

Estimation of the Prevalence of AIDS, Opportunistic Infections, and Standard of Care among Patients with HIV/AIDS Receiving Care Along the U.S.-Mexico Border through the Special Projects of National Significance: A Cross-Sectional Study

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Abstract

There is high demand for care among the Hispanic population in states along the U.S.-Mexico border. The objective is to describe the standard of care received by people living with HIV/AIDS (PLWH/A) at enrollment into one of five Special Projects of National Significance (SPNS) Sites located along the U.S.-Mexico border. This cross-sectional study describes the presence of opportunistic infections (OIs), AIDS status and two types of standard of care received by 707 PLWH/A participating in SPNS. Patients receiving care through SPNS in one of the five sites between June 1, 2002 and December 31, 2003 were invited to participate to the medical chart review component of the study. The association between sociodemographic variables and the prevalence of OIs and AIDS at enrollment was estimated using multivariate hierarchical logistic models. More than one quarter of the 707 participants had at least one OI recorded and 58% of new and 60% of existing patients had AIDS at enrollment in SPNS. The association between being Hispanic and having higher prevalence of OI and AIDS at entry varied by SPNS site. Standard of care was well followed overall. This is the first study describing HIV stage and OI prevalences and standard of care in PLWH/A in all U.S.-Mexico bordering states. Being of Hispanic ethnicity may not fully explain discrepancy in access to care along the border.

Introduction

BETWEEN 2001 AND 2005, there were an estimated 184,170 new HIV/AIDS cases diagnosed in individuals aged at least 13 years old in 33 states of the United States, of whom 93,019 (50.5%) were non-Hispanic black and 33,399 (18.1%) were Hispanic.¹ Similarly, the Centers for Disease Control (CDC) estimated that there were 20,187 (50.1%) new AIDS cases among non-Hispanic blacks and 7676 (19.0%) among Hispanics in 2005.² Since non-Hispanic blacks and Hispanics were estimated to represent 12.3% and 14.4% of the U.S. population on July 1, 2005,³ these data suggest that the black population, and to a smaller extent, the Hispanic population,

are disproportionately affected by the epidemic compared to other racial and ethnic groups in the United States. Indeed, the estimated incidence rate of new HIV/AIDS diagnoses among adolescents and adults in 33 states in 2005 was highest in Black males and females with 124.8 and 60.2 new cases per 100,000 person-years, respectively followed by Hispanic males and females at 56.2 and 15.8 new cases per 100,000 person-years, respectively.⁴

This racial and ethnic disparity in new diagnoses of HIV/AIDS is particularly likely to affect those clinics serving mostly Black and Hispanic populations. This has been the case with primary health care clinics located along the U.S.-Mexico border.⁵ However, very little data are available

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on the health status of people living with HIV/AIDS (PLWH/A) receiving care in these areas and if Hispanic patients differ from patients of other ethnicities. In a cross-sectional study conducted as part of the Bilingual Intercultural Oncology Quality of Life (BIOQOL) project, 223 PLWH/A receiving care in Chicago, Atlanta, New York City, and San Juan agreed to answer the Functional Assessment of HIV Infection (FAHI) to assess their quality of life. Results showed that Hispanics, and especially English-speaking Hispanic PLWH/A, had lower scores on the emotional and social well-being scales than non-Hispanic whites.⁶

There is some evidence of racial and ethnic disparities regarding access to highly active antiretroviral therapy (HAART) and prophylaxis for opportunistic infections (OIs). In a review of 28 articles, 10 studies found no association, 3 found positive association, and 14 found negative associations between being black or Hispanic compared to non-Hispanic white and receiving some HAART.⁷ In a study conducted in 1996 on hospitalization data collected from 10 states, the rate of hospitalization for AIDS was almost twice as high in blacks than in Hispanics or whites, for whom the rate was similar.⁸ Hence, the evidence for the effect of being Hispanic compared to non-Hispanic on receiving HAART and being hospitalized for AIDS is less compelling than what has been described for blacks compared to whites. However, there has been a recent trend toward an increase in the proportion of new AIDS cases among Hispanics in California and Texas, two border states, a trend not observed in New York or Florida.⁹ This shows that more work needs to be done to compare the care received by Hispanic and non-Hispanic HIV-positive patients. The aim of this study was to describe and explore what factors are associated with the distribution of HIV stage, presence of OIs, and standard of care offered at the time of enrollment into the Special Projects of National Significance (SPNS) among PLWH/A receiving care along the U.S.-Mexico border.

