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The impact of unstable housing on emergency department use in a cohort of HIV-positive people in a Canadian setting

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Abstract

The social-structural challenges experienced by people living with HIV (PHA) have been shown to contribute to increased use of the Emergency Department (ED). This study identified factors associated with frequent and non-urgent ED use within a cohort of people accessing antiretroviral therapy (ART) in a Canadian setting. Interviewer-administered surveys collected socio-demographic information; clinical variables were obtained through linkages with the provincial drug treatment registry; and ED admission data were abstracted from the Department of Emergency Medicine database. Multivariate logistic regression was used to compute odds of frequent and non-urgent ED use. Unstable housing was independently associated with ED use (adjusted odds ratio [AOR]=1.94, 95% confidence interval [CI] 1.24–3.04), having three or more ED visits within 6 months of interview date [AOR: 2.03 (95% CI: 1.07–3.83)] and being triaged as non-urgent (AOR=2.71, 95% CI: 1.19–6.17). Frequent and non-urgent use of the ED in this setting is associated with conditions requiring interventions at the social-structural level. Supportive

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housing may contribute to decreased healthcare costs and improved health outcomes amongst marginalized PHA.

Keywords

HIV; Emergency Department; Antiretroviral Therapy; marginalized Populations; housing

Introduction

Early in the history of HIV/AIDS, patients primarily presented in the emergency department (ED) with AIDS-related illnesses (Kozak, McCarthy, & Moien, 1993; Talan & Kennedy, 1991; Venkat et al., 2008). Following the advent of highly active antiretroviral therapy (HAART), HIV-related morbidity and mortality have decreased and life expectancy has increased (Lima et al., 2007; Palella Jr et al., 1998; Sabin et al., 2006), transforming the challenges experienced by people living with HIV (PHA). Consequently, emergency physicians have had to adapt to a radically transformed HIV/AIDS landscape. The growing number of people living longer with HIV has brought to light new issues regarding the cumulative effects of living many years with the virus. Particularly, the social-structural challenges experienced by many chronically ill populations—poverty, housing instability, food insecurity, addictions and mental health comorbidities—exacerbate existing health issues and have been shown to contribute to frequent ED use (Betz et al., 2005; Hunt, Weber, Showstack, Colby, & Callahan, 2006; Knowlton et al., 2001; Kushel, Gupta, Gee, & Haas, 2006; Masson, Sorensen, Phibbs, & Okin, 2004; Tashima et al., 2001; Venkat, Shippert et al., 2008), as have psychosocial issues related to lack of support, stigma, marginalization, loneliness and distress (Bernstein, 2006; Dunlop, Coyte, & McIsaac, 2000; Geller, Janson, McGovern, & Valadini, 1999; Koziol-McLain, Price, Weiss, Quinn, & Honigman, 2000; Lowe et al., 2005; Mandelberg, Kuhn, & Kohn, 2000; Padgett & Brodsky, 1992).

In addition to highlighting the complex life pressures that persist despite the availability of effective therapies in the HAART era, ED use patterns are also a reflection of degree of accessibility of care. Use of the ED as an entry point into care, particularly in the context of universal access to antiretroviral therapy (ART) and HIV-specific care, suggests the care system may not be responsive to the needs of marginalized populations. In order to improve care for vulnerable populations and to optimize allocation of resources, it is critical to better understand the drivers of frequent and non-urgent ED use. Following the same line of inquiry as previous studies (Fairbairn et al., 2011; Venkat, Shippert et al., 2008), the objective of this analysis was to describe the factors associated with frequent and non-urgent ED use in a cohort of hard-to-reach HIV positive individuals on ART using St. Paul's Hospital in downtown Vancouver, British Columbia (BC).

Methods

Study design and participant enrollment

The Drug Treatment Program (DTP) at the BC Centre for Excellence in HIV/AIDS is mandated by the government of BC to distribute ART free of charge to all eligible PHA. The DTP distributes medications in accordance with the BC Therapeutic Guideline Committee, which have remained consistent with those from the International AIDS Society-USA between 1996 and the last revision in 2010 (Thompson et al., 2010).

