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Population-Level Effects of Uninterrupted Health Insurance on Services Use among HIV-Positive Unstably Housed Adults

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Abstract

Health services research consistently confirms the benefit of insurance coverage on the use of health services sought in the United States. However, few studies have simultaneously addressed the multitude of competing and unmet needs specifically among unstably housed persons. Moreover, few have accounted for the fact that hospitalization may lead to obtaining insurance coverage, rather than the other way around. This study used marginal structural models to determine the longitudinal impact of insurance coverage on the use of health services and antiretroviral therapy (ART) among HIV-positive unstably housed adults. The impact of insurance status on the use of health services and ART, were adjusted for a broad range of confounders specific to this population. Among 330 HIV positive study participants, both intermittent and continuous insurance coverage during the prior 3–12 months had strong and positive effects on the use of ambulatory care and ART, with stronger associations for continuous insurance coverage. Longer durations of continuous coverage were less robust in affecting emergency and inpatient care. Race and ethnicity had no significant influence on health services use in this low-income population when confounding due to competing needs were considered in adjusted analyses. Given that ambulatory care and ART are factors with substantial potential impact on the course of HIV disease, these data suggest that securing uninterrupted insurance coverage would result in large reductions in morbidity and mortality. Health care policy efforts aimed at increasing consistent insurance coverage in vulnerable populations are warranted.

Keywords

homeless; HIV; insurance; health services; antiretroviral therapy

Introduction

In the United States, suboptimal patterns of health services use, such as high frequency use of an emergency department and low frequency use of ambulatory services, are especially

common among impoverished, addicted and minority populations (Fleishman, and Hellinger 2003; Gelberg et al. 1997; Kidder et al. 2007; Kushel et al. 2006; Prince et al. 2009; Sadowski et al. 2009; Shapiro et al. 1999). Although rates of hospitalization among HIV-infected persons decreased after the advent of highly active antiretroviral therapy (ART), disadvantaged populations, racial minorities and women still experience disproportionately high rates of hospitalization and less preventive care (Bozzette, and Hellinger 2001; Shapiro et al. 1999). Health insurance coverage has been established as a correlate of needed health care among vulnerable populations (Kushel, Vittinghoff, and Haas 2001). However, studies among adults receiving Medicaid indicate that interruptions in insurance are common and associated with increases in hospitalization for ambulatory care-sensitive conditions (Bindman, Chattopadhyay, and Auerback 2008).

While studies that include large sample populations have established reliable health service trends among all HIV-infected individuals, there are several reasons why results of such studies could be markedly different if considered exclusively among vulnerable persons, including: 1) unique competing needs that are uncommon in general populations (Gelberg, Andersen, and Leake 2000) that change over time and may involve time-dependent confounding (e.g., an individual's CD4 cell count increases their likelihood of starting antiretroviral therapy, but antiretroviral therapy will subsequently influence future CD4 cell counts); 2) disproportionate loss of coverage due to issues like failing to renew eligibility annually (Sommers 2007), which may be exacerbated among homeless persons by the lack of an address to which renewal forms can be sent; and 3) difficulties in navigating the US health care system (Kreider, and Nicholson 1997). In addition, many studies do not account for prior health care, which strongly influences use of future health care (Fleishman et al. 2008), or the fact that some people are assisted with signing up for Medicaid during hospital visits in order to ensure that the hospital receives retrospective payment for health services rendered (Currie 2006), which could reverse study finding interpretations. Finally, many studies rely on medical records for data, which systematically excludes persons outside of the health care system.

The aim of the current study was to determine whether varying levels of insurance continuity or increasing periods of observed coverage duration would affect the use of health services among HIV-positive unstably housed persons.

Methods

Sample design

Methods developed to recruit individuals who transition between states of homelessness and housing instability (Burnam, and Koegel 1988), and used successfully in previous cohort studies regarding HIV among homeless adults (Bangsberg et al. 2001), were employed. Between July 2002 and September 2006, individuals were recruited from San Francisco homeless shelters, free food programs and low-cost residential hotels. All individuals present at these venues on recruitment days were invited to participate in screening activities; those with a positive (on-site) HIV antibody test were invited to participate and reimbursed \$20 for each interview completed.

