

# Longitudinal Correlates of Health Care-Seeking Behaviors Among HIV-Seropositive Injection Drug Users

## How Can We Intervene to Improve Health Care Utilization?

James D. Wilkinson, MD, MPH,\* Wei Zhao, MD, MS,† Julia H. Arnsten, MD, MPH,‡  
Amy R. Knowlton, MPH, ScD,§ Yuko Mizuno, PhD,|| Starley B. Shade, PhD,¶  
Marc N. Gourevitch, MD, MPH,# Scott Santibanez, MD, MPH,||  
and Lisa R. Metsch, PhD† for the INSPIRE Study Team

**Objective:** To identify modifiable factors associated with health care utilization by HIV-negative seropositive injection drug users (IDUs).

**Methods:** We analyzed longitudinal data from 966 participants in a randomized controlled trial of a behavioral intervention designed to address medical care, adherence, and risk reduction. The outcomes of this study were usual place for care (clinic vs. emergency room) and frequency of primary care visits.

**Results:** Results of multiple logistic regression analysis showed that increase in "importance of HIV care scale" score (odds ratio [OR] = 2.99;  $P < 0.001$ ), empowerment (OR = 3.53;  $P < 0.001$ ), utilization of case management (OR = 3.07;  $P = 0.007$ ), and having a stable residence (OR = 2.63;  $P = 0.008$ ) were significantly associated with participants being "clinic users." Increase in importance of HIV care scale score (OR = 5.65;  $P = 0.01$ ) increased empowerment (OR =

2.42;  $P = 0.005$ ), taking greater control of one's health (OR = 2.17;  $P = 0.001$ ), having health insurance (OR = 2.58;  $P = 0.003$ ), utilization of case management (OR = 3.14;  $P = 0.027$ ), and CD4 count  $\geq 200$  cells/mm<sup>3</sup> (OR = 2.09;  $P = 0.007$ ) were significantly associated with reporting 2 or more primary HIV care visits in the past 6 months.

**Conclusions:** Future interventions for this population may be strengthened by addressing the importance of HIV primary care; empowering participants with respect to the health care system; and promoting linkages to case management, health insurance, and local housing programs.

**Key Words:** AIDS, health care utilization, HIV, substance abuse, intravenous

(*J Acquir Immune Defic Syndr* 2007;46:S120–S126)

Received for publication July 20, 2006; accepted August 3, 2007.

From the \*Departments of Pediatrics and Epidemiology and Public Health, Leonard M. Miller School of Medicine, University of Miami, Miami, FL; †Department of Epidemiology and Public Health, Leonard M. Miller School of Medicine, University of Miami, FL; ‡Division of General Internal Medicine, Department of Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, Bronx, NY; §Department of Health, Behavior and Society, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD; ||Division of HIV/AIDS Prevention, National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, Centers for Disease Control and Prevention, Atlanta, GA; ¶Center for AIDS Prevention Studies, University of California at San Francisco, San Francisco, CA; and the #Division of General Internal Medicine, Department of Medicine, New York University School of Medicine, New York, NY.

Supported by the Centers for Disease Control and Prevention and the Health Resources and Services Administration (CDC/HRSA grant U50CCU317999).

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

The authors report no conflicts of interest in connection with this article.

Correspondence to: James D. Wilkinson, MD, MPH, Department of Epidemiology and Public Health, University of Miami Miller School of Medicine, PO Box 016069 (R669), Miami, FL 33101 (e-mail: jwilkins@med.miami.edu).

Copyright © 2007 by Lippincott Williams & Wilkins

Injection drug users (IDUs) continue to comprise a significant proportion of persons living with HIV/AIDS in the United States.<sup>1</sup> Many studies have shown that HIV-negative seropositive IDUs underutilize appropriate health care services compared with HIV-negative seropositive non-IDUs.<sup>2–4</sup> This population is more likely to use the emergency room (ER), less likely to utilize outpatient primary care services, and less likely to return for follow-up outpatient visits compared with HIV-seropositive non-IDUs.<sup>2,5–7</sup> Utilization of HIV primary care services is important for HIV-seropositive IDUs because current guidelines recommend monitoring of CD4 cell count and other health indicators at least every 3 to 6 months.<sup>8</sup> Also, HIV-seropositive IDUs present special treatment challenges compared with other HIV-positive populations.<sup>9,10</sup> Appropriate utilization of HIV primary care is associated with better outcomes, including decreased hospitalizations and optimal use of antiretroviral therapy.<sup>11,12</sup>