The distribution of ART through the DTP has been previously described in detail (Hogg et al., 1998). In brief, physicians enroll individuals into the DTP when they are first prescribed ART. The enrolling physician must complete a drug request form, which acts as a legal prescription and is used to compile baseline information including past HIV-specific drug history, CD4 cell counts, plasma HIV RNA levels, current drug requests, and physician data. Physicians typically monitor persons receiving ART at intervals no longer than 3 months, at which time prescriptions are renewed or modified. For all DTP patients, a complete prospective profile of ART is maintained, including the medications prescribed, the amount dispensed, the dose and the prescription-fill dates (2009).

Individuals enrolled in the DTP are eligible to participate in the Longitudinal Investigations into Supportive and Ancillary health services (LISA) study. The aim of the LISA study is to examine the experiences of hard-to-reach HIV infected individuals who have accessed ART in BC. The study integrates cross-sectional socio-demographic information, based on an interviewer-administered survey, with clinical data obtained through longitudinal linkages with the DTP. To be considered eligible for the LISA study, participants must be 19 years of age or older at the time of study enrollment and able to provide informed consent. Study participants were actively recruited through letters distributed via ART-prescribing physicians and pharmacists, by word-of-mouth and through advertisements at HIV/AIDS service organizations throughout the province. The LISA study is closely representative of people on treatment by health authority in BC. Particular sub-populations were deliberately oversampled in order to sufficiently power sub-analyses. Consequently, women, people who inject drugs and people identifying as Aboriginal are overrepresented in the LISA study.

Study instrument and ethical approval

Cross-sectional socio-demographic data on LISA participants are collected through a comprehensive interviewer-administered survey. Clinical variables were obtained through longitudinal linkages with the DTP administrative database. The survey took approximately 60 minutes to complete and participants were offered a \$20 honorarium as compensation for their time.

The LISA study, funded by the Canadian Institutes of Health Research, has been granted ethical approval from the Research Ethics Boards of: the University of British Columbia/ Providence Health Care, Simon Fraser University and the University of Victoria. As part of the informed consent process, permission is requested to link personal identifiers to health service registries. For the purposes of this analysis, emergency department admission

information was abstracted from the Department of Emergency Medicine database at St. Paul's Hospital.

Study setting and inclusion criteria

St. Paul's is a large hospital located in the downtown core of Vancouver located in close proximity to two neighbourhoods that have emerged as the epicenters of the city's HIV epidemic. The Downtown Eastside (DTES) is an inner city neighbourhood characterized by high levels of poverty and unemployment, lack of affordable housing, poorly maintained single room occupancy hotels (SRO) and high rates of homelessness. These social conditions underlie the high rates of addictions, mental health disorders, violence, crime and sex work that are also prevalent in the DTES (Buxton & Canadian Community Epidemiology Network on Drug Use, 2005). In contrast, the West End is a middle-class urban neighbourhood known for its high concentration of gay men (E. Wood et al., 2000). In the beginning of the epidemic, the West End had one of the highest AIDS mortality rates in Canada (Burr, 1995) and currently houses a number of HIV services (Context Research Ltd., 2011).

Inclusion criteria for this analysis, illustrated in Figure 1, were having a baseline CD4 and viral load measurements within 6 months prior to ART initiation, and having initiated treatment before 31 May 2009. This analysis is restricted to individuals whose most recent address prior to their interview date was within the boundaries of the Vancouver Coastal Health Authority (VCHA).

