Methamphetamine Use and Dental Problems Among Adults Enrolled in a Program to Increase Access to Oral Health Services for People Living with HIV/AIDS

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ABSTRACT

Objective. We examined the association between methamphetamine (meth) use and dental problems in a large sample of HIV-positive adults.

Methods. We gathered data from 2,178 interviews across 14 sites of the U.S. Health Resources and Services Administration HIV/AIDS Bureau's Special Projects of National Significance Innovations in Oral Health Care Initiative from May 2007 to August 2010. We used multivariate generalized estimating equations to test the association between meth use and dental problems, adjusting for potential confounders.

Results. Past and current meth use was significantly associated with more dental problems. The study also found that poor self-reported mental health status, fewer years since testing positive for HIV, a history of forgoing dental care, less frequent teeth brushing, poor self-reported oral health status, oral pain, grinding or clenching teeth, some alcohol use, more years of education, and self-reported men-who-have-sex-with-men HIV risk exposure (compared with other exposure routes) were significantly associated with dental problems.

Conclusion. Individuals who are HIV-positive with a history of meth use experience access barriers to oral health care and more dental problems. Our study demonstrated that it is possible to recruit this population into dental care. Findings suggest that predisposing, enabling, and need factors can serve as demographic, clinical, and behavioral markers for recruiting people living with HIV/AIDS into oral health programs that can mitigate dental problems.

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Access to oral health is integral to the promotion and maintenance of overall health and well-being. To date, millions of Americans do not receive adequate oral health-care services because of social, cultural, economic, structural, and geographical barriers.[1] The prevalence of oral health problems has been documented among vulnerable and underserved populations, including racial/ethnic minorities,[2] individuals who are homeless,[3,4] populations of lower socioeconomic status,[2,5] older adults,[2,6] and other groups.[1] Research and empiric evidence demonstrate that racial/ethnic minority groups, homeless populations, individuals of low socioeconomic status, and older adults are more likely to report higher rates of oral pain, more decayed teeth, dental caries, and poor oral health status as a result of limited access to oral health care.[2–4,6] Yet, little is known about the prevalence of oral health problems specifically among adults with human immunodeficiency virus (HIV) infection who have a history of methamphetamine (meth) use.

Over the course of the epidemic, research has shown that individuals with HIV infection have a propensity to develop at least one HIV-related oral health problem during the course of their illness.[7,8] Recently reported data suggest that people living with HIV and acquired immunodeficiency syndrome (AIDS) (PLWHA) report they need help accessing dental care.[9] Among adults with HIV and substance use comorbidity, oral health problems may be intensified, as these conditions compromise the immune system. Evidence posits that substance users have difficulty accessing dental treatment and tend to present to care with more oral health problems compared with non-drug users.[10] The effects of substance use on oral health have been documented among meth users in both clinical case studies,[11–13] and empirical studies.[14,15]

Clinical case studies have shown that meth use is associated with oral health problems such as bruxism (excessive clenching or grinding of teeth), dental caries (cavities), xerostomia (persistent dry mouth), dental pain, bad breath, inflamed and bleeding gingival tissues, and infrequent to no brushing of teeth.[11–13] Further, case studies indicate that meth users consume a large number of carbonated drinks high in sugar content that may contribute to dental caries.[11]

Few empirical studies on the relationship between meth use and increased dental problems exist. In addition, the limited empirical findings on the association between meth use and oral health problems have resulted in mixed findings. Shetty et al. found that meth users (n=301) reported experiencing higher rates of dental problems than never users for an average of 18 months or more. In addition, a considerable proportion of meth users reported problems with dental appearance, broken or loose teeth, bruxism, and unmet oral health needs.[15] Alternatively, in a pilot study comparing meth users (n=17) with other substance users (n=18), Cretzmeyer et al. found no relationship between meth use and dental disease.[14]

The limited empirical evidence and mixed findings call for a better understanding of the relationship between meth use and dental problems. Further, existing research has not addressed the relationship between meth use and dental problems among adults with HIV infection. Our research study presents new data about a sample of 2,178 PLWHA, including 471 people who were past (n=406) and current (n=65) meth users, and 1,707 people who had never used meth. Among PLWHA who had not received oral health care in the past year or more, this research aimed to (*1*) provide new information about personal, financial, structural, and health characteristics of current and former meth users compared with those who have never used meth; (*2*) assess whether there were significant differences in the number of dental problems that current and former meth users experienced in the past 12 months compared with those who have never used meth; and (*3*) provide information about individual, structural, and need factors that may be associated with increased dental problems. The findings will help inform policy and practice with respect to providing oral health care to people who are HIV-positive and are current or former meth users. This study provides the first such data from a large sample of PLWHA, thus extending the knowledge base from the current case study-based and mixed empirical literature.

