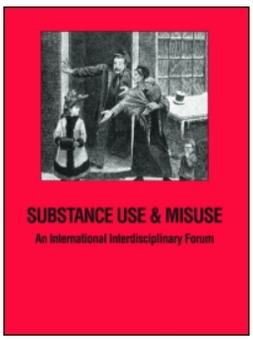

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Population-Based Study of Tobacco Use Among People Living With HIV in Puerto Rico

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ABSTRACT

Background: Despite substantial advances in the era of highly active antiretroviral therapy, HIV-positive persons are at high risk of tobacco-related disease and mortality. This study describes the prevalence and sociodemographic factors associated with current tobacco use among HIV-positive men and women 18 years and older receiving HIV care in Puerto Rico. *Methods*: Data from the 2009 Medical Monitoring Project (MMP) was used. A three-stage sampling design was conducted to obtain annual cross-sectional probability samples of HIV-infected adults in care. Factors associated with current tobacco use were identified using logistic regression models. All analyses were performed using STATA version 11.0. *Results*: The estimated prevalence of current cigarette use among the population was 29.0% (95%CI: 23.5%–35.2%), daily smoking was reported in 76.7% of them. Multivariate logistic regression models, showed that male drug users (injected and noninjected) were up to nine times more likely to be current smokers (OR = 9.9; 95%CI = 3.1, 31.5) as compared to nonusers. *Conclusion*: Findings highlight the need for smoking cessation strategies in this population, particularly among male HIV+ drug users.

KEYWORDS
ART; HIV; MMP; Puerto Rico; tobacco

Introduction

Highly active antiretroviral therapy (HAART) has helped to improve dramatically the life expectancy of HIV-positive individuals (Fang, 2007). However, lifestyle-related risk factors can attempt with the long-term survival of HIV positive individuals (Helleberg, 2013; Obel, 2011). Among these risk factors is cigarette smoking, which is related to clinical conditions such as cardiovascular and pulmonary diseases, cancer, and overall mortality (Lifson, 2012; Petrosillo, 2013). Smoking prevalence estimates among HIV-infected individuals in the United States range from 40% to 84%, much higher than the population-based overall adult prevalence of smoking (20%) (Browning, 2013). The harmful impact of smoking on HIV positive individuals has been documented elsewhere (Pacek, 2014a, 2014b). These include a detrimental impact on mortality, in which HIV-infected smokers lose more life-years to smoking than to HIV (Helleberg, 2013). It has also been documented that smoking weakens the body's immune and virological response of HIV+ individuals (Miguez-Burbano, 2003); leaving HIV+ smokers more vulnerable to disease and less responsive to HAART (Amiya, 2011). Therefore, understanding the use and practices of smoking among people living with HIV/AIDS (PLWHA) is important in the scope of HIV care (Burkhalter, 2005; Tesoriero, 2010), in order to reduce the harms of smoking in this population.

According to the Puerto Rico HIV Surveillance System, there are 20,036 PLWHA (Puerto Rico Department of Health, 2014). In terms of cancer, a higher burden of cancer has been observed among people living with AIDS in Puerto Rico as compared to the general population (Ortíz, 2014a, 2014b) (Ramírez-Marrero, 2010), and a higher burden of oropharyngeal cancer has been reported in Puerto Rican men as compared with other races/ethnicities in the United States (Suárez, 2009). Moreover, there are limited population-based studies that report tobacco use among PLWHA living in Puerto Rico. Since smoking has been identified as a preventable risk factor for cancer, it is important to understand the prevalence and correlates of tobacco use among HIV positive men and women in Puerto Rico;

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one of the areas hardest hit by the HIV epidemic (Pérez, 2005).

Study methods

The medical monitoring project (MMP)