Outcome variable

The main outcome in this analysis is SPH ED use in the 6 months prior to interview date, defined as ever (1) vs. never (0). The secondary outcome is frequency of ED use, dichotomized based on the distribution of visits as frequent (≥ 3) vs. moderate (<3). The third outcome is acuity level on the Canadian Triage and Acuity Scale (CTAS). The CTAS defines the patient's need for timely care and allows ED staff to evaluate their acuity level, resource needs and performance against operating objectives. The CTAS, first described in 1988 (Beveridge et al., 1998) is a five level triage scale that has demonstrated predictive validity (Jiménez et al., 2003) and inter-rater reliability (Beveridge, Ducharme, Janes, Beaulieu, & Walter, 1999). At the first patient encounter the triage nurse assigns a CTAS level between 1 and 5, representing the following classifications: resuscitation, emergent, urgent, less urgent and non-urgent. The lower the number, the higher the acuity. For the purposes of this analysis, acuity level is dichotomized as urgent (levels 1–3) and non-urgent (levels 4–5). Participants who had multiple visits with varying acuity level scores were assigned the lower acuity level (representing the more urgent visit).

Explanatory variables

Self-reported socio-demographic variables included in this analysis are: age, gender, Aboriginal ancestry, education, employment, provincial income assistance, housing stability and food security. Unstable housing was defined as living in a SRO, shelter, hostel, treatment centre, prison, or having no fixed address at the time of interview. Food insecurity

was measured using a modified version of the Radimer and Cornell questionnaire (Kendall, Olson, & Frongillo, 1995; Radimer, Olson, & Campbell, 1990).

This analysis also considered abuse and incarceration in the 6 months prior to the interview date, history of mental health disorder, hepatitis C co-infection, whether the participant's doctor was involved in their routine HIV care, and current drug use. Current injection drug use was defined as injecting cocaine, crack cocaine, heroin, speedball (cocaine and heroin), methamphetamine or anabolic steroids in the 3 months preceding the interview date. Current street drug use indicates any use of heroin, crack, methamphetamines or speedball in the 3 months preceding the interview date.

Clinical variables included in this analysis are: CD4 count less than 200 cells/mm³ at time of interview, undetectable viral load, defined as two consecutive viral load measures of <50 copies/mL, and optimal adherence, defined as adhering to 95% of prescribed treatment. As previously described (Racey et al., 2010), we estimated adherence to ART based on refill compliance, calculated as the number of days of antiretroviral medications dispensed, divided by the number of days of follow-up during the 12 months prior to interview date, and expressed as a percent.

Statistical analysis

Data are presented within categories as frequencies [n (%)] or as median and interquartile range (IQR). Categorical variables were compared using Chi-square test and Fisher's exact test and continuous variables were compared using Wilcoxon rank-sum test. Univariate analyses were conducted to identify variables associated with ED visit and obtain baseline characteristics of ED users in relation to nonusers in this cohort. A logistic regression with a backward-selection procedure based on the Akaike Information Criterion (AIC) was used to select the variables to be included in the final model. Variables which were significant at $p < 0.05$ in the univariate analyses were candidates for inclusion in the multivariable logistic regression model. All analyses were performed using SASTM software version 9.1 (SAS Institute, 2008).

We abstracted from St. Paul's Department of Emergency Medicine data pertaining to the ED visits for the 153 LISA participants with record of ED use in the 6 months prior to interview date. There were a total of 393 visits, with a median of two visits per person (IQR 1–3).

Results

Characteristics of study population

Between July 2007 and January 2010 over 1000 participants were interviewed, of which 917 had complete clinical data within the DTP. A comparison of LISA participants and DTP patients confirmed that the LISA study oversampled hard-to-reach HIV infected individuals, including those with a history of injection drug use (71.3% LISA vs. 34.8% DTP), women (27.4% LISA vs. 17.7% DTP) and people reporting Aboriginal ancestry (31.5% LISA vs. 10.5% DTP). Differences were statistically significant at $p < 0.001$. This suggests that study participants may experience more vulnerability than the general population of HIV-positive individuals on treatment in BC.

The analysis presented herein is based on 493 individuals who met the inclusion criteria. The median age at enrollment was 45 (IQR 40–52), 371 (75.3%) were male, 176 (35.7%) reported having Aboriginal ancestry and 186 (37.8%) reported being homeless or residing in unstable conditions at the time of interview.