METHODS

Analytical framework

This analysis was derived from the Health Resources and Services Administration HIV/AIDS Bureau's Special Projects of National Significance Innovations in Oral Health Care Initiative (hereafter, Oral Health Initiative). The evaluation for the Initiative was framed in accordance with the Institute of Medicine's (IOM's) conceptual model,[16] which suggests that barriers to accessing health-care services result from personal factors such as education, structural factors such as the availability of care, and financial factors such as health insurance. The evaluation design also draws from the Andersen behavioral model of health service utilization as a key conceptual framework for understanding individual and contextual factors associated with access to and utilization of medical services. According to the Andersen model, the decision to access and utilize

health services is predicated by predisposing factors such as gender, enabling factors such as the availability of resources, and need factors such as severity of disease.[17,18] Applied to oral health outcomes, this model suggests that there are pathways among these factors and perceived oral health.[19] Our research examined whether meth use is associated with dental problems in a sample of PLWHA in relation to the predisposing, enabling, and need factors represented in these conceptual frameworks.

Study design

This study presents multisite longitudinal data from the Oral Health Initiative, developed to increase access to oral health care for PLWHA at 15 sites across the country. We used a convenience sampling technique to recruit subjects from 15 sites located in Community Health Centers, mobile dental clinics, AIDS service organizations, and university hospital dental clinics at both urban and rural locations. Participants were eligible to enroll in the study if they were 18 years of age or older, HIV-positive, and had not received oral health care in the past year. Once enrolled, subjects received a broad range of oral health services at no cost. More details about the Oral Health Initiative are provided elsewhere in this supplement.[20]

Data collection

We collected dental service utilization, CD4 cell count, HIV viral load, and survey data from 2,178 patients at 14 of the study sites. One site was unable to submit complete data; therefore, we excluded all data from that site from the analysis. We gathered survey data in interviews with study participants, using a structured interview guide that tapped multiple domains reflected in the conceptual model. We piloted the survey on a small group of similar patients to assess content, length, and understandability before finalizing it for use. We conducted in-person baseline interviews from May 2007 to August 2009 and follow-up interviews every six months until the study's completion in August 2010. Interviews were conducted in English or Spanish. CD4 count and HIV viral load data were retrieved from medical records.

Longitudinal data on dental service utilization included the date of the clinic visit and types of clinic services rendered, as measured by Current Dental Terminology® procedure codes.[21] We also gathered data indicating whether a phase 1 treatment plan (elimination of pain or infection, restoration of carious lesions, and provision of nonsurgical periodontal treatment) was completed at the visit.

Institutional Review Boards approved study protocols at all participating sites and the multisite evaluation center. Written informed consent was obtained from all study subjects. Research staff from the multisite evaluation center trained interviewers at each study site. Trained outreach workers, case managers, and dental health professionals conducted screenings and interviews for the study. Data were entered and stored in a password-protected, Web-based data-entry system at the multisite evaluation center.

Measures

Dependent variable. The dependent variable is a summative score of the number of dental problems that each respondent reported experiencing in the past 12 months. Eleven possible dental problems were included in the calculation, including toothache, problem with appearance, bad breath, growth or bumps, problem with tooth decay or cavity, bleeding gums, pain in jaw joints, sensitivity, sores, loose teeth, and problems with partials or dentures. We conducted a reliability analysis (Cronbach's alpha = 0.70) to determine the internal consistency of items summed to measure the total number of problems. At baseline, study participants reported experiencing a mean of 3.33 (standard deviation = 2.36) dental problems in the past 12 months.