Many factors have been associated with inadequate health care utilization among drug users, including IDUs. Individual factors associated with decreased utilization include young age, low socioeconomic status, unstable housing, not wanting treatment, and minority race.<sup>13–17</sup> Case management, health insurance, and drug treatment have consistently been associated with increased utilization of outpatient health care among HIV-seropositive IDUs.<sup>2,3,13,18</sup>

The Interventions for Seropositive Injectors—Research and Evaluation (INSPIRE) study, supported by the Centers for Disease Control and Prevention (CDC) and the Health Research Services Administration, was a randomized controlled trial of a behavioral intervention to increase health care utilization and adherence to highly active antiretroviral therapy (HAART) and to decrease risky sexual and drug use behaviors among HIV-seropositive IDUs.<sup>19</sup> The overall results of the INSPIRE clinical trial have been reported by Purcell et al.<sup>20</sup> Although there were no significant differences between the intervention and control groups in terms of health care utilization, health care utilization did improve among both treatment groups over the 12-month follow-up period.<sup>20</sup> We proposed to analyze which potentially modifiable factors were associated with better health care utilization in terms of usual place for care (clinic vs. ER) and adequate frequency of primary health care visits. Identification of such factors is important to informing future interventions designed to improve outpatient health care utilization in this vulnerable population.

## METHODS

We analyzed longitudinal data from the INSPIRE project, which was conducted from 2001 to 2005 at 4 sites (Baltimore, Miami, New York, and San Francisco). Recruitment occurred at a variety of venues (eg, AIDS service organizations, medical clinics, methadone clinics, street-based recruiting) using active and passive strategies. Eligibility criteria included confirmed HIV-positive serostatus, self-reported injection drug use in the prior year, sex with an opposite-gender partner in the prior 3 months, and willingness to engage in group educational sessions and provide oral and blood specimens.

Assessments for health care utilization were administered at baseline, 6 months, and 12 months using audio computer-assisted self-interviewing (A-CASI). Participants were randomized to the 10-session peer mentoring experimental condition or to the 8-session video discussion control condition. A detailed description of the INSPIRE project and its methods has been reported elsewhere.<sup>19,20</sup> The CDC Institutional Review Board (IRB) and human subject review boards of the research sites approved the study protocol.

### Participants

All INSPIRE participants who were randomized and completed follow-up assessments at the 6-month or 12-month time point and had complete data regarding study measures at either of those time points were included in the study. Follow-up rates were at least 82% at both time points. At 6 months, loss to follow-up was associated with lower session attendance, lower income, and being male ( $P < 0.05$ ). At 12 months, session attendance and study site (Miami participants were more likely to drop out) were associated with loss to follow-up ( $P < 0.05$ ). Participants were reimbursed for completing baseline and follow-up assessments.

### Outcome Measures

The study examined 2 health care utilization outcomes. The first was based on the response to the assessment question “Where do you usually go if you are sick or need medical

care?” Respondents were dichotomized into 2 groups: those who responded that their usual care source was a public or private clinic or a doctor’s office (hereafter referred to as “clinic users”) and those whose usual source of care was the ER (hereafter referred to as “ER users”). Positive behavior was defined as (1) participants who were clinic users at baseline and continued to be clinic users at 6-month and/or 12-month follow-up assessments or (2) participants who were ER users at baseline who became clinic users at either of the follow-up assessments. Negative behavior was defined as (1) participants who were ER users at baseline and continued to be ER users at 6-month and/or 12-month follow-up assessments or (2) participants who were clinic users at baseline who became ER users at either of the follow-up assessments.

The second outcome was the number of HIV primary care visits reported in the previous 6 months. Respondents were dichotomized into those who reported 2 or more such visits (hereafter referred to as “adequate utilizers”) and those who reported  $<2$  visits (hereafter referred to as “low utilizers”). This cutoff was based on the HIV Cost and Services Utilization Study definition of optimal (outpatient) service use and current treatment guidelines.<sup>4,8</sup> HIV primary health care visits were defined as “a visit to a doctor or medical provider to have a check up on how you’re doing with your HIV or AIDS, (which may include) discussion about HIV or AIDS medications, or blood test results.” Positive behavior was defined as (1) participants who were adequate utilizers at baseline and continued to be adequate utilizers at 6-month and/or 12-month follow-up assessments or (2) participants who were low utilizers at baseline who became adequate utilizers at either of the follow-up assessments. Negative behavior was defined as (1) participants who were low utilizers at baseline and continued to be low utilizers at 6-month and/or 12-month follow-up assessments or (2) participants who were adequate utilizers at baseline who became low utilizers at either of the follow-up assessments.

### Correlate Measures

The following psychosocial measures were addressed in the INSPIRE peer mentoring intervention (PMI) and were therefore examined as potential correlates of health care-seeking behavior.