A total of 153 (31.0%) participants had a record of SPH ED use in the 6 months prior to interview, of whom 51 (10.3%) had three or more ED visits during that period. The 153 participants who used the ED had a total of 393 visits, of which 207 were triaged as non-urgent (CTAS levels 4 or 5). Table 1a illustrates the demographic and clinical characteristics of participants who used the ED versus those who did not use the ED; Table 1b illustrates the characteristics of participants for whom there is record of three or more ED visits; and Table 1c illustrates the characteristics of participants who were triaged as non-urgent.

As shown in Table 2a, unstably housed respondents show an increased likelihood of ED utilization [adjusted odds ratio (AOR): 1.87 (95% confidence interval (CI): 1.20–2.93)], as did those diagnosed with a mental health disorder [AOR: 1.58 (95% CI: 1.02–2.45)] and with a history of hepatitis C infection [AOR: 2.47 (95% CI: 1.48–4.12)]. Undetectable viral load is the sole clinical marker that was significantly associated with ED utilization, with respondents who were virally suppressed being half as likely to present to the ED [AOR: 0.50 (95% CI: 0.32–0.79)].

Similar results emerge in Table 2b for the 51 respondents who utilized the ED three times or more. Individuals who reported unstable housing were twice as likely to frequently present to the ED [AOR: 2.03 (95% CI: 1.07–3.83)] and those with a history of hepatitis C were nearly three times as likely [AOR: 2.61 (95% CI: 1.22–5.59)]. Viral suppression was associated with a lowered likelihood of having three or more visits to the ED [AOR: 0.36 (95% CI: 0.19–0.67)].

Table 2c shows participants were more likely to have presented for issues classified as ‘less urgent’ or ‘non urgent’ if they were unstably housed [AOR: 2.71 (95% CI: 1.19–6.17)]. Provincial Income Assistance showed a protective effect for this outcome [AOR: 0.31 (95% CI: 0.10–0.93)].

Discussion

Unstable housing was the sole variable independently associated with all three outcomes of interest. Additional factors that emerged as significant included diagnosis with a mental health disorder and hepatitis C infection. Having an undetectable viral load and access to Income Assistance had a protective effect.

ED use patterns must be situated within an understanding of the socio-economic and structural factors that mediate a person’s entry to, and journey through, the care system (Browne et al., 2011). While frequent and non-urgent use of the ED was historically characterized as ‘inappropriate’ (Bernstein, 2006), the present analysis provides further evidence that the ED may act as an important safety net for marginalized populations (Bernstein, 2006; Ionescu-Ittu et al., 2007; Malone, 1998; Ragin et al., 2005; Richardson & Hwang, 2001).

Our results add to the growing body of literature that shows housing is an important determinant of a patient's overall well-being, including their relationship with the healthcare system. Intensive medical service utilization is widely documented amongst populations of homeless and unstably housed PHA, who are more likely to frequent emergency departments (Arno et al., 1996; Arno et al., 1996; D'Amore, Hung, Chiang, & Goldfrank, 2001; Kidder et al., 2007; Kim, Kertesz, Horton, Tibbetts, & Samet, 2006; Kushel et al., 2006; Mandelberg et al., 2000; Masson et al., 2004; Palepu et al., 1999), and utilize inpatient services (Cunningham et al., 2007; Kerr et al., 2005; Pulvirenti et al., 2003; Sadowski, Kee, VanderWeele, & Buchanan, 2009; Weissman et al., 1996) and less likely to use ambulatory care (Arno et al., 1996). In addition, homeless PHA on average have longer and more frequent hospital visits than those who are stably housed (Arno et al., 1996; Bonuck & Arno, 1997; Kidder et al., 2007; Masson et al., 2004; Smith et al., 2000). These outcomes are related to a host of barriers that interfere with disease management of unstably housed PHA (Douaihy, Stowell, Bui, Daley, & Salloum, 2005; Gelberg, Gallagher, Andersen, & Koegel, 1997), including regularly attending health care appointments (Schwarcz et al., 2009), having a safe space to refrigerate medications, and adhering to instructions to take medication with food (Bamberger et al., 2000).