Covariates. Selection of covariates was informed by the study's conceptual model; variables were identified from those available in the study database and included personal characteristics, structural variables, and health behaviors and characteristics. Personal characteristic variables included gender, race/ethnicity, employment, housing status, the respondent's report of how he or she was exposed to HIV, and continuous measures of age and education. Structural variables consisted of whether the respondent had dental insurance, difficulty getting dental care since testing HIV-positive, and the most important reason they did not get dental care at a time they needed it. Health habit variables included brushing teeth, sugar consumption, drinking soda with sugar, grinding teeth, and smoking cigarettes in the past 30 days. Health status variables included respondent's HIV viral load and CD4 count obtained from medical records, respondent's rating of overall health status in the past 30 days, oral pain or distress in the past three months, and a continuous measure of years since testing HIV-positive. Self-reported mental and physical health status was measured at study onset using the SF-8™ Health Survey, calculated and normed according to published procedures.[22]

Substance use variables included number of drinks consumed in a week, the National Institute on Alcohol

Abuse and Alcoholism criteria used to categorize alcohol-related problems.[23] Categorical measures of past and current meth use, crack or cocaine use, and polydrug use, defined as the use of both crack or cocaine and meth, were included. Past meth, crack or cocaine, and polydrug use was defined as former drug use but not in the past 30 days. Current use was operationalized as use of the drug in the past 30 days. Data were not collected on all types of drug use, such as heroin, or on route of drug use.

Statistical analysis

Data were analyzed using SPSS®/PASW® statistics software, version 18.0.[24] We used Chi-square and analysis of variance in bivariate analyses comparing the characteristics of respondents who had never used meth with those who reported past and current meth use with respect to the other covariates. We used linear regression modeling techniques to examine the association between meth use and number of dental problems, adjusting for predisposing, enabling/structural, and need factors identified in the conceptual framework. We used generalized estimating equations to adjust for clustering of data by site. The variable "since you tested positive, was there a time you needed dental care but did not get it?" was excluded from the model because it was highly correlated with the variable "reasons you did not get care at a time you needed it."

We conducted correlation analyses to determine whether there was a correlation between the dependent variable and dental problem proximally related measures. Pearson correlation coefficients indicate weak correlations between the dependent variable and "grinding or clenching teeth in past 30 days" ($r=0.281$) and "oral health status" ($r=-0.464$), and a moderate correlation with "oral pain" ($r=0.518$). All three variables were included in the model because perceptions of oral health status and oral pain may differ among respondents who have not been in care for more than a year. In addition, respondents may not be aware of grinding or clenching teeth as a problem unless otherwise identified by a dental health-care worker.

RESULTS

Among this sample of PLWHA who had not received oral health care in the past year or more, results revealed significant differences among current and former meth users and non-meth users, with respect to personal, structural, and health characteristics.

Personal factors

As shown in Table 1, bivariate analyses revealed that, while all three groups were primarily male, nearly all current meth users (more than 95%) were male. Current meth users were likely to be the youngest of the three groups (mean = 41.25 years), and former users were younger (mean = 42.99 years) than never users (mean = 44.21 years). Similarly, current users were most likely to have the most years of education (mean = 13.32 years), while never users had the fewest years of education (mean = 12.16 years). Former users were most likely to identify as white (65.8%), while never users were least likely to identify as white (24.1%). Never users were most likely to identify as African American/black (47.6%). Current users were most likely to identify as an "other race," a group that included all other racial/ethnic identities, including multiple races (15.4%). Current users were most likely to report being unemployed (41.5%), and, interestingly, former users were least likely to report being unemployed (31.8%). Current users were most likely to be living in temporary or no housing (43.8%), while former users (56.7%) and never users (60.4%) were more likely to report living in their own home or apartment. Current (69.2%) and former (60.3%) meth users were more likely to report HIV exposure through the men-who-have-sex-with-men (MSM) risk category than never users (36.5%).

Financial and structural factors

Both current and former meth users were more likely than never users to report having trouble getting dental care since they tested HIV-positive, and current users were more likely than former users and never users to report having some form of dental insurance. Although the cell size was small ($n=5$), current meth users were twice as likely to report "dental care was not a priority, or I was ill, or I was addicted" as the most important reason they did not get dental care, compared with never users.