The MMP is a supplemental surveillance system for collecting clinical and behavioral data on adults receiving care for HIV infection or AIDS (Blair, 2014). The goal of the MMP is to obtain a national probability sample of HIV-infected adults receiving care from known providers of outpatient HIV medical care in the United States; therefore, all 50 states plus the District of Columbia and Puerto Rico are eligible to participate (Centers for Disease and Control, 2014). The MMP uses a three-stage sampling design to obtain annual cross-sectional probability samples of HIV-infected adults in care. In the first stage, 17 states are selected to participate (comprising 73% of all adults diagnosed with HIV in the United States), then HIV care facilities in these states are sampled, and finally HIV-infected adults in HIV care during January–April at participating facilities are sampled. Face-to-face interviews are conducted to collect information on demographics, adherence to HIV medication regimens, and behavioral risk factors. After the interviews are completed, the medical record information from the study participant is reviewed in order to collect demographic and clinical data. All patients who meet the following conditions are eligible for inclusion in the MMP: (1) diagnosed with HIV, with or without AIDS at any time prior to the end of the population data period (PDP) (January–April of the cycle year), (2) at least 18 years of age at the beginning of the PDP, and (3) received medical care, HIV laboratories or prescription of HIV medications - including refill authorizations - during the PDP. The MMP interview uses two instruments to collect data: the standard questionnaire and the short questionnaire. The standard questionnaire consists of 10 modules administered in all project areas: preliminary information, demographics, access to health care; HIV treatment and adherence; sexual behavior, drug and alcohol use, prevention activities, anxiety and depression, health conditions and preventive therapy, and gynecological and reproductive history. This analysis includes data collected with the standard questionnaire in the 2009 Puerto Rico MMP cycle.

Study variables

All study variables were self-reported. Demographic characteristics included: sex (male, female), sexual orientation (homosexual, bisexual, heterosexual), age (<50, ≥50 years), education level (less than high school [HS] or HS graduate, some college or technical school, college graduate or more), income (<15,000, ≥15,000), and health insurance coverage in the last 12 months. Individual clinical characteristics evaluated were: years living with HIV (≤10, >10 years) and current use of antiretroviral medicines. Other variables included current illicit drug use in the past 12 months (injected and noninjected) and current binge drinking (for men, five or more drinks during a single occasion and for women, four or more drinks during a single occasion in the past 30 days).

Statistical analysis

All analyses used weighted data for probability of selection and nonresponse to be representative of adults receiving outpatient medical care for HIV infection in Puerto Rico. Weighted frequency distributions and descriptive statistics were used to characterize the study sample. Bivariate analysis (chi-square test) was used to determine the relation between demographic and behavioral characteristics with current tobacco use (main dependent variable). Variables that achieved statistical significance in the bivariate analysis ($p < 0.05$) were assessed in age-adjusted weighted logistic regression models. An evaluation of statistical interaction with the full model was assessed. Statistical analyses were conducted using STATA 11.0 statistical software.

Results

A total of 209 out of 400 eligible HIV patients participated in Puerto Rico MMP 2009 cycle (52% response rate), representing 6,526 persons receiving HIV care in Puerto Rico. The weighted mean age of the study participants was 47.2 ± 0.77 (95% CI: 45.7, 48.7) years. The majority of the study sample was men (64.2%) and only 2.0% reported not having health insurance in the last 12 months. Regarding educational attainment, 59.7% reported less than a HS degree and most of the participants (81.5%) reported an annual income lower than $15,000 USD. The majority of the HIV population (52.4%) had more than 10 years living with HIV, and 91.3% reported being currently taking antiretroviral medicines at the time of the interview.

The majority of the study participants (79.6%) reported being heterosexual. Regarding risk behaviors, 16.4% reported current illicit drug use (injected and noninjected), and 21.2% reported current binge drinking. Moreover, (19.8%, 95%CI:15.4%–25.0%) of the HIV population reported having smoked previously, but were no longer smokers. Approximately a third (29.0%, 95%CI: 23.5%–35.2%) of the participants reported that they were current smokers, with 76.7% of them reporting smoking daily.

Table 1. Univariate and bivariate analyses of factors associated with current cigarette use ($n = 6,526$) among HIV+ persons living in Puerto Rico, MMP 2009.

