INCENTIVES AND ACCESSIBILITY: A PILOT STUDY TO PROMOTE ADHERENCE TO TB PROPHYLAXIS IN A HIGH-RISK COMMUNITY

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ABSTRACT

Setting. A community-based directly observed preventive therapy (DOPT) program for treatment of latent tuberculosis infection among injection drug users (IDUs) in an inner-city neighborhood.

Objective. To test adherence to a 6-month course of DOPT using cash incentives and an easily accessible neighborhood location.

Design. Street-recruited IDUs (N = 205) were screened for *Mycobacterium tuberculosis* (TB) infection using the Mantoux test and two controls. Subjects who had a purified protein derivative (PPD) reaction of ≥ 5 mm, were anergic, or had a history of a positive PPD received clinical evaluation at a community field site, provided in collaboration with the San Francisco Department of Public Health Tuberculosis Clinic. Twenty-eight subjects were considered appropriate candidates for prophylaxis with isoniazid, and 27 enrolled in the pilot study. Participants received twice-weekly DOPT at a community satellite office, with a \$10 cash incentive at each visit.

Results. The 6-month (26-week) regimen was completed by 24/27 (89%) participants. The median time to treatment completion was 27 weeks (range 26 to 34 weeks). The median proportion of dosing days attended in 6 months was 96%.

Conclusion. Community-based DOPT using cash incentives resulted in high levels of adherence and treatment completion among drug users.

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INTRODUCTION

One of the biggest obstacles facing tuberculosis control in the US is adherence with tuberculosis (TB) treatment and preventive therapy, particularly among disenfranchised urban populations such as injection drug users (IDUs), the homeless, and indigent people with human immunodeficiency syndrome (HIV).¹ For those with latent *Mycobacterium tuberculosis* infection, directly observed preventive therapy (DOPT) is an important and cost-effective means of promoting disease eradication.^{2,3} In San Francisco, California, the incidence of active TB among IDUs is 0.4/100 person-years among the HIV uninfected and 5/100 person-years among the HIV infected.⁴ The estimated cost of treating an IDU with active TB infection in San Francisco is \$20,023 (1998 dollars).⁵ However, treatment to guard against a small risk of disease in the future is often not a high priority among a population confronted daily with dangers such as HIV, drug overdose, substandard housing, street violence, and poverty.⁶

Monetary incentives have shown promise at improving adherence to medical interventions. A review of controlled trials of adherence to treatment for various conditions, each of which included a monetary incentive arm, concluded that monetary incentives were associated with greater adherence in 11 of 12 studies.⁷ A review of randomized trials of various strategies to promote adherence to TB screening, evaluation, or treatment regimens concluded that monetary incentives were among the effective methods.⁸ Two randomized trials found that cash incentives garnered significantly higher return rates for a single TB skin test reading or medical evaluation appointment among IDUs and homeless individuals.^{9,10} A third randomized trial for attendance at skin test reading among IDUs found \$10 cash incentives most effective, followed by coupons or vouchers of \$10 value.¹¹ However, to our knowledge, there are no previous published studies of the use of cash incentives to encourage adherence to a full course of treatment or preventive therapy among drug users. This paper reports the results of a pilot study to determine the potential effectiveness of a community-based program to administer a 6-month course of DOPT to IDUs using cash incentives and a convenient neighborhood field site.

METHODS

The Urban Health Study conducts studies of HIV seroprevalence and risk behavior with street-recruited IDUs in the San Francisco Bay Area.¹² Subjects are recruited using targeting sampling methods¹³ and participate in a standardized

quantitative interview, as well as HIV testing and counseling, at community field sites. For this study, TB screening was added to these activities in one San Francisco community.

Subjects received intracutaneous administration of purified protein derivative (PPD) tuberculin (Mantoux test) and two controls (mumps and candida). Skin tests were read by trained staff 48–72 hours after placement. Participants who had a PPD reaction of ≥ 5 mm of induration, who were anergic, or who clearly reported a previous positive skin test were referred for medical evaluation. Anergy was defined as ≤ 2 mm induration on PPD and both controls. Screening methods have been described in greater detail elsewhere.^{14,15}

Evaluation was conducted at the community field site by physicians from the local health department TB clinic. Chest X rays were done in a mobile unit in the parking lot. Isoniazid (INH) chemoprophylaxis was considered for IDUs without active disease who had a positive PPD (≥ 10 mm if HIV negative or ≥ 5 mm if HIV positive) and for those who were HIV positive and anergic (consistent with US Public Health Service guidelines at that time).¹⁶ Appropriate candidates were offered enrollment in the pilot study of adherence. Incentives of \$10 cash were offered at the skin test reading, medical evaluation, and enrollment appointments.

Subjects enrolled in the adherence study received DOPT using 900 mg of INH administered twice weekly. DOPT was available on a drop-in basis two mornings a week at a satellite office in the study community. A \$10 cash incentive was provided at each dose. DOPT was provided by a research staff member who had several years experience working with IDUs and was knowledgeable about TB and INH chemoprophylaxis. To monitor for adverse effects related to INH, symptom reviews were conducted routinely, and liver function tests were performed as indicated. Patient charts were reviewed regularly by a TB clinic physician. Prescriptions for INH were renewed monthly and picked up by study staff.