Oral health habits and substance use

In general, meth users reported poor oral health habits in the past 30 days. Current users were less likely than former and never users to report brushing teeth daily and were more likely than both former users and never users to report eating candy or drinking soda. Current and former users were more likely than never users to report grinding and clenching teeth and smoking in the past 30 days. Current users were more likely than former users and never users to have used alcohol, but most likely to report consuming no more than seven drinks per week.

Table 1. Comparison of never, former, and current users of methamphetamine, among a sample of HIV-positive adults, by personal, financial, structural, and health characteristics: SPNS Oral Health Initiative, 14 sites, 2007–2010

	No meth use (n=1,707)	*Former meth use (n=406)*	*Current meth use (n=65)*
Characteristic	N[a] *(percent)*	N[a] *(percent)*	N[a] *(percent)*
Personal factors			
Gender[b]			
Male	1,213 (71.7)	351 (88.0)	62 (95.4)
Female	478 (28.3)	48 (12.0)	3 (4.6)
Age (in years)[c,d] (mean [SD])	44.21 (9.94)	42.99 (8.58)	41.25 (8.75)
Education (in years)[b,e] (mean [SD])	12.16 (2.62)	13.10 (2.34)	13.32 (2.57)
Race/ethnicity[b]			
White	411 (24.1)	267 (65.8)	32 (49.2)
Black or African American	813 (47.6)	60 (14.8)	7 (10.8)
Hispanic or Latino	406 (23.8)	53 (13.1)	16 (24.6)
Other race	77 (4.5)	26 (6.4)	10 (15.4)
Employment[b]			
Unemployed	611 (36.0)	129 (31.8)	27 (41.5)
Working full- or part-time	521 (30.7)	100 (24.6)	13 (20.0)
Disabled	543 (32.0)	173 (42.6)	22 (33.8)
Other	24 (1.4)	4 (1.0)	3 (4.6)
Housing[b]			
Own home or apartment	1,029 (60.4)	230 (56.7)	24 (37.5)
Someone else's home or apartment	458 (26.9)	80 (19.7)	12 (18.8)
Temporary or no housing	216 (12.7)	96 (23.6)	28 (43.8)
MSM HIV exposure[b]			
No	1,084 (63.5)	161 (39.7)	20 (30.8)
Yes	623 (36.5)	245 (60.3)	45 (69.2)
Financial barriers			
Dental insurance[d]			
None	1,057 (63.1)	262 (66.2)	27 (45.8)
Any	618 (36.9)	134 (33.8)	32 (54.2)
Structural barriers			
Trouble getting dental treatment since testing HIV-positive[b]			
No	913 (53.9)	172 (42.4)	24 (36.9)
Yes	780 (46.1)	234 (57.6)	41 (63.1)
Most important reason you did not get dental care at the time you needed it[b]			
No insurance or could not afford it	415 (24.5)	128 (31.6)	16 (25.4)
Difficulty finding or getting dental care	159 (9.4)	50 (12.3)	7 (11.1)
Fear or worry of dentist or dental experience or privacy	70 (4.1)	14 (3.5)	3 (4.8)
Dental care was not a priority/I was ill/I was addicted	64 (3.8)	25 (6.2)	5 (7.9)
I did not want to go to the dentist or had a prior bad experience	46 (2.7)	12 (3.0)	5 (7.9)
Some other reason	26 (1.5)	4 (1.0)	3 (4.8)
Did not have trouble getting dental care since testing positive	913 (53.9)	172 (42.5)	24 (38.1)

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Oral health and general health status

Meth users were more likely to report poor oral health status, with current users reporting the lowest oral health status of the three groups. Never users were most likely to report no oral pain, while current and former users reported similar levels of oral pain or distress. Current users were least likely to be taking antiretroviral medication, while never users were most likely to be taking antiretrovirals. Similarly, current users were least likely to report undetectable viral loads, while never users were most likely to report undetectable viral loads. Interestingly, former users reported the lowest physical health scores, while current meth users had the lowest mental health scores. All health status

Table 1 (continued). Comparison of never, former, and current users of methamphetamine, among a sample of HIV-positive adults, by personal, financial, structural, and health characteristics: SPNS Oral Health Initiative, 14 sites, 2007–2010