Allocating resources with a view of housing as healthcare may alleviate stress on acute care units and improve health outcomes. A randomized control trial in Chicago showed that chronically ill homeless people treated with supportive housing achieve better health outcomes, at a lower cost, than those not immediately enrolled in stable housing. For every 100 homeless adults offered the intervention, expected benefits included 49 fewer hospitalizations, 270 fewer hospital days and 116 fewer ED visits (Sadowski et al., 2009). In another recent study, 24% of homeless participants cited hunger, safety concerns and lack of shelter as reasons they came to the ED (Rodriguez, Fortman, Chee, Ng, & Poon, 2009), providing further evidence that provision of subsistence needs, such as food, shelter and safety may mitigate non-urgent ED use. Unstable housing was associated with lower acuity scores in our sample, which aligns with these findings. Conversely, recipients of Income Assistance were less likely to be triaged as non-urgent upon presentation in the ED in this analysis. One explanation for this is that recipients of Income Assistance may be presenting with intentional overdoses, which is categorized as a Level 2 emergent condition in the CTAS. The association between Income Assistance and acuity may be a reflection of the way in which acuity level was operationalized in this analysis, and warrants exploration of the nature of the discharge diagnoses in this sample.

Diagnosis with a mental health disorder and history of hepatitis C infection were also significantly associated with frequent ED use, suggesting that harm reduction and psychosocial support services may play an important role in averting non-urgent ED visits. However, the present analysis showed no difference in the likelihood of ED use between participants who saw a primary care physician for their HIV care and those who did not, echoing studies that have shown that frequent and non-urgent users are not using the ED as a substitute for their primary care (Hunt et al., 2006; Kerr et al., 2005; Zuckerman & Shen, 2004). Evidence of marginalized populations feeling discomfort with primary care settings (Bernstein, 2006; Browne et al., 2011; Malone, 1998; Mustard, Kozyrskyj, Barer, & Sheps,

1998; Sarver, Cydulka, & Baker, 2002) suggests further research is needed to elucidate the barriers this population experiences despite their access to primary and ancillary care.

Participants were also less likely to have presented at the ED and be frequent users if they were virally suppressed. Antiretroviral therapy plays a powerful role in preventing disease progression and reducing AIDS-related mortality (Hogg et al., 1998) and is an important factor in this analysis. With one exception (Fairbairn et al., 2011), investigations of ED utilization patterns have been conducted in areas without universal access to ART and did not include the nature of access to ART as an explanatory covariate. It is thus possible these analyses were unable to distinguish the effect of socio-economic variables on ED use independent of the confounding influence of financial need. Our study population has access to a universal, publicly funded health care system where medically necessary services, including ART and laboratory monitoring, are provided free of any charge or co-payments. By conducting our study in this context we have identified an effect of social-structural factors on ED use independent of financial constraint. This is further evidence that in the province of BC, where direct financial barriers to HIV-specific care are removed, marginalized individuals continue to bear a disproportionate burden of HIV/AIDS-related morbidity and mortality (Joy et al., 2008; Strathdee et al., 1998; E. Wood et al., 2006).

Limitations

The LISA cohort is a non-probability sample, specifically enriched to allow evaluation of frequently underrepresented hard-to-reach populations. Further, a modest honorarium provided to participants might have led to over-sampling of individuals in need of financial gain. As such, while the study does not represent the entirety of individuals accessing ART in BC, it does reflect the reality of hard-to-reach HIV infected individuals in an urban setting. By linking with ED data provided by St. Paul's only, we limited our analysis to people living in the VCHA catchment area. If participants residing in the catchment area used another hospital, ED use would be under reported. Finally, because of the cross-sectional study design we were unable to determine causality or map the biological and social pathways linking ED use and clinical/socio-demographic variables.