Data collection

Participants made quarterly visits to a community-based field site, provided blood for CD4 cell count and viral load assessments, and completed a standardized questionnaire to assess factors that might influence health services use. All study procedures were conducted with the approval of the Committee on Human Research at the University of California, San Francisco.

Statistical methods

To make use of multiple measures on the same individuals over time, and address potential time-dependent confounding, the analysis framework used was the marginal structural model (Robins, Hernan, and Brumback 2000). A staggered entry approach was employed where follow-up began at the time of study entry for each individual. Because individuals belonged to different comparison groups as their insurance status changed, estimates yielded by each model represented the average effect of insurance coverage, adjusted for time-dependent characteristics. In order to maintain a consistent sample through time, only individuals who completed interviews during 5 consecutive quarters at any point during the period of observation were included in the sample (1 quarter of insurance only and 4 subsequent quarters of insurance and health services).

Outcome variables: health services and ART use

Study outcomes included the use of ambulatory care (any outpatient visit with a health care provider), inpatient hospitalizations, emergency department services and any use of ART. Previous studies indicate that homeless and drug-using persons provide health services information that is generally valid (Bonin et al. 2007), thus self-reported data were used. Each outcome variable was binary and indicated whether the service or medication was used during the follow-up quarter; each was assessed in a separate statistical model. Similar to the HIV Cost and Services Utilization Study (HCSUS) model of utilization, it was assumed that a need for care existed among HIV-infected persons, and that suboptimal patterns of care were reflected by infrequent use of primary care, any use of an emergency department or inpatient hospitalization, and a failure to take ART when indicated (Shapiro et al. 1999). Models regarding ART use as the outcome were restricted to those eligible for therapy, defined as either being on ART or not being on ART but having a CD4 cell count <350 (HHS 2006). Models regarding health services use were not run separately for persons who did and did not take ART because the ability of marginal structural models to 1) consider the impact of starting and stopping ART, and 2) account for time dependent confounding would be lost.

Main effect: insurance coverage

Consistent with previous studies that acknowledge the importance of gaps in coverage (Short, and Graefe 2003) and coverage continuity (McWilliams et al. 2003), this study defined continuously insured as 90 days of self-reported coverage during an observation quarter, intermittently insured as 1–89 days and continuously uninsured as 0 days of coverage. To determine whether longer durations of insurance coverage affected health services and ART use, sequentially longer periods of observed coverage were tested for each outcome variable. With each additional 3-month period of insurance coverage, being continuously insured or uninsured required being in that respective state for all of the prior observed 3-month periods. To ensure that the exposure preceded the outcome (an assumption of risk and the statistical models that estimate it), the impact of insurance coverage during the preceding and current quarters was assessed for outcomes observed during the current quarter.

Potential confounding variables: the treatment model

A treatment model was estimated to account for confounding of the primary effect of insurance coverage on health services and ART use. The Deletion/Substitution/Addition (DSA) algorithm was used to select confounding variables that would be included in the final treatment models (Sinisi, and van der Laan 2004). Unlike traditional models, influences of potential confounding variables that may change the association between the primary exposure (insurance) and the outcome (health services use) were not estimated for their own

effects. Rather they were included as part of the estimation process to minimize potential confounding on the primary effect. Marginal structural models thus spotlight a single effect on services use with all measured confounders accounted for.

Variables considered as potential confounders of insurance coverage included sociodemographics, such as homelessness (slept on the street or in a homeless shelter)(Table 1), unmet subsistence needs (insufficient access to a bathroom, clothing, food or a safe place to sleep)(Gelberg et al. 1997), social support (Gielen et al. 2001) and receipt of benefits from the AIDS Drug Assistance Program (ADAP); heavy alcohol use (>1 drink/day(NIAAA 1995)); any use of heroin, crack cocaine or methamphetamine; symptoms of withdrawal from heroin, crack cocaine and alcohol, detected in the Diagnostic Interview Schedule-IV (Zimmerman, and Coryell 1988); a history of trauma and history of mental illness detected in the Diagnostic Interview Schedule-IV (Zimmerman, and Coryell 1988); chronic health conditions, including self-reported asthma, diabetes, heart disease, high blood pressure or emphysema; self-reported overall health defined by the SF-36 (Riley et al. 2003) and receipt of ART (Table 1). To account for secular trends, the year of study participation was included. To minimize potential bias from receiving insurance as a result of sign-up assistance during a health care encounter, insurance status and health services at time t-2 were considered as potential confounders for insurance status at time t-1.