	No meth use (n=1,707)	*Former meth use (n=406)*	*Current meth use (n=65)*
Characteristic	N[a] *(percent)*	N[a] *(percent)*	N[a] *(percent)*
Health habits and substance use			
Brush teeth daily in past 30 days[b]			
No	228 (13.8)	76 (19.0)	21 (32.8)
Yes	1,423 (86.2)	324 (81.0)	43 (67.2)
Eat hard sugar candy or chew gum with sugar in past 30 days[f]			
No	644 (37.8)	171 (42.1)	15 (23.1)
Yes	1,058 (62.2)	235 (57.9)	50 (76.9)
Drink soda (with sugar) in past 30 days			
No	505 (29.7)	110 (27.3)	12 (18.5)
Yes	1,196 (70.3)	293 (72.7)	53 (81.5)
Grind/clench teeth in past 30 days[b]			
No	1,262 (75.1)	198 (49.1)	27 (41.5)
Yes	419 (24.9)	205 (50.9)	38 (58.5)
Smoke in past 30 days[b]			
No	860 (50.5)	140 (34.5)	15 (23.1)
Yes	842 (49.5)	266 (65.5)	50 (76.9)
Alcohol use in past week[f]			
None	875 (63.5)	265 (66.8)	34 (54.0)
≤7 drinks	410 (29.8)	92 (23.2)	25 (39.7)
≤14 drinks	50 (3.6)	25 (6.3)	1 (1.6)
>14 drinks	43 (3.1)	15 (3.8)	3 (4.8)
Crack or cocaine use[b]			
Never used crack or cocaine	1,137 (66.6)	75 (18.5)	26 (40.0)
Past crack or cocaine use	526 (30.8)	314 (77.3)	25 (38.5)
Current crack or cocaine use	44 (2.6)	17 (4.2)	14 (21.5)
Polydrug use[b]			
Never used meth and/or crack or cocaine	1,137 (66.6)	NA	NA
Past meth and/or crack or cocaine use	526 (30.8)	389 (95.8)	NA
Current meth and/or crack or cocaine use	44 (2.6)	17 (4.2)	65 (100.0)

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scores were below national norms.[22] Lastly, in the past 12 months, current meth users reported experiencing the most dental problems, and nonusers reported the fewest dental problems.

In an additional bivariate analysis (data not shown), current meth users were significantly more likely to report toothache(s), problems with bad breath, problems with growth or bumps, bleeding gums, pain in jaw joints, sensitivity, sores, and loose teeth than former users and never users. Former meth users were more likely to report problems with the appearance of teeth than current and never users. Finally, both current and former users were more likely to report problems with tooth decay or cavities than never users.

Multivariate analysis

As shown in Table 2, in multivariate analyses controlling for other factors, meth use was strongly associated with a greater number of dental problems. Respondents who reported either past or current meth use were significantly more likely to report a higher number of dental problems in the past 12 months than respondents who had never used meth.

In this high-risk sample, other factors besides meth use were also associated with more dental problems. These factors included more years of education, reported exposure through the MSM HIV risk category, not having insurance or not being able to afford dental care, difficulty finding or getting dental care, being ill and/or addicted, not having dental care as a priority, and fear or worry of dentist or dental experience and privacy. As suggested in the bivariate analyses, other covariates included less frequent teeth brushing, grinding and clenching teeth (bruxism), some alcohol use, lower reported oral health status, and oral pain. Lastly, fewer years since HIV diagnosis and poor mental health

Table 1 (continued). Comparison of never, former, and current users of methamphetamine, among a sample of HIV-positive adults, by personal, financial, structural, and health characteristics: SPNS Oral Health Initiative, 14 sites, 2007–2010