Conclusions

Frequent and non-urgent use of the ED in this universal health care setting is associated with social, structural and environmental barriers that persist despite this population's access to medical care and support services. There is a public health and economic imperative to respond to the well-established body of evidence that suggests emergency department utilization is driven by socio-economic disparity, among other factors. Supportive housing, among other interventions at the social-structural level, may contribute to improved health outcomes and decreased health care costs.

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Table 1

a Characteristics of LISA participants residing in the boundaries of the Vancouver Coastal Health Authority in the 6 months preceding interview date (N=493)			
Demographic and clinical characteristics	No record of ED use N=340, n (%)	At least 1 ED visit N=153, n (%)	p-value
Age			
Median (IQR)	46 (42–52)	44 (39–50)	0.002
<i>missing values=1</i>			
Gender			
Male	264 (77.6)	107 (69.9)	0.072
Ethnicity			
Aboriginal	109 (32.1)	67 (43.8)	0.015
Education past high school	219 (64.6)	70 (45.8)	<0.001
<i>missing values=1</i>			
Currently unemployed	250 (73.5)	137 (89.5)	<0.001
Provincial income assistance	243 (71.5)	133 (86.9)	<0.001
Ever diagnosed with a mental health disorder	182 (53.5)	102 (66.7)	0.008
Current injection drug use	65 (19.2)	60 (39.5)	<0.001
<i>missing values=3</i>			
Current street drug use	134 (39.6)	95 (62.5)	<0.001
<i>missing values=3</i>			
Unstable housing	102 (30)	84 (55.3)	<0.001
<i>missing values=1</i>			
Hepatitis C	170 (50.1)	119 (78.3)	<0.001
<i>missing values=2</i>			
Family Doctor is involved in routine HIV care	253 (74.4)	120 (78.4)	0.365
Attacked in past 6 months	48 (14.2)	41 (27)	<0.001
<i>missing values=3</i>			
Incarcerated in past 6 months	13 (3.8)	17 (11.2)	0.004
<i>missing values=3</i>			
Individual food insecure	176 (51.8)	84 (55.3)	0.495
<i>missing values=1</i>			
CD4<200 (at time of interview)	53 (17.9)	41 (30.8)	0.004
<i>missing values=64</i>			
Undetectable viral load	250 (75.5)	92 (61.7)	0.003
<i>missing values=13</i>			
Adherence during the 12 months prior to interview 95%	200 (64.3)	55 (43.7)	<0.001
<i>missing values=56</i>			
Emergency department use			
Median (IQR)	0 (0–0)	2 (1–3)	<0.001

b Characteristics of LISA participants residing in the boundaries of the Vancouver Coastal Health Authority for whom there is record of three or more emergency department visits in the 6 months preceding interview (N=493)

Demographic and clinical characteristics	ED use <3 times N=442, n (%)	3+ ED visits N=51, n (%)	p-value
Age			
Median (IQR)	46 (41–52)	44 (40–49)	0.111
<i>missing values=1</i>			
Gender			
Male	335 (75.8)	36 (70.6)	0.397
Ethnicity			
Aboriginal	156 (35.3)	20 (39.2)	0.644
Education past high school	262 (59.4)	27 (52.9)	0.373
<i>missing values=1</i>			
Currently unemployed	339 (76.7)	48 (94.1)	0.003
Provincial income assistance	331 (74.9)	45 (88.2)	0.036
Ever diagnosed with a mental health disorder	251 (56.8)	33 (64.7)	0.299
Current injection drug use	103 (23.5)	22 (43.1)	0.004
<i>missing values=3</i>			
Current street drug use	196 (44.6)	33 (64.7)	0.007
<i>missing values=3</i>			
Unstable housing	155 (35.1)	31 (60.8)	<0.001
<i>missing values=1</i>			
Hepatitis C	248 (56.4)	41 (80.4)	<0.001
<i>missing values=2</i>			
Family Doctor is involved in routine HIV care	332 (75.1)	41 (80.4)	0.492
Attacked in past 6 months	77 (17.5)	12 (23.5)	0.336
<i>missing values=3</i>			
Incarcerated in past 6 months	27 (6.2)	3 (5.9)	0.999
<i>missing values=3</i>			
Individual food insecure	236 (53.5)	24 (47.1)	0.459
<i>missing values=1</i>			
CD4<200 (at time of interview)	77 (20.1)	17 (37.8)	0.012
<i>missing values=64</i>			
Undetectable viral load (at time of interview)	317 (73.7)	25 (50)	<0.001
<i>missing values=13</i>			
Adherence during the 12 months prior to interview >=95%	242 (61.4)	13 (30.2)	<0.001
<i>missing values=56</i>			
Emergency department use 1 or more times	102 (23.1)	51 (100)	<0.001
Emergency department use			
Median (IQR)	0 (0–0)	4 (3–6)	<0.001