Methods

Target population

The target population consists of PLWH/As who were receiving primary HIV/AIDS medical services between January 1, 2001 and November 30, 2004 from any one of five U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA), HIV/AIDS Bureau, SPNS-funded Border Health demonstration sites. The SPNS sites were located in Harlingen and El Paso, Texas; Las Cruces, New Mexico; San Ysidro, California; and Tucson, Arizona. Each SPNS site was arbitrarily assigned letters A through E to protect confidentiality. HRSA funded this initiative to build service capacity and develop innovative models of care designed to overcome structural, socio-economic, and cultural barriers that might limit early detection of HIV among Hispanics residing along the U.S.-Mexico border. This included training of physicians where care was not provided and forming collaborations with other community health centers and AIDS service organizations to increase local access to HIV care through outreach and marketing. It should be noted that unlike other Ryan White funding mechanisms, SPNS is targeted toward the development and evaluation of innovative models of HIV service delivery and of promoting the replication of successful models. It is not designed to support the long-term provision of HIV/AIDS related health care.

Study population

Existing and new participants in SPNS were asked for their consent to review their medical charts between June 1, 2002 and December 31, 2003. Thus, only SPNS participants who were still receiving care in June 2002 and those who entered into care prior to January 1, 2004 were invited to participate in the medical chart review component of the study. This is because the medical chart review component of the study had not been planned in the original study design. The ethical approval of this component resulted in a delay in asking patients for their consent. Participants include a combination of previously existing and newly diagnosed HIV/AIDS patients receiving care at one of the five participating SPNS sites.

Study design

This is a cross-sectional study taken from the SPNS cohort study. The SPNS cohort study included data on medical care visits to the SPNS sites (physician, other HIV services [i.e., blood sample], reference to a specialist or unspecified), CD4 counts (dates and values) and HIV viral loads (dates and values) up to 6 times within each quarter for a total of 16 quarters. Data on new diagnosis, noted diagnosis, or prophylaxis for 13 OIs as well as new or continuing HAART were collected at intake and at each quarter, but no exact date was collected. At intake and for each quarter when the patient had a medical visit, a diagnosis of AIDS noted by the physician was recorded, but the exact date of the diagnosis was not recorded.

For this study, "first quarter" is used to indicate the first quarter when patients attended one of the participating SPNS sites following intake into the project (January 1, 2001 to December 31, 2003). We report here the prevalence of outcomes measured at the first quarter and intake.

Medical chart review process

The medical charts were reviewed for patient information at intake into the participating SPNS site and for 16 quarters starting on July 1, 2000 (retrospectively) until June 30, 2004 (prospectively). The period of intake corresponded to any information recorded on patients prior to July 1, 2001. If a patient first received care in one of the five participating SPNS sites after July 1, 2001, their intake information was identical to the information from the first quarter of follow-up (see below for a definition of a new patient).

Six consultants, five nurses and one physician, were recruited from a variety of local and national sources to conduct the medical chart reviews across all SPNS sites. Consultants were initially trained, via conference call, by The Measurement Group, an evaluation group which conducted a similar medical chart review study in Broward County (Florida) in 2001.

Teams of consultants, ranging from two to four people, traveled to project locations to conduct the reviews that required a minimum of 1 day to more than a week to complete. Once on site, the time needed to extract the data from patient medical records varied widely with data extraction for a single review requiring an average of 2–3 hours. Multiple factors, such as patient time in treatment, availability of complete medical records, and variance in coding, influenced the time needed to review each record. In some

instances, consultants traveled to satellite locations associated with a primary SPNS site to access the medical records. Time required for each review was much greater in the early stages of the study and decreased as the study progressed.

The data collection system utilized in the study was designed using Teleform v9.0.¹⁰ Three unique sets of paper-based data extraction forms were developed to capture health indicators at intake, during each quarter and additional indicators extending beyond normal quarter parameters. Once data were coded onto these forms, they were returned to the site responsible for data management: the Evaluation Center at the University of Oklahoma, Norman, Oklahoma, for optical character recognition scanning and processing into an SPSS datafile.

Definitions of outcomes

AIDS at entry into care. A patient was considered to have AIDS at enrollment into the SPNS program if there was a note on the medical chart that this patient had AIDS at intake or if the CD4 count was measured as less than 200 cells/mm³ at intake or at the first CD4 test during the first quarter or an OI was noted or diagnosed at intake or during the first quarter. Because the exact date of the diagnosis of OIs was not recorded, an alternative definition of AIDS at entry would be to ignore the presence of an OI during the first quarter into care. Only nine (1.3%) patients were defined as having AIDS at entry strictly based on the presence of at least one OI during the first quarter and a CD4 count of more than 200 cells/mm³ at the first measurement. Since this only has minimal effect on the results, the first definition was used in this analysis. The prevalence of AIDS at entry into care was calculated by dividing the total number of patients meeting the AIDS at entry definition by the total number of participating patients.

Opportunistic infection(s) at entry into care. A patient was considered as having an OI at entry into care if any of 13 OIs listed by the CDC to define clinical AIDS had been newly diagnosed or noted at intake or during the first quarter. The prevalence of each OI at entry into care was defined as the number of patients with at least one OI at intake or during the first quarter divided by the total number of participating patients.