	No meth use (n=1,707)	*Former meth use (n=406)*	*Current meth use (n=65)*
Characteristic	N[a] *(percent)*	N[a] *(percent)*	N[a] *(percent)*
Health status			
Overall oral health status[f]			
Very good or excellent	238 (13.9)	51 (12.6)	7 (10.8)
Good	405 (23.7)	90 (22.2)	15 (23.1)
Fair	535 (31.3)	104 (25.6)	14 (21.5)
Poor	529 (31.0)	161 (39.7)	29 (44.6)
Oral pain or distress in past three months[b]			
None	691 (40.5)	102 (25.1)	16 (24.6)
A little bit/some	728 (42.6)	188 (46.3)	32 (49.2)
Quite a bit/a great deal	288 (16.9)	116 (28.6)	17 (26.2)
Antiretroviral medications[b]			
No	334 (19.6)	127 (31.5)	29 (44.6)
Yes	1,367 (80.4)	276 (68.5)	36 (55.4)
Chart CD4 cell count[g]			
<200 cells/mm^3	329 (20.2)	64 (16.4)	10 (15.4)
≥200 cells/mm^3	1,303 (79.8)	326 (83.6)	55 (84.6)
Chart HIV viral load[f]			
Detectable	727 (44.7)	196 (50.8)	37 (57.8)
Undetectable	900 (55.3)	190 (49.2)	27 (42.2)
Years since testing positive[c] (mean [SD])	10.17 (7.17)	10.84 (7.32)	9.72 (7.12)
SF-8™ Health Survey physical composite score[b,h] (mean [SD])	48.54 (9.84)	45.90 (10.64)	48.06 (9.49)
SF-8™ Health Survey mental composite score[b,h] (mean [SD])	47.71 (11.30)	42.36 (11.90)	38.48 (13.86)
Total number of dental problems[b,c] (mean [SD])	3.06 (2.24)	4.25 (2.50)	4.78 (2.62)

[a]Total *N* may not sum to total sample due to missing data. Percentages are based on number of responses in each category and may not add to 100 due to rounding.

[b]$p \leq 0.001$

[c]degree of freedom = 2, 2,175

[d]$p \leq 0.01$

[e]degree of freedom = 2, 2,139

[f]$p \leq 0.05$

[g]The range for a healthy CD4 count is 500–1,000 cells/mm^3. A CD4 count of <200 cells/mm^3 is an indicator of an AIDS diagnosis. Source: Department of Health and Human Services (US). AIDS.gov: understand your test results: CD4 count [cited 2010 Dec 13]. Available from: URL: http://aids.gov/hiv-aids-basics/diagnosed-with-hiv-aids/understand-your-test-results/cd4-count

[h]degree of freedom = 2, 2,172

HIV = human immunodeficiency virus

SPNS = Special Projects of National Significance

meth = methamphetamine

SD = standard deviation

MSM = men who have sex with men

NA = not applicable

mm^3 = cubic millimeter

SF-8™ = Short Form 8™

AIDS = acquired immunodeficiency syndrome

Table 2. Modeling the association between methamphetamine use and dental problems among a sample of HIV-positive adults, controlling for predisposing, enabling/structural, and need factors: SPNS Oral Health Initiative, 14 sites, 2007–2010