c Characteristics of LISA participants using the Emergency Department and having an acuity score of 4/5 versus 1/2/3 (N=153)

Demographic and clinical characteristics	Acuity score 1/2/3 N (%)	Acuity score 4/5 N (%)	p-value
Age			

c Characteristics of LISA participants using the Emergency Department and having an acuity score of 4/5 versus 1/2/3 (N=153)

Demographic and clinical characteristics	Acuity score 1/2/3 N (%)	Acuity score 4/5 N (%)	p-value
Median (IQR) <i>missing values=1</i>	44 (39–50)	44 (40–51)	0.545
Gender			
Male	70 (66.7)	37 (71.1)	0.254
Ethnicity			
Aboriginal	41 (39)	26 (54.2)	0.114
Education past high school <i>missing values=1</i>	47 (44.8)	23 (47.9)	0.730
Currently unemployed	96 (91.4)	41 (85.4)	0.267
Provincial income assistance	95 (90.5)	38 (79.2)	0.070
Ever diagnosed with a mental health disorder	70 (66.7)	32 (66.7)	0.999
Current injection drug use <i>missing values=3</i>	42(40.4)	18 (37.5)	0.859
Current street drug use <i>missing values=3</i>	64 (61.5)	31 (64.6)	0.857
Unstable housing <i>missing values=1</i>	52 (49.5)	32 (68.1)	0.036
Hepatitis C <i>missing values=2</i>	83 (80.6)	36 (75.3)	0.522
Family Doctor is involved in routine HIV care	80 (76.2)	40 (83.3)	0.399
Attacked in past 6 months <i>missing values=3</i>	26 (25)	15 (31.3)	0.437
Incarcerated in past 6 months <i>missing values=3</i>	12 (11.5)	5 (10.4)	0.999
Individual food insecure <i>missing values=1</i>	59 (56.7)	25 (52.1)	0.603
CD4<200 (at time of interview) <i>missing values=64</i>	30 (33.3)	11 (25.6)	0.425
Undetectable viral load <i>missing values=13</i>	58 (56.3)	34 (73.9)	0.046
Adherence during the 12 months prior to interview 95% <i>missing values=56</i>	37 (43)	18 (45)	0.849
Emergency department use			
Median (IQR)	2 (1–3)	1 (1–2)	<0.001