Standard of care at entry. Two measures of standard of care at entry were used. The U.S. Department of Health and Human Services recommends that any new HIV patients should have their CD4 lymphocytes counts and HIV viral load levels measured in a reasonable timeframe following a first visit to a physician.¹¹ The first measure of Standard of Care (SOC1) was defined as having had a measure of CD4 lymphocytes counts and of HIV viral load levels 8 weeks prior or 8 weeks after the first HIV-related visit to a physician during the SPNS study period. SOC1 was only evaluated among new patients (see definition below). A second measure of standard of care (SOC2) was based on the U.S. Office of AIDS Research Advisory Council (OARAC) guidelines for HAART which recommends that therapy be initiated before CD4 lymphocytes counts fall below 200 cells/mm³.¹¹ SOC2 was defined here as the initiation of HAART within two quarters if a patient's first CD4 lymphocytes count was less

than 200 cells/mm³ at the first visit and/or an OI was newly diagnosed or noted during the first quarter of follow-up.

Measurement of exposure variables

Patients who agreed to participate in the SPNS project were asked to fill in a multimodule uniform close-ended questionnaire designed to measure information on demographic characteristics. More details on these participants can be found elsewhere.¹² The demographic module was available in English or Spanish and was completed during face-to-face interviews with bilingual SPNS staff. The consenting process and interviews were conducted in Spanish or English depending on the language preference of the participant. Exposure variables of interest were measured from the demographic module and include: age (18–29; 30–39; 40–49; 50+), gender, most likely mode of infection (men having sex with men [MSM], heterosexual, injection drug users [IDU], or blood transfusion), SPNS site, type of site (rural, urban), ethnicity (Hispanic, not Hispanic), and primary medical insurance (private, public/governmental, none).

A new patient was defined as a patient who had never received any HAART nor any care for HIV/AIDS at their first visit to the SPNS Site and who had an intake date on or later than July 1, 2000. All other participants were considered to be existing patients.

Statistical analyses

Descriptive statistics were first done for each outcome variable. Estimates of the 95% confidence intervals (95% CI) of prevalence proportions were calculated with the binomial Clopper-Pearson exact method. The median CD4 lymphocytes counts and HIV viral loads at entry into care were compared using the Wilcoxon rank-sign test. The difference (and 95% CI) in the distribution of selected demographic variables between participants and nonparticipants to the medical chart review was calculated assuming that the sum of the variances was equal to the variance of the difference. Bivariate and stratified analyses were then conducted to explore the potential association between exposure variables and the different outcomes. Prevalence odds ratios (POR) and their 95% CI were used to assess these associations. These analyses were conducted in Stata/SE 9.2[®] for Windows.¹³ Bayesian hierarchical logistic models were fitted to determine which factors were associated with AIDS at entry and the presence of any OI at enrollment.^{14,15} A hierarchy (random-effect) on the SPNS site was added for the effect of being a new patient and of being Hispanic. Models with hierarchical effects on the intercept indicated that there was no clustering of the prevalence of AIDS or OIs by SPNS site and were thus excluded from the final models. All Bayesian analyses were conducted in WinBugs 1.4.¹⁶

Ethics

Local investigators from each of the participating projects, as well as those from the Evaluation Center at the University of Oklahoma (Norman, Oklahoma) and from the University of Oklahoma Health Sciences Center (Oklahoma City, Oklahoma), received approval from their respective Institutional Review Boards (IRB) to conduct this study. As the

overarching entity among the SPNS Sites, the Evaluation Center was responsible for facilitating data exchange that minimized harm to participants.

Selection and recruitment of participants and administration of consents were conducted exclusively by each SPNS Site, maintaining the confidentiality of patients. Special populations of pregnant women, patients under the age of 18 and over the age of 80, as well as patients who were currently incarcerated were excluded. Separate consent forms were used for the participation in the interviews and in the medical chart components of the study.

Medical chart reviews were conducted in the respective clinics of participants which afforded increased participant confidentiality. Consultants worked directly with local project staff to facilitate data coding and eventual transfer of data to the Evaluation Center. Data were submitted to the Evaluation Center with a unique identification number which excluded personal identifiers.