Variable	*Patients (n=1,622)* N	*ß[a] (95% CI)*	P-*value*
Personal factors			
Gender			
Male	1,270	−0.204 (−0.432, 0.023)	0.079
Female	352	Ref.	Ref.
Age	1,622	−0.004 (−0.013, 0.004)	0.287
Education	1,622	0.037 (0.015, 0.059)	≤0.001
Race/ethnicity			
White	580	Ref.	Ref.
Black or African American	632	0.071 (−0.172, 0.314)	0.566
Hispanic or Latino	326	0.137 (−0.237, 0.510)	0.473
Other race	84	−0.015 (−0.518, 0.489)	0.954
Employment			
Unemployed	540	Ref.	Ref.
Working full- or part-time	509	0.161 (−0.024, 0.346)	0.088
Disabled	552	0.092 (−0.124, 0.308)	0.405
Other	21	−0.412 (−1.213, 0.390)	0.314
Housing			
Own home or apartment	975	Ref.	Ref.
Someone else's home or apartment	400	−0.153 (−0.445, 0.140)	0.306
Temporary or no housing	247	0.003 (−0.439, 0.445)	0.989
MSM HIV exposure			
Yes	754	0.406 (0.224, 0.588)	≤0.001
No	868	Ref.	Ref.
Financial barriers			
Dental insurance			
Any	574	−0.144 (−0.346, 0.058)	0.162
None	1,048	Ref.	Ref.
Structural barriers			
Most important reason you did not get dental care at the time you needed it			
No insurance or could not afford it	427	0.506 (0.246, 0.767)	≤0.001
Difficulty finding or getting dental care	157	0.487 (0.133, 0.841)	0.007
Fear or worry of dentist or dental experience or privacy	69	0.707 (0.077, 1.336)	0.028
Dental care was not a priority/I was ill/I was addicted	65	0.421 (0.106, 0.736)	0.009
I did not want to go to the dentist or had a prior bad experience	52	0.322 (−0.159, 0.802)	0.189
Some other reason	25	1.114 (0.307, 1.921)	0.007
Did not have trouble getting dental care since testing positive	827	Ref.	Ref.
Health habits and substance use			
Brush teeth daily in past 30 days			
Yes	1,383	−0.302 (−0.466, −0.137)	≤0.001
No	239	Ref.	Ref.
Eat hard sugar candy or chew gum with sugar in past 30 days			
Yes	1,001	0.113 (−0.062, 0.288)	0.205
No	621	Ref.	Ref.
Drink soda (with sugar) in past 30 days			
Yes	1,163	0.086 (−0.111, 0.282)	0.392
No	459	Ref.	Ref.
Grind/clench teeth in past 30 days			
Yes	538	0.484 (0.288, 0.679)	≤0.001
No	1,084	Ref.	Ref.
Smoke in past 30 days			
Yes	902	−0.219 (−0.450, 0.013)	0.064
No	720	Ref.	Ref.

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Table 2 (continued). Modeling the association between methamphetamine use and dental problems among a sample of HIV-positive adults, controlling for predisposing, enabling/structural, and need factors: SPNS Oral Health Initiative, 14 sites, 2007–2010

Variable	*Patients (n=1,622)* N	*ß[a] (95% CI)*	P-*value*
Health habits and substance use			
Alcohol use in past week			
None	1,042	Ref.	Ref.
≤7 drinks	459	0.225 (0.028, 0.422)	0.025
≤14 drinks	71	0.131 (−0.230, 0.493)	0.477
>14 drinks	50	0.043 (−0.433, 0.519)	0.860
Meth use			
Never used meth	1,219	Ref.	Ref.
Past meth use	348	0.504 (0.169, 0.840)	0.003
Current meth use	55	1.494 (0.222, 2.766)	0.021
Crack or cocaine use			
Never used crack or cocaine	832	Ref.	Ref.
Past crack or cocaine use	731	0.116 (−0.211, 0.443)	0.487
Current crack or cocaine use	59	0.654 (−0.445, 1.753)	0.244
Polydrug use			
Never used meth and/or crack or cocaine	751	Ref.	Ref.
Past meth and/or crack or cocaine use	767	−0.214 (−0.493, 0.064)	0.131
Current meth and/or crack or cocaine use	104	−0.959 (−2.152, 0.234)	0.115
Health status			
Overall oral health status			
Very good or excellent	224	−1.982 (−2.440, −1.524)	≤0.001
Good	387	−1.592 (−1.846, −1.337)	≤0.001
Fair	471	−0.926 (−1.149, −0.703)	≤0.001
Poor	540	Ref.	Ref.
Oral pain or distress in past three months			
None	589	Ref.	Ref.
A little bit/some	719	1.070 (0.860, 1.279)	≤0.001
Quite a bit/a great deal	314	2.018 (1.759, 2.276)	≤0.001
Antiretroviral medications			
Yes	1,234	0.059 (−0.100, 0.218)	0.466
No	388	Ref.	Ref.
Chart CD4 count[b]			
≥200 cells/mm^3	1,338	0.008 (−0.225, 0.241)	0.945
<200 cells/mm^3	284	Ref.	Ref.
Chart HIV viral load			
Undetectable	852	−0.142 (−0.373, 0.090)	0.230
Detectable	770	Ref.	Ref.
Years since testing positive	1,622	−0.016 (−0.030, −0.002)	0.030
SF-8™ Health Survey physical composite score	1,622	−0.007 (−0.020, 0.005)	0.239
SF-8™ Health Survey mental composite score	1,622	−0.016 (−0.024, −0.008)	≤0.001