Relationship with provider was assessed using the Perceived Engagement with Provider scale (13 items, score range: 1 to 4;  $\alpha = 0.95$ ). This scale had items such as “My healthcare provider or doctor listens to me,” “...answers my questions,” and “...involves me in decisions.”<sup>21</sup> Depression was assessed using the Brief Symptom Inventory-Depression (7 items, score range: 1 to 5;  $\alpha = 0.88$ ).<sup>22</sup> Empowerment (28 items, score range: 1 to 4,  $\alpha = 0.76$ ) included items such as “I see myself as a capable person,” or “I am usually confident about the decisions I make.”<sup>23</sup> The taking control of health scale was composed of 4 items (score range: 1 to 4,  $\alpha = 0.63$ ): (1) “I make and keep my appointments with my healthcare provider every 3 to 4 months,” (2) “I keep a list of symptoms to tell my healthcare provider,” (3) “I ask my healthcare provider to explain a word that I don’t know,” and (4) “I tell my healthcare provider my symptoms.” This scale was

specifically developed for the INSPIRE study. Also addressed in the intervention were importance of HIV care (4-point Likert scale, dichotomized into yes/no) and knowledge about HIV (18 true-false knowledge questions). All psychosocial measures were scored by summing the individual responses and dividing by the number of scale items, and changes in correlate scores were computed as 6-month/12-month follow-up value minus baseline for continuous variables.

Additional measures that have been associated with health care utilization behavior previously included systemic factors such as health insurance status (response to query “What kind of health insurance do you currently have?” with responses from a list dichotomized as yes/no; most reported Medicaid or Medicare); receipt of case management in the past 6 months (yes/no response to query “In the past six months have you seen a case management worker, social worker, or counselor to help you get medical care, insurance, food stamps, housing assistance and the like?”); outpatient drug treatment in the past 6 months (yes/no); and stable housing, defined as a positive response to the question “Do you currently have a place to where you stay 5 to 7 days a week?”).<sup>2,4,11,15</sup> We also included the most recent CD4 count  $\geq 200$  cells/mm<sup>3</sup> as a measure of health care demand (yes/no) and recent crack cocaine (“crack”) use (previous 3 months; yes/no) because it has shown to be associated with decreased HIV health care utilization.<sup>24</sup> Changes of categoric correlates or systemic factors were then computed. Participants whose responses remained/changed to “no” at 6- or 12-month follow-up were defined as “no.” Those whose responses remained/changed to “yes” at 6- or 12-month follow-up were defined as “yes.”

### Statistical Analysis

Descriptive analysis was conducted to show the change in behaviors in 2 temporal intervals: (1) from baseline to 6-month follow-up and (2) from baseline to 12-month follow-up. These same follow-up intervals were used in the logistic regression analyses. To determine the association between study outcomes and modifiable correlates, we first conducted simple logistic regression and then multiple logistic regressions by choosing the correlates that had an association at the 0.10 significance level in simple logistic regression to model

the probability of positive behaviors as a function of each correlate change. Baseline correlate values were used in testing associations with 6-month and 12-month outcomes. Generalized estimating equations (GEEs) were used in simple and multiple logistic regressions, instead of regular logistic regression, to capture correlation induced by clustering within cities. Empiric standard errors calculated from the GEEs were used for all tests from simple and multiple logistic regression analysis. Covariates were assessed for collinearity problems, and none were identified (variance inflation  $< 6$  as cut point). No significant interactions were identified. In multiple logistic regression, age (continuous), gender (did not adjust gender on 6-month follow-up because of sample size issue), race/ethnicity, education, income, and treatment condition were adjusted for both outcome variables. Statistical significance was set at the 0.05 level. Analyses were performed using SAS version 9.1.3 (SAS Institute, Cary, NC).

### RESULTS

Of the 1161 INSPIRE participants who completed baseline assessments, 966 were randomized and comprised the source population for the sample analyzed for this study. There were 798 (6 months) and 811 (12 months) participants with complete study data for the usual source of care outcome; there were 527 (6 months) and 497 (12 months) participants with complete study data for the frequency of primary care outcome at baseline and 6 months or baseline and 12 months, respectively. The much smaller number of participants with complete data for the frequency outcome compared with the usual source of care is attributable to the fact that all participants (except for missing values) had to identify a usual source of care (clinic or ER) at baseline. Only those participants who reported a primary care visit in the past 6 months at baseline were included in the analysis of change in this outcome over time, however. The difference in sample sizes represents participants who reported a usual source for care but not a recent primary care visit (past 6 months). Longitudinal health care-seeking behavior in terms of usual place for care (clinic vs. ER) and frequency of primary care ( $\geq 2$  vs.  $< 2$  visits) is shown in Table 1. Approximately 80% of participants