Results

There was a 3% refusal rate during recruitment activities, 2% annual loss to follow-up among all study participants and 0.5% annual mortality rate, resulting in a population of 430 individuals. The restriction of the population to persons with at least 5 consecutive quarterly interviews (in sequence) resulted in a sample of 330 individuals and 4,357 quarterly interviews (Table 1). Individuals who were and were not included in the analysis were similar with respect to sociodemographics (e.g., 21% of those included and 19% of those not included were homeless at the first interview of this study period; $p=0.76$), drug use (e.g., 25% of those included and 24% of those not included used cocaine at the first interview of this study period; $p=0.87$), and mental health (median MCS score was 44 for individuals who were and were not included; $p=0.53$). The exception was that a higher proportion of persons who were not included were biologically female (27% of those not included vs. 19% of those included). This difference was a function of over-sampling women later in the study, which did not give newly enrolled women as much opportunity to achieve five study visits.

The median age of study participants was 41 years and 42% were African American (Table 1). During the study period, 54% of respondents reported using crack cocaine, almost 40% reported sleeping on the street or in a homeless shelter, and 51% reported unmet subsistence needs. The median viral load during the study was 3000 (Interquartile Range = 22–40000) and the median CD4 cell count was 330 (Interquartile Range = 173–512). Median SF-36 scores during the study period were 42/100 for physical health and 47/100 for mental health (general population average= 50/100). A history of physical trauma was reported by 52% of study participants, depression by 35% and manic episodes by 22%.

Insurance status

The vast majority of study participants (97%) reported some level of health insurance coverage during at least one interview for the follow-up period. Among those insured, 94% had either or both Medicaid and Medicare. Among those who reported Medicaid coverage only, 30% subsequently reported no insurance (i.e., “lost insurance”); among those who lost coverage during the study period, 82% subsequently regained some level of coverage for at least one additional study quarter (Table 2). Considering changes in insurance continuity,

3% of study participants were continuously uninsured, 32% intermittently insured and 65% continuously insured during the entire 12-month study period.

Health care use

Ambulatory care was used by an average of 77% of participants each quarter. Both continuous and intermittent insurance increased the odds of having an ambulatory care visit, relative to having no insurance, for all durations of health coverage. The odds of using ambulatory care increased with increasing durations of both observed intermittent coverage and observed continuous coverage. However, continuous insurance throughout the observation period conferred the highest relative odds of ambulatory care use (Table 3). After one year of observed health insurance coverage, adjusted analysis indicated that the odds of using ambulatory care were 2.95 for the continuously insured compared to the continuously uninsured (95% Confidence Interval [CI]=1.75, 4.94).

Inpatient care was used by an average of 10% of participants each quarter. While the effect of insurance was consistently positive for inpatient care, in all but one case it did not reach a level of statistical significance (Table 3). There were no consistent patterns of increasing odds with increasing durations of insurance for either intermittently insured or continuously insured individuals.

Emergency department care was used by an average of 17% of participants each quarter. The odds of emergency care that did not end in hospitalization were over 80% higher for continuously insured persons after 3 and 6 months of coverage; however, this trend was not as strong after 9 months of coverage. In addition, continuously insured persons had higher odds of emergency care than intermittently insured persons in most cases (Table 3).

ART was used by an average of 54% of the 259 persons eligible each quarter. The relative odds of using ART among intermittently insured persons were over 2 times higher than the uninsured, but consistently 3 times higher among continuously insured persons (Table 4). The effect of continuous insurance changed only slightly with varying durations of coverage (Range of adjusted OR = 3.20–3.38).

Confounding variables included in the final treatment models were CD4 cell count, viral load, ART use in the previous quarter, primary care use in the previous quarter, insurance in the previous quarter, age, monthly income, year of observation and crack cocaine withdrawal. Variables that have been implicated in previous studies, but not observed to be significant confounders of the association between health insurance and services use in the current study included female sex, non-Caucasian race/ethnicity, heavy alcohol use, drug use, chronic health conditions, trauma, mental illness and social support.

