliable and valid measures. At present, attempts are being made to counsel and test all recruited individuals for HIV intervention. Future outcome studies will certainly use the seroprevalence data as an outcome measure.

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