[a]Difference in mean number of dental problems vs. referent MSM

[b]The range for a healthy CD4 count is 500–1,000 cells/mm^3. A CD4 count of <200 cells/mm^3 is an indicator of an AIDS diagnosis. Source: Department of Health and Human Services (US). AIDS.gov: understand your test results: CD4 count [cited 2010 Dec 13]. Available from: URL: http://aids.gov/hiv-aids-basics/diagnosed-with-hiv-aids/understand-your-test-results/cd4-count

HIV = human immunodeficiency virus

SPNS = Special Projects of National Significance

CI = confidence interval

Ref. = reference category

MSM = men who have sex with men

meth = methamphetamine

mm^3 = cubic millimeter

SF-8™ = Short Form 8™

AIDS = acquired immunodeficiency syndrome

status were significantly associated with a greater number of dental problems.

DISCUSSION

This research study makes two important contributions to public health research on oral health care among PLWHA who have limited access to oral health care. First, this research demonstrates that, among adults who were HIV-positive and had limited access to oral health care, past and current meth use was significantly associated with a greater number of dental problems, adjusting for predisposing, enabling/structural, and need factors. Although the effects of meth use on oral health are recognized in case studies and empirical literature, no studies have been designed to specifically test the relationship between meth use and dental problems among PLWHA, grounded in a multilevel conceptual framework. This research study substantiates prior clinical case[11–13] and empirical[15] findings associating meth use and considerable dental problems, such as poor oral health status, oral pain, grinding or clenching, and infrequent brushing of teeth in an adult population. This study challenges the finding of Cretzmeyer et al. that there is no association between meth use and dental disease.[14] In fact, this large study demonstrates that meth users have significantly more dental problems than never users.

To the best of our knowledge, this research study is the first to provide oral health information about current and former meth users who are also HIV-positive. Results suggest that meth users are in need of dental care and have difficulty accessing care as a result of predisposing, need, and enabling factors. These results reinforce the need to promote access to oral health care for this population. This study also builds a foundation for future research on the association between substance use and oral health for an understudied HIV-positive adult population.

Second, this study provides information about individual, structural, and need factors that may be associated with increased dental problems among PLWHA more generally. The study examined potential confounders and found that respondents with more dental problems were more likely to report fewer years living with HIV diagnosis, poor self-reported mental health status, MSM HIV exposure, more years of education, poor oral health status, oral pain, a history of forgoing dental care, some alcohol use, and bruxism. Guided by the IOM[16] and Andersen conceptual frameworks,[17,18] study findings illustrate important characteristics that influence access to and utilization of health-care services that are integral to understanding the unmet oral health needs and dental problems for this population. Additional research is needed to learn more about the prevalence of specific dental problems and associated risk and protective factors among PLWHA. For example, the finding that MSM HIV exposure is associated with dental problems requires further study, given the potential for confounding among risk and protective factors such as stigma, race/ethnicity, multiple potential routes of transmission, and self-reported data.

Overall, this study demonstrates that it is possible to recruit past and current meth users into dental care, especially given that they present to care with more dental problems. It is interesting to note that crack or cocaine and polydrug use were not associated with dental problems, controlling for all other factors in the model. Perhaps future research could also examine the effects of these and other drugs on oral health and how they may be interrelated with other predisposing, enabling, and need factors for substance users accessing oral health care.

Limitations

Despite its many strengths, this study had two limitations. Data were predominantly self-reported and were subject to reporting and missing data issues. Survey constraints did not allow for detailed questions on a broad range of illegal substance use, route of drug administration, and severity and duration of drug use. This information would have provided a richer understanding of patterns of drug use and oral health.

CONCLUSION

Access to oral health care is integral to overall health for vulnerable and underserved populations.[1] This study highlights personal, structural, and health characteristics associated with dental problems for PLWHA. Our findings highlight the importance of developing programs that facilitate the initiation and continuity of oral health care for PLWHA. Public health practitioners across behavioral, social, and medical disciplines can help promote and facilitate access to oral health care for individuals with current or past meth use and HIV disease. Future research should seek to identify other barriers to dental care for people with substance use and HIV comorbidity and should evaluate the need for and effectiveness of policies and programs that target this population.

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