**TABLE 1.** Health Care Utilization at Baseline and at 6- and 12-Month Study Time Points Among INSPIRE Participants at the 4 Study Sites (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

	6 Months (N = 798)†	12 Months (N = 811)
<b>Usual Place for Care</b>		
ER at baseline and ER at follow-up	76 (9.5%)	75 (9.3%)
Clinic at baseline and ER at follow-up	82 (10.3%)	76 (9.4%)
Clinic at baseline and Clinic at follow-up	533 (66.8%)	553 (68.2%)
ER at baseline and Clinic at follow-up	107 (13.4%)	107 (13.2%)
<b>Frequency of HIV Care*</b>		
	<b>6 Months (N = 527)</b>	<b>12 Months (N = 497)</b>
Low at baseline and low at follow-up	13 (2.5%)	9 (1.8%)
Adequate at baseline and low at follow-up	44 (8.4%)	37 (7.4%)
Adequate at baseline and adequate at follow-up	421 (79.9%)	402 (80.9%)
Low at baseline and adequate at follow-up	49 (9.3%)	49 (9.9%)

\*Low,  $< 2$  primary HIV care visits; adequate,  $\geq 2$  primary HIV care visits.

†Total numbers (N) change because of missing values at 6- or 12-month follow-up.

were clinic users at 6-month and 12-month follow-up, with approximately 13% demonstrating positive behavior change over time (ie, ER users at baseline and clinic users at follow-up) and approximately 10% demonstrating negative behavior change (ie, clinic users at baseline and ER users at follow-up). More than 90% of participants were adequate utilizers of primary care at the follow-up time points, with approximately 10% demonstrating positive behavior change over time (ie, <2 visits at baseline and ≥2 visits at follow-up) and approximately 8% demonstrating negative behavior change (ie, ≥2 visits at baseline and <2 visits at follow-up).

First, we assessed the differences in correlate levels between the intervention and control conditions at the 3 assessment time points. The proportion of participants reporting that HIV care was important to them differed significantly at the 6-month follow-up ( $P = 0.023$ ), but the absolute difference was small (98.1% in the experimental condition vs. 94.5% in the control condition). There were no other significant differences in the level of correlates between the 2 treatment groups at any time point.

Table 2 shows the results of the univariate analysis of the association between changes in correlates and positive behavior regarding usual place for health care. At 6-month follow-up, increase in “importance of HIV care scale” score, having health insurance, higher empowerment, and utilization of case management were significantly associated with participants being clinic users. At 12-month follow-up, increased HIV knowledge, utilization of case management, and having a stable residence were significantly associated with being a clinic user.

In the multiple regression models at 6-month follow-up, increase in importance of HIV care scale score, higher empowerment, and utilization of case management were significantly associated with participants being clinic users (Table 3). Only change to receipt of case management and having a stable residence were significantly associated with being a clinic user at 12-month follow-up.

Table 4 shows the results of the univariate analysis of the association between changes in correlates and positive

behavior regarding frequency of primary care visits. At 6-month follow-up, increase in importance of HIV care scale score, increased engagement with provider, taking greater control of one’s health, utilization of case management, and recent crack use were significantly associated with participants being adequate utilizers of primary care. At 12-month follow-up, having health insurance, increased engagement with provider, increased empowerment, and utilization of case management were significantly associated with being an adequate utilizer of primary care.

In the multiple regression models at 6-month follow-up, increase in importance of HIV care scale score, taking greater control of one’s health, receipt of case management, and having a CD4 count ≥200 cells/mm<sup>3</sup> were significantly associated with participants being adequate utilizers of primary care (Table 5). Having health insurance, taking greater control of one’s health, increased empowerment, and receipt of case management were all associated with adequate utilization of primary care at 12-month follow-up.

## DISCUSSION

Outpatient health care utilization by populations of HIV-seropositive IDUs has previously been shown to be lower as compared with other HIV-seropositive groups.<sup>3,4,25,26</sup> Appropriate use of HIV primary care is important for disease management, initiation, and monitoring of HAART and for provision of important prevention messages. Many factors associated with poor utilization in this population, such as race, age, income, and education, are not modifiable or are not easily modifiable. Identification of modifiable factors is important to the design of effective interventions to promote increased primary care utilization among this group.