Discussion

To our knowledge, this is the first study to estimate the population effects of insurance coverage on the use of health services and ART among community-recruited HIV-positive unstably housed individuals. We conclude that insurance continuity and, to a lesser extent, increasing durations of observed coverage were positively associated with increased health services use in this population. Ninety-five percent of study participants reported some type of insurance during at least one interview and 28% had a break in coverage. These results support conclusions reached by Sommers et al. regarding the retention of Medicaid and SCHIP recipients, namely that enrolling eligible persons is not the primary program limitation, rather that public insurance programs need to retain those enrolled (Sommers 2007). Conducted in San Francisco, this study represents the impact of insurance coverage among a high-need population in a resource-rich area. Therefore, we would expect that

ambulatory care use and ART use among persons with one year of continuous coverage would be at least 3 times higher than those without insurance coverage (Tables 3 and 4), and likely more in resource-poor areas where the uninsured have fewer options (Buchmueller et al. 2005).

Our finding that consistent and longer durations of insurance coverage did not result in lower odds of inpatient hospitalization (Table 3) is consistent with earlier studies (Buchmueller et al. 2005; Hahn 1994; Long, Marquis, and Rodgers 1998). Taken together, these results suggest that while inpatient care is suboptimal, it is necessary, and persons without insurance are unable to receive either necessary or optimal care. This hypothesis is supported by data suggesting that while Medicaid recipients access services more frequently, their uninsured counterparts experience poorer health status resulting in higher service need once care is finally sought (Gilman, and Green 2008).

Similar to inpatient care, the findings presented here do not support the hypothesis that consistent and longer durations of insurance coverage result in lower odds of emergency department use. This pattern of care seeking among insured patients may reflect an inability to obtain timely appointments with primary care providers (Newton et al. 2008) or difficulties in establishing clinically appropriate care patterns (Sudano, and Baker 2003). This pattern of care may also reflect recent findings by Rodriguez et al., which suggest that emergency department visits are often made to address hunger, shelter, and safety rather than medical need (Rodriguez et al. 2009). While the current study adjusted for competing and unmet need during each 3-month interval, it did not account for need at the time of emergency department visits. Future studies among impoverished people may be strengthened by including data regarding both medical and social reasons for each emergency department visit.

Confounding variables included in the final treatment models were CD4 cell count, viral load, ART use in the previous quarter, primary care use in the previous quarter, insurance in the previous quarter, age, monthly income, year of observation and crack cocaine withdrawal. A failure to include factors such as heroin withdrawal or heavy alcohol use in the final treatment model does not indicate that these issues are unimportant with regard to services use; rather it indicates that, on a population-level, these issues do not confound the association between insurance status and services use. The confounding of the association between insurance and the use of services by cocaine withdrawal suggests that drug treatment and attempts to reduce drug-related withdrawal may lead to improved levels of health service use and thus improved health among HIV-infected unstably housed persons. Additionally, after controlling for changes in insurance, withdrawal and income, neither race nor gender confounded the relationship between insurance status and health services use. This result extends earlier findings indicating that racial minorities and women experience the least optimal health services use among HIV-infected persons (Shapiro et al. 1999) by showing that, when adjustment is made for confounding due to competing needs which may disproportionately effect people of color and women, ethnicity and gender have less influence on health services use.

The results of this study should be considered in light of potential limitations. First, study participants may have underreported behaviors such as drug use, due to social desirability, or health services use, due to complexities or uncertainty in the system. However, in this case, we would expect results to have been biased toward the null, indicating that effects are at least as strong as those reported here. Second, restricting the sample population to persons with 5 consecutive interviews may have biased the population to higher functioning individuals. Comparisons of persons included and not included failed to show significant differences, suggesting that any resulting bias was minimal; however, it is possible that

unmeasured differences exist. Third, we attempted to minimize biases related to obtaining insurance during a hospital visit by adjusting for insurance and health services in the previous quarter; however, residual confounding may exist. Finally, regardless of insurance status, there are a variety of factors that may predispose some individuals to use more services than others (Gelberg et al. 2000). By adjusting for insurance and health service use in the previous quarter, we minimized potential confounding due to such predisposing factors. Strengths of this study include a reproducible community-based sample of unstably housed persons, including those in and outside of the health care system; frequent data collection over a 12-month observation period; detailed information on a broad spectrum of issues specific to marginalized populations; and statistical control for time-dependent confounding.