Treatment completion was defined as receipt of 52 doses (a 6-month course) of INH therapy. Subjects requiring 12 months of therapy were referred to the health department, drug treatment programs, and other appropriate venues for continuation. Adherence was defined as observed doses taken/expected doses over a 6-month treatment period.⁶

RESULTS

TB screening was offered to all 223 subjects in the source study; 205 (92%) agreed to participate. Of those screened, 41% were female, 14% were HIV positive, and 32% reported being currently homeless. Seventy-nine percent were African-

American, 15% were Caucasian, 5% were Latino, and 1% represented other ethnicities. The mean age was 42 years. Ninety percent reported injecting drugs in the 30 days prior to screening.

SCREENING

Of the 205 participants, 179 (87%) returned for the skin test reading appointment 48–72 hours after placement, and 115 (65%) had a negative skin test reaction. Thirty-five (20%) had a positive reaction to PPD (≥ 5 mm induration for HIV-positive individuals or ≥ 10 mm for HIV-negative individuals). An additional 22 (12%) subjects did not receive a PPD, but had a history of a positive reaction. Seven (4%) subjects were anergic (Table I).

MEDICAL EVALUATION

Seventy subjects with a PPD ≥ 5 mm, a history of a positive PPD, or anergy were referred for medical evaluation. As HIV results were not available at time of referral, this included all HIV-positive and HIV-negative subjects who had a PPD ≥ 5 mm or who were anergic. Fifty-nine (84%) subjects attended the appointment approximately 1 week later. Of these 59, there were 11 subjects who received previous treatment; 10 were excluded from therapy for health reasons (such as chronic liver disease) that made prophylaxis inadvisable; 6 were technically PPD negative (had a PPD of 5–9 mm and were HIV negative); and 4 were anergic and HIV negative. The remaining 28 subjects were referred for INH chemoprophylaxis by TB clinic physicians. Twenty-seven (96%) enrolled in the pilot study. These 27 did not differ significantly from the original sample of 205 IDUs screened in terms of race, gender, income, or HIV status.

The 6-month course of INH prophylaxis was completed by 24 participants (89%) (Table II). Of the 3 participants who did not complete the study, 1 had advanced HIV disease and became too ill to travel to the DOPT site, 1 was murdered shortly before finishing treatment, and 1 stopped attending for un-

TABLE I Screening Results

	n	%
Negative PPD	115	64
Positive PPD*	35	20
History of positive PPD	22	12
Anergic†	7	4
Total	179	100

* ≥ 5 mm for HIV+; ≥ 10 mm for HIV-.

† ≥ 2 mm on PPD and two controls.

TABLE II Return Rates by Study Activity Using \$10 Cash Incentive Among Street-Recruited Injection Drug Users in San Francisco

Activity	n	%
Skin test reading	170/205	87
Medical evaluation	59/70	84
Adherence pilot enrollment	27/28	96
Prophylaxis for six months*	24/27	89

*\$10 incentive for each directly observed dose.

known reasons. Excluding the 2 individuals known to be unable physically to participate to conclusion, 24/25 (96%) completed therapy.

Among those who completed the 26-week regimen of chemoprophylaxis, the median time to completion was 27 weeks. The range was 26–34 weeks (interquartile range 26.5–29.5 weeks).

To calculate adherence, we divided the number of directly observed doses over a 6-month treatment period by the number of expected doses in that period. Median adherence was 96% (interquartile range 85–98%).

DISCUSSION

This pilot study achieved a high rate of adherence to a 6-month regimen of prophylaxis using twice-weekly DOPT, cash incentives, and a community satellite location. Treatment was time-effective, with a median of 27 weeks to completion for a 26-week regimen. Good return rates (87%, 84%, and 96%, respectively) were also obtained for skin test reading, medical evaluation, and study enrollment appointments; these outcomes were consistent with results from other studies that examined cash incentives and single-appointment attendance.^{9–11,17}

Other strategies have shown promise in promoting adherence to TB therapy and preventive treatment, including directly observed therapy (DOT),^{18–20} patient education,^{21,22} noncash incentives,^{11,23,24} and a nurturing provider-patient relationship.^{25,26} In San Francisco, one program of the public health department TB clinic achieved a 73% completion rate among 107 primarily homeless, substance-using clients through a comprehensive program of community-based DOPT, case management, food coupons, and transportation tokens; a newer program that also includes a social work intervention (n = 38) has a 92% completion rate to date (Alberto Martinez, personal communication, July 6, 1999). Monetary incentives are another promising tool. Providing badly needed cash can assist people with competing life issues, such as homelessness or addiction, in adhering to health

care regimens. As Giuffrida and Torgerson^{7(p706)} note: "If non-compliance is associated with low income, financial incentives might . . . improve equity." In addition, it is important to make services accessible so that regimens can be worked into people's daily lives with minimal disruption.

This study has significant limitations. As a pilot, it involved a small sample from only one community. We cannot measure the relative impact of each factor on adherence (incentives vs. accessibility) or the impact of other factors such as the rapport between subjects and the DOPT worker. Most important, there was no control group. Although these preliminary results are promising, randomized controlled trials with larger samples are necessary to evaluate better the impact of incentives on adherence. At least three such studies were funded by the National Institute on Drug Abuse in the mid-1990s, and it is hoped results will be available soon.

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