Results

Study population

Table 1 compares patients who consented to participate to both the interview and medical chart review components of the study (medical chart participants) to those who only consented to participate to the interview component (interview-only participants). The participation proportion to the medical chart review was 59.3% (711/1200). Age, gender, most likely exposure, living with a partner, self-reported AIDS status at entry into SPNS, time between HIV diagnosis and intake were not or were very weakly associated with consent for the medical chart component. However, there was a larger proportion of Hispanics among the medical chart participants (62.4%) than among the interview-only participants (37.6%). In addition, there were more patients without medical insurance among medical chart participants (71.0%) than among interview-only participants (56.2%). A larger propor-

TABLE 1. FREQUENCY AND DIFFERENCE OF SOCIODEMOGRAPHIC CHARACTERISTICS OF PATIENTS WHO CONSENTED TO BEING INTERVIEWED AND HAVING THEIR MEDICAL CHART REVIEWED (711) TO PATIENTS WHO ONLY CONSENTED TO THE INTERVIEW^a (489) IN FIVE SPNS SITES LOCATED ALONG THE U.S.-MEXICO BORDER

Variable	Categories	Medical chart participants (%)	Interview-only participants (%)	Difference in the proportion (%) of patients with consent (95% CI)
Age groups	18–29	127 (17.9)	89 (18.2)	–0.3 (–4.8, 4.1)
	30–39	314 (44.2)	191 (39.1)	5.1 (–0.6, 1.08)
	40–49	187 (26.3)	148 (30.3)	–4.0 (–9.2, 1.2)
	50+	83 (11.7)	61 (12.5)	–0.8 (–4.6, 3.0)
Gender	Male	585 (82.3)	418 (85.5)	–3.2 (–7.4, 1.0)
Ethnicity	Hispanic	605 (62.4)	365 (37.6)	10.4 (5.8, 15.1) ^b
Most likely mode of infection	Men who have sex with Men	400 (56.3)	274 (56.0)	0.2 (–5.5, 5.9)
	Injection drug users or blood exposure	90 (13.0)	69 (14.1)	–1.1 (–5.1, 2.9)
	Heterosexual	221 (31.1)	146 (29.9)	1.2 (–4.1, 6.5)
Living with a partner	Yes	320 (45.0)	213 (43.6)	1.4 (–4.3, 7.2)
Medical insurance	Government/public	148 (20.8)	169 (34.6)	–13.7 (–18.9, –8.6) ^b
	Private	58 (8.2)	45 (9.2)	–1.0 (–4.3, 2.2)
	None	505 (71.0)	275 (56.2)	14.8 (9.3, 20.3) ^b
Self-reported HIV status	CDC defined AIDS	200 (28.1)	151 (30.9)	–2.7 (–8.0, 2.5)
	HIV-AIDS status unknown	115 (16.2)	99 (20.2)	–4.1 (–8.5, 0.4)
	HIV—no AIDS	396 (55.7)	239 (48.9)	6.8 (1.1, 12.6) ^b
Time between HIV diagnosis and intake	≤1 year	307 (43.2)	192 (39.3)	3.9 (–1.7, 9.6)
	>1 and ≤5 years	172 (24.2)	124 (25.4)	–1.2 (–6.1, 3.8)
	>5 years	232 (32.6)	173 (35.4)	–2.7 (–8.2, 2.7)
Time of entry into the SPNS program	Before or on June 1, 2002	468 (65.8)	227 (46.4)	19.4 (13.8, 25.0) ^b
Site	A	54 (7.6)	72 (14.7)	–7.1 (–10.8, –0.3) ^b
	B	205 (28.8)	148 (30.3)	–1.4 (–6.7, 3.8)
	C	248 (34.9)	97 (19.8)	15.0 (10.1, 20.0) ^b
	D	46 (6.5)	48 (9.8)	–3.3 (–6.6, 0.0) ^b
	E	158 (22.2)	124 (25.4)	–3.1 (–8.1, 1.8)
Type of Site	Urban	453 (63.7)	245 (50.1)	13.6 (7.9, 19.3) ^b

^aPatients who only consented to the interview: the reasons for not obtaining consent were not recorded but are thought to be mostly due to not being asked or having been lost to follow-up before the medical chart component of the study was initiated.

^bIndicates a difference in distribution between the medical chart participants and interview-only participants. CI, confidence interval.

tion of medical chart participants were patients who enrolled in the SPNS project before June 1, 2002 (65.8%) as compared to interview-only participants (46.4%). Among all SPNS sites, Site C recruited the largest proportion of medical chart participants (34.9%) and was clearly the most active recruiter. Sites A and D had a larger proportion of interview-only participants as compared to medical chart participants. The overrepresentation of Site C among participants led to a larger proportion of medical chart participants from urban sites (63.7%) as compared to rural sites (50.1%). Finally, a slightly larger proportion of medical chart participants self-reported having HIV—not AIDS (55.7%) compared to interview-only participants (48.9%).

Of the 711 patients with medical chart consent, 707 had information on the CD4 lymphocytes counts at entry and intake and on AIDS status at entry and intake. Therefore, the following analyses are limited to those 707 patients with complete data.

Description of patients at entry

Of the 707 patients with complete data, only 194 (27.4%) were new patients. Table 2 shows the frequency of each OI, AIDS status, and the standard of care received at entry into the SPNS project, stratified by new and existing patients. More than one quarter of all patients had at least one OI

recorded at intake or entry into care. The prevalence of any type of OI was similar between new and existing patients. The most common OI was *P. jiroveci* followed by *M. tuberculosis* in existing patients. The most common OI among new patients was *M. tuberculosis* followed by *P. jiroveci*. Approximately one third of patients with recorded OIs had had more than one type of OI at entry or intake.