Economic crises that lead to homelessness often reorder priorities among HIV-infected persons, deemphasizing consistent medical care (Riley et al. 2007). The results presented here suggest that consistent insurance may counteract some of these barriers and, while the impact of inconsistent insurance is not as strong, it is still effective. Given the array of competing and unmet needs in this population, maintaining consistent health insurance, much like consistent medical care, is not likely to be a priority for many unstably housed individuals. The seemingly insignificant nature of insurance coverage in the context of poverty, and additional difficulties such as being located for insurance recertification when an individual is homeless, suggest the need for health care policy efforts aimed at decreasing barriers to consistent coverage in vulnerable populations.

Costs and benefits associated with extending health insurance coverage depend on the ways in which health insurance affects the utilization of medical care, and these influences are expected to vary across different populations (Buchmueller et al. 2005). The results presented herein indicate that for HIV-infected unstably housed persons, a 3-fold potential increase in use of ambulatory services and ART are expected when insurance coverage is consistent. Sustained use of ART is the strongest predictor of survival among HIV-infected unstably housed persons (Riley et al. 2005), and increased costs associated with initiating antiretroviral therapy are offset by marked decreases in costs for overall HIV care (Hill, and Gebo 2007; Merito et al. 2005). Thus, these results suggest that, despite a host of competing needs in this population, consistent insurance coverage strongly influences factors with the most potential to reduce morbidity and mortality as well as the associated costs among unstably housed persons.

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Table 1

Characteristics of HIV-Infected Unstably Housed Adults living in San Francisco, CA, 2002–2006 (N=330)

SOCIOECONOMIC	
Age	Median=41
Graduated high school	70%
Female sex	19%
African American	42%
Caucasian	40%
Latino	7%
Other	11%
Married	36%
Any minor children living at home	1%
Incarcerated during the study period	22%
Homeless (slept on the street or in a homeless shelter) during the study period	39%
DRUG AND ALCOHOL USE DURING THE STUDY PERIOD	
Crack cocaine	54%
Symptoms of cocaine withdrawal	20%
Heroin	28%
Symptoms of heroin withdrawal	16%
Methamphetamine	42%
Heavy alcohol	75%
Symptoms of alcohol withdrawal	10%
History of physical trauma	52%
History of non-physical trauma	82%
History of depression	35%
History of schizophrenia	3%
History of manic episodes	22%
History of PTSD	16%
SUBSISTENCE NEEDS AND SOCIAL SUPPORT DURING THE STUDY PERIOD	
Employed	28%
Monthly income	Median=\$822
Difficulty meeting subsistence needs (insufficient access to a bathroom, clothing, food or shelter)	51%
Reports close friend/confidant	95%
Social network size	Median=1
Social/instrumental support during study period	95%
HEALTH	
CD4 cell count	Median=330
Viral load	Median=3000
Any chronic health condition (asthma, diabetes, heart disease, high blood pressure or emphysema) during study period	32%

PCS score (overall physical health composite score) during study period

Median=42

MCS score (overall mental health composite score) during study period

Median=47

Table 2

Insurance Coverage among HIV-Infected Unstably Housed Adults Living in San Francisco, CA, 2002–2006
(N=330)

Type	Any Level of Insurance Type During Study Period	Lost Insurance Type (among those with Insurance Type During Study Period)	Regained Insurance Type (among those who Lost Coverage Type)
Any Insurance	97%	23%	80%
Medicaid only	89%	30%	82%
Medicare only	12%	79%	90%
Both Medicaid and Medicare	39%	84%	76%
Either Medicaid or Medicare or Both	94%	23%	83%
Veteran's Benefits	15%	84%	60%
Private	10%	91%	37%

* The subject subsequently reported no insurance of any kind at a later point; Ω Regained any type after losing coverage.

Odds of Services Use by Continuously and Intermittently Insured Persons Relative to Continuously Uninsured Persons (N=330)