Variables	Total *n* (Column %)	Current cigarette use: No *n* (Row %)	Current cigarette use: Yes *n* (Row %)	*p* value
All respondents	6,526 (100)	4,633 (70.99)	1,893 (29.01)	n/a
Sociodemographic characteristics				
Age (years)				
<50	4,191 (64.4)	2,865 (68.36)	1,326 (31.64)	0.2812
50 +	2,319 (35.6)	1,752 (75.54)	567 (24.46)	
Educational level				
< HS	3,899 (59.7)	2,609 (66.91)	1,290 (33.1)	0.2813
Some college	1,837 (28.2)	1,393 (75.84)	444 (24.2)	
BS or more	790 (12.1)	631 (79.85)	159 (20.15)	
Gender				
Male	4,189 (64.2)	2,867 (68.44)	1,322 (31.56)	0.2834
Female	2,337 (35.8)	1,766 (75.56)	571 (24.44)	
Individual annual income				
< $15,000	5,167 (81.5)	3,528 (68,29)	1,638 (31.71)	0.0674
≥ $15,000	1,170 (18.5)	979 (83.68)	191 (16.32)	
Health insurance				
No	127 (2.0)	127 (100.0)	0 (0)	0.1937
Yes	6,399 (98.0)	4,506 (70.4)	1,893 (29.6)	
Risk factors				
Binge drinking (past 30 days)				
No	5,140 (78.8)	3,749 (72.93)	1,391 (27.07)	0.2398
Yes	1,386 (21.2)	884 (63.79)	502 (36.21)	
Illicit drug use (past 12 months)*				
No	5,457 (83.6)	4,287 (78.6)	1,170 (21.5)	<0.0001
Yes	1,069 (16.4)	346 (32.4)	723 (67.6)	
Sexual orientation				
Heterosexual	5,197 (79.6)	3,622 (69.7)	1,575 (30.3)	0.7189
Homosexual	1,043 (16.0)	788 (75.6)	255 (24.4)	
Bisexual	286 (4.4)	223 (77.8)	63 (22.2)	
Clinical characteristics				
Years living with HIV				
≤10	2,210 (47.6)	1,577 (71.4)	633 (28.6)	0.2729
>10	2,434 (52.4)	1,929 (79.2)	506 (20.8)	
Current HAART				
No	567 (8.7)	283 (49.8)	285 (50.2)	0.0390
Yes	5,959 (91.3)	4,350 (73.0)	1,609 (27.0)	

*Illicit drug use includes injected and noninjected HIV+ individuals.

Bivariate analysis of the association between demographic, lifestyle factors, and current tobacco use are presented in Table 1. Although the prevalence of tobacco use was higher in males than females (31.6 vs. 24.4, respectively) and higher among those with annual income <$15,000 than among with income ≥$15,000 (31.6% vs. 24.5%, respectively), these differences did not achieved statistical significance ($p > 0.05$). Statistical significant differences in current tobacco use were observed among illicit drug users in which 67.6% reported themselves as current smokers, compared to 21.5% of their counterparts ($p < 0.0001$). In addition, statistical significance was observed by use of HAART, in which persons that were not using HAART at the time of the survey had a higher prevalence of tobacco consumption (50.2%) as compared to current HAART users (27.0%) ($p = 0.04$). A marginal association was observed in relation to individual annual income in which the prevalence of current tobacco consumption was higher among those which reported income less than $15,000 (31.7%) as compared to participants with income higher or equal than $15,000 (16.3%) ($p = 0.0674$).

In multivariate logistic regression models, we found a statistically significant interaction in the variable gender ($p = 0.04$). Hence, we ran the model stratifying by gender. Among men, drug users were up to 10.5 times more likely to be current smokers than their counterparts (OR = 10.5; 95%CI = 3.6, 31.0) in the age-adjusted model and up to 9.9 times (OR = 9.9; 95%CI = 3.1, 31.5) in the full model. With respect to current HAART use, men were 80% less likely to smoke in the age-adjusted model (OR = 0.2; 95%CI = 0.03, 0.8) and in the full model (OR = 0.2; 95%CI = 0.02, 1.5), although the results were not statistically significant in the full model.

Among women, drug users were up to 2.8 times more likely to be current smokers than their counterparts (OR = 2.8; 95%CI = 0.4, 20.4) in the age-adjusted model and up to 3.5 times (OR = 3.5; 95%CI = 0.5, 26.0) in the full model. The magnitude of these associations were not statistically significant. In the case of current HAART,

Table 2. Logistic regression analysis stratified by sex of factors associated to current smoking among HIV-positive individuals living in Puerto Rico, MMP, 2009.

	Men		Women	
Variables	Model 1 OR (95% CI)*	Model 2 OR (95% CI)†	Model 1 OR (95% CI)*	Model 2 OR (95% CI)†
Illicit drug use				
No	1.0	1.0	1.0	1.0
Yes	10.5 (3.6–31.0)	9.9 (3.1–31.5)	2.8 (0.4–20.4)	3.5 (0.5–26.0)
Current HAART				
No	1.0	1.0	1.0	1.0
Yes	0.2 (0.03–0.8)	0.2 (0.02–1.5)	2.03 (0.6–7.4)	3.0 (0.5–17.6)

*Model 1: age adjusted.
†Model 2: full model (age, drug use, current HAART use).

women users were two times more likely to be current smokers than their counterparts (OR = 2.0; 95%CI = 0.6, 7.4) in the age-adjusted model and up to three times (OR = 3.0; 95%CI = 0.5, 17.6) in the full model. However, no significant association was observed (Table 2) .