In the INSPIRE project, most participants were appropriately utilizing health care in terms of outpatient care as the usual care source (81%) and adequate frequency of primary care visits (91%) at the 12-month follow-up assessment. In our study sample, only approximately 10% of

**TABLE 2.** Univariate Association of Changes of Positive Behavior Regarding Usual Source of Care as a Function of Change in Correlates From Baseline for INSPIRE Participants at the 4 Study Sites (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

Correlate Change	6-Month Follow-Up (N = 798)			12-Month Follow-Up (N = 811)		
	cOR	95% CI	P	cOR	95% CI	P
Belief that HIV care is important	2.59	1.16 to 5.76	0.020	1.19	0.27 to 5.20	0.818
Health insurance	1.67	1.27 to 2.20	<0.001	1.16	0.83 to 1.63	0.382
Engagement with provider	1.06	0.66 to 1.70	0.798	1.08	0.89 to 1.30	0.449
Taking control of health	1.01	0.76 to 1.35	0.922	1.05	0.65 to 1.70	0.834
Depression	0.80	0.59 to 1.07	0.136	0.93	0.74 to 1.17	0.526
Empowerment	1.74	1.12 to 2.70	0.014	1.25	0.59 to 2.64	0.568
HIV knowledge	1.70	0.84 to 3.41	0.139	2.10	1.17 to 3.76	0.012
Case management	1.84	1.62 to 2.08	<0.001	1.34	1.01 to 1.77	0.042
Outpatient drug treatment	0.86	0.59 to 1.25	0.426	0.86	0.66 to 1.11	0.237
Stable housing	1.92	0.95 to 3.90	0.071	1.89	1.45 to 2.47	<0.001
Recent crack use	1.31	0.80 to 2.14	0.286	1.12	0.92 to 1.37	0.265
CD4 count ≥200 cells/mm <sup>3</sup>	1.64	1.10 to 2.46	0.015	0.58	0.25 to 1.34	0.202

CI indicates confidence interval; cOR, crude odds ratio.

**TABLE 3.** Multivariate Analysis of Positive Behavior Regarding Usual Source of Care as a Function of Change in Correlates From Baseline for INSPIRE Participants at the 4 Study Sites (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

Correlate Change	6-Month Follow-Up (N = 227)			12-Month Follow-Up (N = 760)		
	aOR	95% CI	P	aOR	95% CI	P
Belief that HIV care is important	2.99	1.80 to 4.96	<0.0001	NA	NA	NA
Health insurance	0.73	0.10 to 5.34	0.761	NA	NA	NA
Empowerment	3.53	1.89 to 6.62	<0.0001	NA	NA	NA
HIV knowledge	NA	NA	NA	1.85	0.86 to 3.96	0.115
Case management	3.07	1.35 to 6.97	0.007	1.30	1.01 to 1.67	0.045
Stable housing	1.30	0.20 to 8.31	0.778	1.63	1.14 to 2.32	0.008
CD4 count $\geq$ 200 cells per mm <sup>3</sup>	1.51	0.79 to 2.86	0.212	NA	NA	NA

aOR indicates adjusted odds ratio; CI, confidence interval; NA, not applicable ( $P > 0.10$  in univariate analysis).

participant exhibited positive behavior change in terms of health care utilization; however, most were already appropriate care utilizers at baseline and continued as such over the follow-up period. This pattern may be explained by the relatively older age (mean age  $>40$  years) and length of time since HIV diagnosis (mean = 9 years) of our study participants. A younger and/or more recently diagnosed population may have shown less health care utilization at baseline with more potential for positive change. Lower utilization of health care by younger patients has been shown for other HIV-seropositive substance-abusing populations.<sup>17,18,27</sup>

Change to use of case management by INSPIRE participants was associated with positive health care utilization over time. Persons who had received case management were up to 50% more likely to be clinic users and more than twice as likely to be adequate utilizers of primary care compared with those not in case management. This is consistent with findings from other studies, which have found a positive association between case management and increased health care utilization among HIV-seropositive IDUs.<sup>2,14</sup> It could be that being in primary care increases access to case management.

Conversely, Gardner et al<sup>24</sup> have recently reported an efficacious and relatively inexpensive brief case management strategy that increased health care utilization among a disadvantaged population of recently diagnosed persons with HIV/AIDS. The efficacy of such strategies needs to be explored in populations of HIV-seropositive IDUs.

Obtaining or keeping health insurance was also associated with appropriate health care utilization in terms of frequency of primary care visits at 12-month follow-up. Health insurance has been associated with improved outpatient health care utilization in many other studies focusing on drug users.<sup>2,13,14,28</sup> Assisting patients to navigate the often complex health insurance system is an important function of case management, and linkage to health insurance is an important strategy to improve health care utilization and clinical outcomes.