Table 3

Duration of Insurance Coverage	Continuity Level of Insurance Coverage	Estimate (Odds Ratio)	Unadjusted		Estimate (Adjusted Odds Ratio)	95% Confidence Interval
AMBULATORY CARE						
3 months	Intermittent	1.05	(0.72,1.52)	1.85	(1.07,3.09) [‡]	
	Continuous	1.47	(1.05,2.06) [‡]	2.34	(1.47,3.58) [‡]	
6 months	Intermittent	1.57	(1.08,2.28) [‡]	1.69	(0.99,2.80)	
	Continuous	2.21	(1.51,3.25) [‡]	2.52	(1.53,4.01) [‡]	
9 months	Intermittent	2.14	(1.37,3.36) [‡]	1.71	(1.01,2.82) [‡]	
	Continuous	3.04	(1.93,4.78) [‡]	2.68	(1.60,4.41) [‡]	
12 months	Intermittent	2.78	(1.71,4.51) [‡]	2.11	(1.25,3.47) [‡]	
	Continuous	3.86	(2.34,6.35) [‡]	2.95	(1.75,4.94) [‡]	
INPATIENT HOSPITALIZATION						
3 months	Intermittent	1.51	(0.99,2.29)	2.03	(0.99,4.85)	
	Continuous	1.55	(1.09,2.21) [‡]	1.78	(1.06,3.91) [‡]	
6 months	Intermittent	1.12	(0.69,1.84)	1.42	(0.73,3.39)	
	Continuous	1.46	(0.94,2.27)	1.59	(0.95,3.53)	
9 months	Intermittent	1.62	(0.92,2.85)	1.78	(0.98,4.48)	
	Continuous	1.75	(0.99,3.09)	1.69	(0.99,4.18)	
12 months	Intermittent	1.93	(0.98,3.79)	1.75	(0.92,4.47)	
	Continuous	1.80	(0.91,3.58)	1.53	(0.90,3.79)	
EMERGENCY SERVICES THAT DID NOT RESULT IN A HOSPITALIZATION						
3 months	Intermittent	0.77	(0.40,1.48)	1.90	(0.88,4.31)	
	Continuous	1.76	(0.97,3.19)	1.82	(1.06,3.84) [‡]	
6 months	Intermittent	0.75	(0.40,1.39)	2.05	(0.98,4.77)	
	Continuous	1.52	(0.81,2.85)	2.07	(1.11,4.98) [‡]	

Duration of Insurance Coverage	Continuity Level of Insurance Coverage	Estimate (Odds Ratio)	95% Confidence Interval	Adjusted ϕ	
				Unadjusted	Adjusted
9 months	Intermittent	0.60	(0.29,1.25)	1.42	(0.67,3.43)
	Continuous	1.23	(0.61,2.47)	1.90	(1.00,4.55)
12 months	Intermittent	0.51	(0.23,1.13)	1.03	(0.50,2.45)
	Continuous	1.13	(0.53,2.40)	1.84	(0.94,4.41)

[‡] Confidence interval considered statistically significant at $\alpha = 05$;

[∅] Confounding variables included in the final treatment models were CD4 cell count, viral load, ART use in the previous quarter, primary care use in the previous quarter, insurance in the previous quarter, age, monthly income, year of observation and cocaine withdrawal.

Table 4

Odds of Antiretroviral Use by Continuously and Intermittently Insured Persons Relative to Continuously Uninsured Persons (n=259)^{*}

Duration of Insurance Coverage	Continuity Level of Insurance Coverage	Estimate (OR)	Unadjusted		Adjusted ϕ	
			Estimate (OR)	95% Confidence Interval	Estimate (AOR)	95% Confidence Interval
3 months	Intermittent	1.19	(0.78,1.81)		2.60	(1.03,6.72) [‡]
	Continuous	1.43	(0.94,2.16)		3.20	(1.33,7.33) [‡]
6 months	Intermittent	1.42	(0.8,2.51)		2.82	(1.10,7.28) [‡]
	Continuous	1.74	(0.97,3.11)		3.31	(1.24,8.34) [‡]
9 months	Intermittent	1.91	(0.89,4.09)		2.84	(1.04,7.35) [‡]
	Continuous	2.21	(1.02,4.81) [‡]		3.38	(1.24,8.99) [‡]
12 months	Intermittent	2.50	(0.97,6.43)		2.66	(0.93,6.92)
	Continuous	2.84	(1.08,7.48) [‡]		3.34	(1.15,9.18) [‡]

^{*} Only individuals taking or eligible to take antiretroviral medication were included (CD4 cell count < 350 cells/ μ l);

[‡] Confidence interval considered statistically significant at $\alpha = 0.05$;

ϕ Confounding variables included in the final treatment models were CD4 cell count, viral load, ART use in the previous quarter, primary care use in the previous quarter, insurance in the previous quarter, age, monthly income, year of observation and cocaine withdrawal.