The majority of new (57.7%) and existing (60.2%) patients already met the CDC definition of AIDS when they enrolled in the SPNS project. This estimate is twice what was self-reported by the SPNS participants (Table 1). Indeed, 41% of those participants who self-declared not having AIDS had evidence of AIDS according to the medical chart review. In contrast, the AIDS status of 91% who self-declared having AIDS was confirmed by their medical chart.

The compliance with standard-of-care measured as having been tested for CD4 levels and viral loads within 8 weeks before or after a first medical visit was followed in 88.1% (95% CI: 82.3%, 92.3%) of new patients. Compliance with the second type of standard of care was followed with 694 new and existing patients (98.1%; 95% CI: 96.9%, 99.0%).

The median CD4 lymphocytes counts among Hispanics and non-Hispanics who were treatment naïve at entry into care were 246 cells/mm³ (interquartile range [IQR] = 4; 1549, *n* = 313) and 376 cells/mm³ (IQR = 9; 1188, *n* = 43), respectively (*p* = 0.0052). The median HIV viral load among

TABLE 2. DESCRIPTION OF THE PREVALENCE OF OPPORTUNISTIC INFECTIONS, AIDS STATUS AND STANDARD OF CARE FOR 707 NEW (194) AND EXISTING (513) PATIENTS ENTERING THE SPNS PROGRAM BETWEEN 2001 AND 2004

		Prevalence (%) at entry into SPNS (95% CI)	
		New patients	Existing patients
Opportunistic infection at intake or entry	Candidiasis	2.1 (0.6, 5.2)	3.9 (2.4, 6.0)
	Coccidiomycosis	0.5 (0.0, 2.8)	1.9 (1.0, 3.6)
	Cryptosporidiosis	3.6 (1.3, 7.3)	1.6 (0.7, 3.0)
	Cytomegalovirus	4.6 (2.1, 8.6)	5.7 (3.8, 8.0)
	Histoplasmosis	0.0 (0.0, 1.9)	0.6 (0.1, 1.7)
	Kaposi's sarcoma	1.5 (0.3, 4.5)	1.8 (0.8, 3.3)
	Lymphoma	0.0 (0.0, 1.9)	0.8 (0.2, 2.0)
	<i>Mycobacterium avium</i> complex	4.6 (2.1, 8.6)	3.1 (1.8, 5.0)
	Tuberculosis	11.9 (7.7, 17.3)	7.6 (5.5, 10.2)
	<i>Pneumocystis jiroveci</i> complex	8.8 (5.2, 13.7)	12.4 (9.7, 15.7)
Toxoplasmosis	2.1 (0.6, 5.2)	2.9 (1.6, 4.8)	
Any opportunistic infection at intake or entry		26.8 (20.7, 33.6)	29.6 (25.7, 33.8)
Any opportunistic infection at intake		18.0 (12.9, 24.2)	23.6 (20.0, 27.5)
Any opportunistic infection at entry		25.8 (19.8, 32.5)	21.2 (17.8, 25.0)
Number of opportunistic infections at intake or entry	One	18.0 (12.9, 24.2)	20.9 (17.4, 24.6)
	Two	5.7 (2.9, 9.9)	6.0 (4.1, 8.5)
	Three	2.1 (0.6, 5.2)	1.8 (0.8, 3.3)
	Four	1.0 (0.1, 3.7)	0.8 (0.2, 2.0)
	Five	0.0 (0.0, 1.9)	0.2 (0.0, 1.1)
CDC-defined AIDS at intake or entry		57.7 (50.4, 64.8)	60.2 (55.9, 64.5)
Compliance with standard of care recommendations ^b	SOC1 ^a	88.1 (82.3, 92.3)	NA
	SOC2	96.9 (93.4, 98.9)	98.6 (97.2, 99.4)

^aSOC1: this was only evaluated among the 194 patients who had never received any type of HIV/AIDS treatment before being included in the SPNS program.

^bCompliance with standard of care recommendations: see methods for a definition of the two types of standard of care.

NA: Not applicable to existing patients.