We found that having a stable housing situation was associated with using an outpatient setting rather than the ER as the usual source of care at 12-month follow-up. An unstable housing situation has been previously reported to be associated with decreased utilization of outpatient care.<sup>15,27,29</sup> Linkage for

**TABLE 4.** Univariate Association of Changes of Positive Behavior Regarding Usual Source of Care as a Function of Change in Correlates From Baseline for INSPIRE Participants at the 4 Study Sites (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

Correlate Change	6-Month Follow-Up (N = 527)			12-Month Follow-Up (N = 497)		
	cOR	95% CI	P	cOR	95% CI	P
Belief that HIV care is important	3.90	1.51 to 10.06	0.005	2.23	0.69 to 7.27	0.182
Health insurance	1.28	0.67 to 2.44	0.450	2.18	1.45 to 3.27	<0.001
Engagement with provider	1.85	1.07 to 3.20	0.028	1.52	1.22 to 1.88	<0.001
Taking control of health	1.49	1.21 to 1.84	<0.001	1.33	0.95 to 1.86	0.096
Depression	1.06	0.71 to 1.59	0.766	1.08	0.88 to 1.34	0.445
Empowerment	2.49	0.76 to 8.21	0.133	3.43	2.56 to 4.60	<0.001
HIV knowledge	2.34	0.42 to 13.13	0.333	0.69	0.33 to 1.47	0.338
Case management	1.38	1.01 to 10.88	0.047	2.10	1.25 to 3.53	0.005
Outpatient drug treatment	1.12	0.58 to 2.13	0.741	1.07	0.70 to 1.64	0.762
Stable housing	1.21	0.42 to 3.49	0.730	1.18	0.42 to 3.37	0.752
Recent crack use	0.68	0.48 to 0.96	0.031	1.85	0.86 to 3.98	0.114
CD4 count $\geq$ 200 cells/mm <sup>3</sup>	1.43	0.97 to 2.12	0.070	0.78	0.11 to 5.77	0.809

CI indicates confidence interval; cOR, crude odds ratio.

**TABLE 5.** Multivariate Analysis of Positive Behavior Regarding Frequency of Primary Care Visits as a Function of Change in Correlates From Baseline for INSPIRE Participants at the 4 Study Sites (Baltimore, Miami, New York, and San Francisco) From 2001 to 2005

Correlate Change	6-Month Follow-Up (N = 231)			12-Month Follow-Up (N = 437)		
	aOR	95% CI	P	aOR	95% CI	P
Belief that HIV care is important	5.65	1.52 to 20.99	0.010	NA	NA	NA
Health insurance	NA	NA	NA	2.58	1.38 to 4.81	0.003
Engagement with provider	1.58	0.70 to 3.53	0.269	1.38	0.85 to 2.24	0.194
Taking control of health	2.17	1.36 to 3.47	0.001	1.38	1.10 to 1.73	0.005
Empowerment	NA	NA	NA	2.42	1.31 to 4.45	0.005
Case management	3.14	1.14 to 8.63	0.027	2.17	1.35 to 3.49	0.001
Recent crack use	0.99	0.29 to 3.34	0.985	NA	NA	NA
CD4 count $\geq 200$ cells/mm <sup>3</sup>	2.09	1.23 to 3.55	0.007	NA	NA	NA

aOR indicates adjusted odds ratio; CI, confidence interval; NA, not applicable ( $P < 0.10$  in univariate analysis).

HIV-seropositive IDUs with local housing programs is another potentially important strategy to improve health care utilization in this population.

Participants who increased their importance of HIV care scale score were 3 times more likely to demonstrate positive health care utilization for both study outcomes. Likewise, increased empowerment was associated with utilization of outpatient primary care services and appropriate frequency of care visits, and taking greater control of one’s health was only associated with appropriate frequency of care visits. Although these factors were both specifically addressed in the INSPIRE intervention, the findings were the same for those in the control group. It may be that participation in the study, in a supportive and positive environment, promoted valuing HIV care and empowerment in this relatively disenfranchised and powerless population.

Outpatient drug treatment has been associated with increased health care utilization in several studies.<sup>2,11–13</sup> We did not find recent outpatient drug treatment (past 6 months) to be associated with increased health care utilization. The reason for this difference is not clear, although most of our participants were already adequate care users at baseline; perhaps the effect of drug treatment is greater on HIV-seropositive patients who are not already in care. Lower CD4 cell counts and increased AIDS symptoms have previously been reported by Solomon et al<sup>26</sup> to be associated with increased outpatient visits. In our multivariate analyses, CD4 cell count was associated with utilization of outpatient primary care services outcome at 6-month follow-up. Specific data on AIDS-related symptoms were not collected. Differences between our study and the study by Solomon et al<sup>26</sup> could be attributable to the following: (1) Solomon et al<sup>26</sup> reported on patients from 1988 to 1991 before the HAART era, (2) their population was younger and less geographically diverse, or (3) other undetermined reasons.