Discussion

Our study documents the prevalence and correlates of current smoking among PLWHA in Puerto Rico using a population-based sample. Current tobacco use reported in this population (29.0%) is higher than the prevalence in the general population in Puerto Rico. According to the 2009 Behavioral Risk Factor Surveillance System (BRFSS), only 10.6% (95%CI = 19.2%, 11.9%) of the population in Puerto Rico were currently smokers (Centers for Disease and Control, 2009). Although the overall prevalence of current smoking in Puerto Rico is higher among PLWHA, the prevalence of current smoking among this group is similar to that reported in a study among HIV+ individuals in two HIV primary clinics in New York City, United States (Shirley, 2013); but lower when compared with several other studies elsewhere (Pacek, 2014a, 2014b). For example, estimates of current cigarette smoking range from 29% in two primary clinics in New York City (Frankel, 2012) to as high as 85.2% in HIV infected and HIV uninfected drug users in Maryland, United States (Marshall, 2011).

Our study also showed a higher likelihood of current smoking among male drug users (injected and noninjected). The relation between current tobacco use and illicit drug use is not surprising and has been documented previously (Pacek, 2014A), similar results have been shown in studies among PHLWA living in the United States, both in Baltimore (Pacek, 2014B) and New York (Burkhalter, 2005). Other studies have indicated that - among drug users - high levels of impulsivity, mental health as well as other comorbidities might impact their higher smoking use (Brennan, 2013). The importance to target men in programs that assist with smoking cessation might be of benefit due to the reported burden of cancer in the island and among HIV+ individuals (Ortiz, 2014A). Since illicit drug users are less likely to attend primary care settings as compared with other HIV groups (Frankel, 2012), disparities in cancer mortality among HIV male drug users can be part of the long-term sequelae of the current smoking rates among HIV+ drug users in the island. According to our findings, male drug users are groups to target in Puerto Rico. Therefore, an understanding of the barriers that exists particularly in this population are important to document, in order to develop successful smoking cessation programs in parallel with treatment programs provided in the island (Mdodo, 2013). Another finding from our study was that HIV+ individuals (particularly men) in current HAART medication were less likely to be current smokers, although this association loss significance in multivariable analysis. Although our variable is limited by the fact that it indicates HAART use (not adherence by any of the dimensions recently studied in the literature) (Beer, 2012), results partially support previous findings that HIV+ individuals retained in care are more conscious of their health. Other studies have also found that smoking was associated with poorer adherence and depressive symptoms (Webb, 2009), leading to identifying mechanisms in which the development of smoking cessation interventions might help to target adherence (Kwong, 2007).

Since the MMP is a surveillance project designed for recruitment in clinical settings, our findings might not be generalizable to the general HIV+ population living in Puerto Rico (McNaghten, 2007). Due to limitations in the tobacco-related questions and due to the importance of gathering such questions to further our understanding in this area, future waves of MMP should include additional questions that specifically assess the role of smoking in drug use. We also recommend including questions on the number of cigarettes smoked per day, underlying factors that contribute to persistent smoking, barriers to abstinence; and motivators (facilitators) for quitting attempts.

Finally, since factors that increase the risk for smoking are also the factors that are associated with not seeking healthcare, particularly illicit drug use, from the methodological standpoint, excluding from the sampling HIV+ individuals not receiving care might underestimate the potential higher risk for smoking and cancer in this population. Recognizing the difficulty to identify and reach these individuals, should be an opportunity for future research and interventions to reduce the cancer rates of the HIV+ population.

Conclusion

The prevalence of current smoking among HIV+ individuals receiving HIV care in Puerto Rico is high when compared to population-based data in the island. HIV+ male drug users had a higher likelihood of current smoking. Opportunities for a comprehensive program, which targets male HIV+ drug users who receive care in STI clinics or other treatment centers, might help in decreasing chronic disease sequelae related to tobacco use.

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Declaration of interest

The authors declare that they have no conflict of interest. The content is solely the responsibility of the authors and does not necessarily represent the official views of the Centers for Disease and Control.

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