TABLE 3. MULTIVARIATE PREVALENCE ODDS RATIO ESTIMATES (AND 95% BAYESIAN CREDIBLE INTERVAL) OF FACTORS ASSOCIATED WITH THE LIFELONG PREVALENCE OF OPPORTUNISTIC INFECTIONS AT ENTRY INTO THE SPNS PROGRAM IN FIVE SPNS SITES LOCATED ALONG THE U.S.-MEXICO BORDER, 2000–2004

Variable	Value	Reference	Hierarchical effect	Prevalence odds ratio (95% BCI)
Ethnicity	Hispanic	Non-Hispanic	Site A	1.39 (0.57, 3.29)
			Site B	1.92 (1.03, 3.80)
			Site C	0.91 (0.49, 1.83)
			Site D	1.48 (0.58, 3.75)
			Site E	1.99 (1.04, 4.18)
Type of patient	New	Existing	Site A	0.42 (0.04, 2.06)
			Site B	1.79 (0.92, 3.41)
			Site C	0.28 (0.09, 0.71)
			Site D	0.69 (0.08, 5.20)
			Site E	0.36 (0.15, 0.79)
CD4 count ever been below 200 mm ³	Yes	No	None	5.87 (3.96, 8.67)
Gender	Male	Female	None	1.80 (1.09, 3.08)

Hispanics and non-Hispanics who were treatment naïve at entry were 33,041 copies per milliliter (IQR = 6,174; 144,000, $n = 314$) and 17,510 copies per milliliter (IQR = 487; 90,771, $n = 44$), respectively ($p = 0.076$). We define treatment naïve any patient who was not receiving “continuing HAART” during the first quarter and had no HAART recorded at intake.

Factors associated with the prevalence of OIs at intake or entry

Table 3 reports the results from the Bayesian hierarchical logistic model for the association between different potential risk factors and the presence of OI at entry. As expected, having had a CD4 lymphocytes count of less than 200 cells/mm³ at least once before or at the time of entry was strongly associated (POR = 5.87, 95% BCI: 3.96, 8.67) with the probability of having OI at entry into care. Also, the prevalence of OI at entry was higher among males than among females (POR =

1.80, 95% BCI: 1.09, 3.08). There was no important clustering of the prevalence of OI by SPNS site. However, the effects of ethnicity and of being a new patient were different depending on the SPNS site. Hispanic patients receiving services in Site B and E were more likely to have at least one OI at entry into care than non-Hispanic patients. This was not the case in the other three sites. New patients were less likely to have OIs at entry into care in Sites C and E than existing patients. On the other hand, new patients tended to be more likely to have OIs at entry in Site B than existing patients. There was no evidence of association between OIs at entry and the most likely mode of infection, primary medical insurance, age, and receiving care in a urban site.

Factors associated with AIDS at entry into care

Table 4 reports the results from the Bayesian hierarchical logistic model for the association between different po-

TABLE 4. MULTIVARIATE PREVALENCE ODDS RATIO ESTIMATES OF FACTORS ASSOCIATED WITH THE PREVALENCE OF CDC-DEFINED AIDS AT INTAKE OR ENTRY INTO THE SPNS PROGRAM IN FIVE SPNS SITES LOCATED ALONG THE U.S.-MEXICO BORDER, 2000–2004

Variable	Value	Reference	Effect modifier	Prevalence odds ratio (95% CI)
Ethnicity	Hispanic	Non-Hispanic	Site A	1.85 (0.89, 4.17)
			Site B	2.03 (1.14, 3.53)
			Site C	1.19 (0.72, 2.00)
			Site D	0.93 (0.36, 2.07)
			Site E	1.92 (1.06, 3.58)
Type of patient	New	Existing	Site A	0.68 (0.19, 1.85)
			Site B	1.10 (0.59, 2.14)
			Site C	0.90 (0.52, 1.67)
			Site D	0.73 (0.16, 2.58)
			Site E	0.51 (0.25, 0.95)
Age	18–29	30–39	None	0.63 (0.40, 0.99)
	40–49		0.94 (0.65, 1.39)	
	50+		1.50 (0.89, 2.61)	
Exposure	MSM	Heterosexual	None	0.62 (0.39, 0.99)
	IDU		0.63 (0.35, 1.13)	
Gender	Male	Female	None	2.39 (1.42, 3.94)

tential risk factors and having AIDS at entry into care. In this model, MSM and the youngest age group (18–29) were less likely to have AIDS at entry. Males were more likely to have AIDS at entry than females. As with the previous model, there was no important clustering of the prevalence of AIDS at entry by SPNS site. However, there was a difference in the effect of ethnicity and of patient status according to the SPNS Site where the patient was followed. Hispanic patients receiving care in Sites B and E were more likely to have AIDS at entry into care. No such difference was observed for Sites C and D. Being a new patient was associated with a lower probability of having AIDS at entry in Site E. This was clearly not the case in Site B. The effect of being a new patient in the other three sites had very large confidence intervals.

Factors associated with standard of care

Because there were only 194 new patients, and that SOC1 was followed in 88.1% of patients, only descriptive statistics were conducted for this analysis. SOC1 was met in 94.5% and 93.9% in Sites B and C, respectively, but only in 79.0% of the cases in Site E. Even though this difference is not strictly significant due to small numbers, it does tend to suggest that testing for CD4 lymphocytes and HIV viral loads within 8 weeks among new patients may not be uniform across SPNS sites. Because of this site distribution, SOC1 was met more often in patients followed in urban sites (Sites B and C) compared to rural sites (Sites A, D, and E) (POR = 4.10, 95% CI = 1.6, 10.6). No other variables had an impact on SOC1.