Table 2

a Odds ratios of likelihood of emergency department utilization based on demographic and clinical characteristics				
Demographic and clinical characteristics	Unadjusted Odds Ratio (95% Confidence Interval)	p-value	Adjusted Odds Ratio (95% Confidence Interval)	p-value
Ethnicity (Aboriginal)	1.65 (1.12–1.03)	0.012		
Education past high school	0.46 (0.31–0.68)	<0.001		
Currently unemployed	3.08 (1.74–5.46)	<0.001		
Provincial Income assistance	2.65 (1.57–4.49)	<0.001		
Ever diagnosed with a mental health disorder	1.74 (1.17–2.58)	0.007	1.58 (1.02–2.45)	0.039
Current injection drug user	2.74 (1.79–4.18)	<0.001	1.54 (0.95–2.51)	0.080
Unstable housing	2.88 (1.94–4.28)	<0.001	1.87 (1.20–2.93)	0.006
Hepatitis C	3.67 (2.36–5.73)	<0.001	2.47 (1.48–4.12)	<0.001
Attacked in past 6 months	2.23 (1.39–3.57)	<0.001	1.60 (0.96–2.68)	0.074
Undetectable viral load	0.52 (0.35–0.79)	0.002	0.50 (0.32–0.79)	0.003
CD4<200 (at interview)	2.04 (1.27–3.28)	0.003		
Log 10 viral load (at time of interview)	1.47 (1.21–1.79)	<0.001		
Adherence during the 12 months prior to interview >=95%	0.43 (0.28–0.66)	<0.001		
b Odds ratios of likelihood of emergency department utilization 3 or more times based on demographic and clinical characteristics				
Demographic and clinical characteristics	Unadjusted Odds Ratio (95% Confidence Interval)	p-value	Adjusted Odds Ratio (95% Confidence Interval)	p-value
Ethnicity (Aboriginal)	1.18 (0.65–2.14)	0.416		
Education past high school	0.77 (0.43–1.38)	0.375		
Currently unemployed	4.86 (1.48–15.93)	0.009		
Provincial Income Assistance	2.51 (1.04–6.05)	0.040		
Ever diagnosed with a mental health disorder	1.39 (0.76–2.55)	0.280		
Current injection drug user	2.47 (1.36–4.49)	0.003		
Unstable housing	2.86 (1.58–5.19)	<0.001	2.03 (1.07–3.83)	0.030
Hepatitis C	3.14 (1.53–6.43)	0.002	2.61 (1.22–5.59)	0.014
Attacked in past 6 months	1.45 (0.72–2.89)	0.143		
Undetectable viral load	0.36 (0.20–0.65)	<0.001	0.36 (0.19–0.66)	<0.001
CD4<200 (at interview)	2.42 (1.26–4.65)	0.008		
Log 10 viral load (at time of interview)	1.35 (1.04–1.74)	0.022		
Adherence during the 12 months prior to interview >=95%	0.27 (0.14–0.54)	<0.001		
c Odds ratios of likelihood of having an Acuity score of 4/5 versus 1/2/3 (n=153)				
Demographic and clinical characteristics	Unadjusted Odds Ratio (95% Confidence Interval)	p-value	Adjusted Odds Ratio (95% Confidence Interval)	p-value
Ethnicity (Aboriginal)	1.84 (0.93–3.68)	0.082		
Education past high school	1.14 (0.57–2.25)	0.716		
Currently unemployed	0.55 (0.19–1.57)	0.265		
Provincial Income assistance	0.40 (0.15–1.04)	0.060	0.31 (0.10–0.93)	0.036

c Odds ratios of likelihood of having an Acuity score of 4/5 versus 1/2/3 (n=153)

Demographic and clinical characteristics	Unadjusted Odds Ratio (95% Confidence Interval)	p-value	Adjusted Odds Ratio (95% Confidence Interval)	p-value
Ever diagnosed with a mental health disorder	1.00 (0.48–2.06)	0.999		
Current injection drug user	0.89 (0.44–1.79)	0.735		
Unstable housing	2.17 (1.06–4.48)	0.035	2.71 (1.19–6.17)	0.017
Hepatitis C	0.72 (0.32–1.63)	0.435		
Attacked in past 6 months	1.36 (0.64–2.90)	0.421		
Undetectable viral load	2.20 (1.02–4.72)	0.043	2.06 (0.93–4.56)	0.073
CD4<200 (at interview)	0.69 (0.30–1.55)	0.367		
Log 10 viral load (at time of interview)	0.82 (0.59–1.14)	0.241		
Adherence during the 12 months prior to interview ≥95%	1.01 (1.00–1.03)	0.075		

* Blank cells denote no statistical significance after adjustment