This study had several limitations. Health care utilization was assessed by self-report, which is subject to incorrect recall and social desirability bias. Although follow-up rates were  $>80\%$  at both time points, loss to follow-up is always a potential source of bias in longitudinal studies. Although the study was prospective, the “predictor” or independent

variables were based on the statistical models selected. One cannot necessarily infer causality between these variables and appropriate utilization of health care. It could be that appropriate utilizers of health care are more likely to receive case management, have stable housing, and so forth. Also, the terms *health insurance* and *case management* can have a range of meanings, and our participants’ responses to the specific survey questions may not be consistent with those of providers or policy makers. As noted previously, most participants reported Medicaid as their insurance source, with benefits that vary widely across states. Most participants had positive behaviors at baseline; thus, behavior change could only occur in 20% to 30% of participants. Finally, our findings may not be generalizable to younger or more recently diagnosed IDUs.

The development of effective interventions to increase primary care utilization among HIV-seropositive IDUs is important to improve clinical outcomes and to provide a source of prevention counseling for this high-risk population. Based on our findings, future interventions for this population may be strengthened by addressing the importance of HIV primary care; empowering participants with respect to the health care system; and promoting linkages to case management, health insurance, and local housing programs. We realize that promoting linkages to various social services would likely require a significant investment in resources and infrastructure in some locales. These findings highlight the potential importance for HIV-seropositive IDUs of promoting improvements in individual-level factors such as attitudes and structural factors such as access to various systems and resources.

#### ACKNOWLEDGMENTS

The INSPIRE Study Team includes the following people: Carl Latkin, Amy Knowlton, and Karin Tobin (Baltimore); Lisa Metsch, Eduardo Valverde, James Wilkinson, and Martina DeVarona (Miami); Mary Latka, Dave Vlahov, Phillip Coffin, Marc Gourevitch, Julia Arnsten, and Robert Gern (New York); Cynthia Gomez, Kelly Knight, Carol Dawson Rose, Starley Shade, and Sonja Mackenzie (San Francisco); David Purcell, Yuko Mizuno, Scott Santibanez, Richard Garfein, Ann O’Leary (CDC); and Lois Eldred

and Kathleen Handley (Health Resources and Services Administration).

The authors acknowledge the following people for their contributions to this research: Susan Sherman, Roena Marvin, Joanne Jenkins, Donny Gann, and Tonya Johnson (Baltimore); Clyde McCoy, Rob Malow, Wei Zhao, Lauren Gooden, Sam Comerford, Virginia Lo Cascio, Curtis Delford, Laurel Hall, Henry Boza, and Cheryl Riles (Miami); George Fesser, Carol Gerran, and Diane Thornton (New York); Caryn Pelegrino, Barbara Garcia, Jeff Moore, Erin Rowley, Debra Allen, Dinah Iglesia-Usog, Gilda Mendez, Paula Lum, and Greg Austin (San Francisco); Craig Borkowf, Ying Chen, Gladys Ibanez, Hae-Young Kim, Toni McWhorter, Jan Moore, Lynn Paxton, and John Williamson (CDC); and Lee Lam, Jeanne Urban, Stephen Soroka, Zilma Rey, Astrid Ortiz, Sheila Bashirian, Marjorie Hubbard, Karen Tao, Bharat Parekh, and Thomas Spira (CDC Laboratory).