Since the vast majority of patients were treated in accordance with SOC2, no significant differences were noted. However, rural sites (97.4%) tended to follow this standard of care marginally less often than urban sites (99.6%).

Discussion

This is the first study describing the HIV stage, prevalence of OIs and standard of care in PLWH/A receiving care in all U.S.-Mexico bordering states of the United States. Most previous studies had been conducted in one clinic or one state only. This is also the first study to assess the impact of SPNS sites on the effect of ethnicity and the treatment history of patients on HIV stage and prevalence of OI at the time of entry into a SPNS site.

The participation proportion to the medical chart review component of the study was a little less than 60%. The five participating SPNS sites reported that most SPNS participants who were asked to participate did consent. Hence, it is likely that those who were not included in the medical chart review study were never asked to participate. Unfortunately, no data on the reasons for the absence of consent for the medical chart review were collected.

In general, PLWH/A who consented to the medical chart review had similar age, gender, sex behaviors, and household living status compared to those who did not consent. However, Hispanics, Site C participants, people without medical insurance and PLWH/A who entered the SPNS program before June 1, 2002, were over-represented. This can partially be explained by the fact that this grant was especially designed to assess the quality of care provided to Hispanic PLWH/A along the U.S.-Mexico border. Hence, consent for

the medical chart component of the study may have been more actively sought from Hispanic SPNS participants as compared to non-Hispanics. This difference by ethnicity explains the overrepresentation of participants without medical insurance consenting to the medical chart review because 72% of Hispanics SPNS participants were uninsured compared to only 36% of the non-Hispanics.¹² Site C recruited the largest proportion of participants compared to other sites. One possible explanation is the multidisciplinary care team approach utilized by this site. The intervention matched a three-person team (one registered nurse–care manager, one case manager, and one peer advocate) to a predetermined client group. This team approach may have been more effective at recruiting patients for participation in the medical chart review. The overrepresentation of patients who enrolled in the SPNS program on or before the inception of the consenting process for the medical chart review may be due to existing patients being asked more often than new patients. It is possible that project staff were more likely to ask participants in a more positive emotional state for their consent to conduct a review of their medical charts. This could explain the slightly higher proportion of participation by patients who reported being HIV-positive but not AIDS at entry into SPNS. However, the fact that there was strong disagreement between self-reported and medical-chart based AIDS status makes it unlikely that this variable introduced any important selection bias in the analysis. Hence, we believe that our estimation of the factors associated with the outcomes of interest, which are all directly or indirectly linked to immunologic status at entry into care, are valid.

Overall, we found that the standard of care regarding the initiation of HAART within 8 weeks of a diagnosis with AIDS was very well followed in all SPNS sites. The recommendation of testing each new patient for their CD4 lymphocytes counts and HIV viral loads was slightly less well followed and varied between SPNS sites. In particular, this recommendation was better followed in urban sites compared to rural sites. This was also true, but to a lesser extent, for the initiation of HAART within 8 weeks of a diagnosis with AIDS. This could be due to better access to testing facilities in urban sites, to less familiarity with standard of care by physicians taking care of PLWH/A in rural areas, funding limitations in rural clinics or to less patients from rural sites coming back for a second appointment within eight weeks of their initial medical visit. Based on a multivariate logistic regression analysis of data from the HIV Cost and Services Utilization Study (HCSUS) conducted in 1996, the odds of having taken HAART when needed (CD4 counts less than 200 cells/mm³) was three times greater among patients receiving care in urban clinics compared to patients receiving care in rural clinics.¹⁷ Our results show that in more recent years, the gap between rural and urban clinics may still be as important as it was in the first years of the introduction of HAART. In a large study of 64 Ryan White Care Act-funded clinics, it was shown that HAART was provided to appropriate patients by 80% of infectious disease physicians and expert generalists but by only 73% of nonexpert generalists. In addition, this standard of care was followed by 82% of physicians following at least 20 patients compared to 73% for physicians following fewer patients needing HAART.¹⁷ This could partly explain our observed difference between rural and urban sites since rural sites tended to be smaller than urban sites.

In a study conducted in Los Angeles County between 1996 and 2000 using data from the Adult and Adolescent Spectrum of Disease (ASD) project, 58% of all "Latinos" had AIDS at enrollment.¹⁹ This proportion is very similar to what we have found in our study in a largely Hispanic group of patients receiving care along the U.S.-Mexico border. In another study where medical charts of HIV patients newly diagnosed in 1998 and who had been receiving care through the Kaiser Permanente Medical Care Program for five years prior to the HIV diagnosis, 49% had AIDS at the time of the HIV diagnosis.²⁰ Hence, it appears that being a member of a private health care program for at least five years only marginally reduced the proportion of patients simultaneously diagnosed with HIV and AIDS. This raises doubts about the presence of a large discrepancy in access to care between people with and without private health care.