## REFERENCES

- Centers for Disease Control and Prevention. *HIV/AIDS Surveillance Report, 2004*, vol. 16. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2005:18.
- Knowlton AR, Hoover DR, Chung S, et al. Access to medical care and service utilization among injection drug users with HIV/AIDS. *Drug Alcohol Depend.* 2001;64:55–62.
- Chitwood DD, Sanchez J, Comerford M, et al. Primary preventative health care among injections drug users, other sustained drug users, and non-users. *Subst Use Misuse.* 2001;36:807–824.
- Shapiro MF, Morton SC, McCaffrey DF, et al. Variations in the care of HIV-infected adults in the United States: results from the HIV Cost and Services Utilization Study. *JAMA.* 1999;281:2305–2315.
- Kerr T, Wood E, Grafstein E, et al. High rates of primary care and emergency department use among injection users in Vancouver. *J Public Health (Oxf).* 2005;27:62–66.
- Mor V, Fleishman JA, Dresser M, et al. Variation in health service use among HIV-infected patients. *Med Care.* 1992;30:17–29.
- Arici C, Ripamonti D, Maggiolo F, et al. Factors associated with the failure of HIV-positive persons to return for scheduled medical visits. *HIV Clin Trials.* 2002;3:52–57.
- Panel on Clinical Practices for Treatment of HIV Infection. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services, October 6, 2005. Available at: <http://aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>. Accessed February 23, 2006.
- Alcades P, Friedland G. Injection drug use and human immunodeficiency virus infection. *Clin Infect Dis.* 1995;20:1467–1479.
- O'Connor PG, Selwyn PA, Schottenfeld RS. Medical care for injection-drug users with human immunodeficiency virus infection. *N Engl J Med.* 1994;331:450–459.
- Laine C, Hauch WW, Gourevitch MN, et al. Regular outpatient medical and drug abuse care and subsequent hospitalization of persons who use illicit drugs. *JAMA.* 2001;285:2355–2362.
- Laine C, Hauch WW, Turner BJ. Outpatient patterns of care and longitudinal intensity of antiretroviral therapy for HIV-infected drug users. *Med Care.* 2002;40:976–995.
- Cronquist A, Edwards V, Galea S, et al. Health care utilization among young adult drug users in Harlem, New York. *J Subst Abuse.* 2001;13:17–27.
- Mizuno Y, Wilkinson JD, Santibanez S, et al. Correlates of health care utilization among HIV-seropositive injection drug users. *AIDS Care.* 2006;18:417–425.
- Palepu A, Strathdee SA, Hogg RS, et al. The social determinants of emergency department and hospital use by injection drug users in Canada. *J Urban Health.* 1999;76:409–418.
- McCoy CB, Metsch LR, Chitwood DD, et al. Drug use and barriers to use of health care services. *Subst Use Misuse.* 2001;36:789–806.
- Metsch LR, Pereyra M, Brewer TH. Use of HIV health care in HIV-seropositive crack cocaine smokers and other active drug users. *J Subst Abuse.* 2001;13:155–167.
- Sambamoorthi U, Warner LA, Crystal S, et al. Drug abuse, methadone treatment, and health services use among injection drug users with AIDS. *Drug Alcohol Depend.* 2000;60:77–89.
- Purcell DW, Metsch LR, Latka M, et al. Interventions for seropositive injectors—research and evaluation: an integrated behavioral intervention with HIV-positive injection drug users to address medical care, adherence, and risk reduction. *J Acquir Immune Defic Syndr.* 2004;37(Suppl 2):S110–S118.
- Purcell DW, Latka MH, Metsch LR, et al. Results from a randomized controlled trial of a peer-mentoring intervention to reduce HIV transmission and increase access to care and adherence to HIV medications among HIV-seropositive injection drug users. *J Acquir Immune Defic Syndr.* 2007;46(Suppl 2):S35–S47.
- Bakken S, Holzemer WL, Brown M, et al. Relationships between perception of engagement with health care provider and demographic characteristics, health status, and adherence to therapeutic regimen in persons with HIV/AIDS. *AIDS Patient Care STDS.* 2000;14:189–197.
- Derogatis LR, Spencer PM. *The Brief Symptom Inventory (BSI): Administration, Scoring, and Procedural Manual.* Baltimore, MD: John Wiley; 1982.
- Rogers ES, Chamberlin J, Ellison ML, et al. A consumer-constructed scale to measure empowerment among users of mental health services. *Psychiatr Serv.* 1997;48:1042–1047.
- Gardner LI, Metsch LR, Anderson-Mahoney P, et al. Efficacy of a brief case-management intervention to link recently diagnosed HIV-infected persons to care. *AIDS.* 2005;19:423–431.
- French MT, McGeary KA, Chitwood DD, et al. Chronic illicit drug use, health services utilization and the cost of medical care. *Soc Sci Med.* 2000;50:1703–1713.
- Solomon L, Frank R, Vlahov D, et al. Utilization of health services in a cohort of intravenous drug users with known HIV-1 serostatus. *Am J Public Health.* 1991;81:1285–1290.
- Masson CL, Sorensen JL, Phibbs CS, et al. Predictors of medical service utilization among individuals with co-occurring HIV infection and substance abuse disorder. *AIDS Care.* 2004;16:744–755.
- Sterk CE, Theall KP, Elifson KW. Health care utilization among drug-using and non-drug-using women. *J Urban Health.* 2002;79:586–599.
- Kushel MB, Perry S, Bangesberg D, et al. Emergency department use among the homeless and marginally housed; results from a community-based study. *Am J Public Health.* 2002;92:778–784.