There have been some reports that PLWH/A who are Hispanic may seek care at a later stage of their disease than white patients. In a study conducted at the University of Nebraska Medical Center HIV clinic between 1996 and 2001, the authors reported that the median CD4 lymphocytes counts among treatment naïve patients were 220 cells/mm³ among Hispanics and 371 cells/mm³ among whites.²¹ Similar results were obtained in a study conducted in public AIDS clinics in San Mateo County (Northern California) with median CD4 lymphocytes counts of 287 cell/mm³ among immigrants (more than 78% Hispanics) and 333 cells/mm³ among U.S.-born patients.²² We also observed that the median CD4 counts were lower in Hispanics than in non-Hispanics. In addition, our median CD4 lymphocytes counts fell between those found in the two studies described above. In our multivariate analysis, we found that Hispanic patients were about twice as likely to have AIDS at enrollment into SPNS than non-Hispanics in Sites B and E. In other sites, Hispanics and non-Hispanics had similar prevalences of AIDS at entry.

The relative frequency and the prevalence of OIs in the SPNS patients differed somewhat from that reported for three clinics participating in the ASD study of Los Angeles County, California. According to the latest report from the study for patients who were in care between 1996 and 2002, the most frequently reported OI was *P. jiroveci*.²³ The distribution of other OIs was not identical to that found in our study but this is probably due to the fact that our data were collected starting in 2000 and until 2004, or 4 years after the introduction of HAART. In addition, the frequencies of OIs in SPNS patients were usually lower than those reported in ASD. This agrees with a large analysis of hospitalization of HIV patients between 1996 and 2000, which reported a decrease of 39% in hospitalization for OIs between 1996 and 2000.²⁴

Using a univariate analysis, the Nebraska study suggested that the proportion of patients presenting with at least one OI was higher among Hispanics than non-Hispanics.²¹ In the Northern California study, being an immigrant was associated with an "adjusted" odds ratio of 2.98 (95% BCI: 1.21, 7.38) as compared to U.S.-born for the presence of an OI at the time of HIV diagnosis.²² In the later study, being Hispanic was not associated with an increased OR of OIs at HIV diagnosis, probably due to very high confounding between being an immigrant and being Hispanic. This population was different to ours as all patients were newly HIV diagnosed. In addition, it is not clear what variables the authors adjusted for. Nonetheless, our study supports the findings of these studies in two

of the five SPNS sites. It is important to note that ethnical difference was not detected when the SPNS site was not taken into consideration. Hence, results suggesting an effect of ethnicity on the presence of OIs at entry into care should be interpreted with care as they may depend on the clinic where services are provided. In addition, in the Los Angeles study, the incidence rate ratio of developing a new OI was 1.3 (1.0, 1.8) when comparing U.S.-born Latino patients to Latin American-born Latino patients.¹⁹ This means that the variation of the effect of being Hispanic on the prevalence of OI in our cross-sectional study could depend on where the patients were actually born. However, only 9% of Hispanic patients were born in the United States in Site B (the lowest proportion) with 45% U.S.-born in Site E (the largest observed). Hence, there are obviously reasons other than place of birth in our population that are associated with the prevalence of OIs at entry, even after adjusting for potential confounders.

Males were more likely to have AIDS and have had at least one OI at enrollment into SPNS as compared to females. These results agree with a recent review of the literature from developed countries that found that males tended to be diagnosed later in the course of their HIV infection than females.²⁵ Our finding that MSM are less likely to have AIDS at enrollment than heterosexuals also agrees with this review paper. However, unlike what was seen with gender, MSM was not found to be associated with the prevalence of OIs at enrollment after adjusting for ever having had a CD4 lymphocytes count of less than 200 cells/mm³. This suggests that factors independent of CD4 lymphocytes counts are putting males more at risk of acquiring OIs compared to females. This could be associated with occupational exposures to tuberculosis, which has a higher incidence in Hispanics than non-Hispanics in the United States.

It is important to realize that the generalizability of this study may be limited to SPNS-funded sites and not to other health care sites located along the U.S.-Mexico border. Previous assessments by HRSA indicated that, prior to the SPNS initiative, there was very little capacity to provide HIV services along the border region due to financial limitations and provider shortages.²⁶ However, most facilities that were providing some form of HIV services with Ryan White funding became grantees through SPNS. This indicates a dearth of HIV/AIDS service providers in this region. Therefore, our results are likely to apply to clinics serving a considerably large population of PLWH/A along the U.S.-Mexico border.

In conclusion, this study shows that being of Hispanic ethnicity may not fully explain discrepancy in access to care along the U.S.-Mexico border. More analyses of the cohort is planned to assess if the standard of care through time changes according to the SPNS site and ethnicity.

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