A Comparison of Unmet Needs for Dental and Medical Care Among Persons with HIV Infection Receiving Care in the United States

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Abstract

Objective: Oral health conditions associated with HIV disease are frequently more severe than those of the general population, making access to both dental and medical care important. Using the domains specified in the Behavioral Model of Health Services Use, this paper examines the correlates of unmet needs for dental and medical care in a nationally representative sample of patients with HIV. Methods: This investigation is a cross-sectional study using baseline data from the HIV Cost and Services Utilization Study (HCSUS), the first nationally representative study of persons in care for HIV. Using probability-based techniques, 4,042 people were randomly selected in January 1996, and 2,864 (71%) completed a structured interview that included questions on unmet needs for dental and medical care. Regression analysis was used to identify variables associated with having unmet needs for dental care only, medical care only, and both medical and dental care. Results: Of the estimated 230,900 people in treatment for HIV in the United States, approximately 58,000 had unmet medical or dental needs based on self-reported data. Unmet dental needs were more than twice as prevalent as unmet medical needs (32,900 vs 14,300), and 11,600 people were estimated to have both types of unmet needs. Multinomial logit regression showed that persons with low income had increased odds of reporting unmet needs for both dental and medical care. The uninsured and those insured by Medicaid without dental benefits had more than three times the odds of having unmet needs for both types of care than did the privately insured. Conclusions: To serve both the dental and medical needs of diverse populations affected by HIV disease, greater coordination of services is needed. In addition, state insurance programs for people with HIV should consider the feasibility of expanding their benefit structure to include dental care benefits. [J Public Health Dent 2001;61(1):14-21]

Key Words: acquired immunodeficiency syndrome, health services accessibility, oral health.

Dental and medical services have increasingly important and interrelated roles in the management of human immunodeficiency virus (HIV) disease. According to some estimates, more than 90 percent of HIV patients will have at least one oral manifestation in the course of the disease (1,2). Oral health problems associated with HIV are often more complicated and difficult to treat than those in the general population, and require the attention of both medical and dental personnel. Without early and adequate access to dental and medical care, periodontal disease in the immunocompromised patient can lead to lifethreatening infection (2). Moreover, findings from oral examination may have strong implications for medical diagnosis and treatment. In early stages of HIV disease, oral health conditions are frequently a sign of declining immune function. For instance, oral candidiasis in the presence of HIV infection is a widely recognized prognostic indicator for developing AIDS within two years (3). The Centers for Disease Control and Prevention (CDC) recommend that prophylaxis for pneumocystis carinii pneumonia be commenced in all HIV-positive patients with a history of oral thrush (4). In patients with more advanced HIV disease, treatment of painful symptoms of the mouth, oropharynx, and esophagus may improve oral intake, thereby decreasing problems related to weight loss and adherence to oral treatment regimens (2,5).

Despite the importance of both dental and medical care in managing HIV disease, available evidence suggests that socially marginalized populations are more likely to report unmet needs for these services. Racial and ethnic minorities (6), women (7), and injection drug users (IDUs) with HIV have been found to have relatively greater unmet needs for medical care than do less disadvantaged groups. Although the estimates vary widely, unmet needs for dental care are also a problem among these populations. An evaluation of a health and social services program in San Francisco found that 26 percent of 1,056 mostly indigent persons with HIV reported unmet needs for dental care-a level greater than that for any other service (8). In an earlier study, 52 percent of a convenience sample of 857 HIV pa-

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tients reported needs for dental care, which was again higher than that for any other service (5). The AIDS Cost and Services Utilization Study (AC-SUS) found much lower rates of unmet dental needs among 2,090 patients with HIV, ranging from approximately 5 percent to 9 percent across three follow-up interviews (9). The variability in these rates highlights some of the limitations of working with non-representative samples. In addition, none of these studies estimated the extent to which patients with HIV disease experience unmet needs for both medical and dental services and the factors associated with this particular indicator of poor access. For example, lack of any insurance could result in unmet needs for both medical and dental care, although insured groups also may have problems with access (10). Persons with insurance covering medical but not dental care may be more likely to have unmet dental needs; however, such insurance plans might be less generous in other ways that result in unmet medical needs.

Prior studies on access to care and unmet needs among patients with HIV often have been based on data from limited geographic areas and nonrepresentative patient samples. The ACSUS used purposive sampling techniques for selecting provider sites, and implemented probability sampling of patients within sites only. The current study improves on previous work in several ways. We use data on the first national probability sample of patients receiving care for HIV in the US, representing approximately 230,900 HIV patients over age 18 (11). This sample represents a large proportion of all persons living with HIV or AIDS in the US, which has been estimated at approximately 650,000 (11). Second, this study reports the prevalence not only of unmet needs for dental care and medical care alone, but also for both types of care—as well as the proportion of patients with no unmet needs for either service. Comparisons of the prevalence of these unmet needs are then made with the general US population and two national chronic disease samples. Finally, using multivariate analysis, we determine the patient characteristics associated with each category of unmet needs among patients with HIV. With regard to the latter analysis, we hypothesized that socioeconomic variables, particularly the different types of medical and dental insurance that patients possessed, would be more strongly associated with unmet needs for both medical and dental care than with unmet needs for either service alone.

Methods

The HIV Cost and Services Utilization Study (HCSUS) is the first nationally representative study of HIV-positive adults receiving care in the contiguous United States. The general objective of HCSUS is to inform health policy by describing the characteristics of HIV patients, the costs of treating them, and the types of services they use. For practical reasons, the reference population was limited to persons at least 18 years old with known HIV infection who made at least one visit for regular or ongoing care to a nonmilitary, nonprison medical provider other than an emergency department during a specified "population definition period." This period was January 5 to February 29, 1996, in all but one metropolitan area, where the start was delayed until March. Full details of the design are available elsewhere (12,13).

The HCSUS used a multistage design in which geographic areas, medical providers, and patients were sampled. In the first stage, we sampled with certainty the eight Metropolitan Statistical Areas (MSAs) with the largest AIDS caseloads plus an additional 20 MSAs and 24 clusters of rural counties. In the second stage, we sampled 58 urban and 28 rural "known providers" from lists of all providers known by local informants to provide HIV care. To ensure that all HIV providers were represented, we also sampled 87 urban and 23 rural "other providers" who had affirmed caring for HIV patients in a screening survey of approximately 4,000 physicians randomly selected from the Physician Master File of the American Medical Association. In the third stage, we sampled patients from anonymous lists of all eligible patients who visited participating providers during the population definition period. To the extent possible, we removed duplicate entries across lists to minimize the possibility of persons appearing on more than one list. We set the third-stage sampling rates such that the overall probability of selection was as uniform as possible within subgroups. The overall rate was doubled for women and increased again for members of staff and group model health maintenance organizations.

The HCSUS enrolled 57 of 58 urban known providers and replaced the one refusing institution with a similar institution in the same city (98 to 100 percent). We enrolled 22 of 28 (79 percent) rural known providers, 61 of 87 (70 percent) urban other providers, and 19 of 23 (83 percent) of rural other providers. We handled provider nonresponse by weighting rather than by replacement in these latter three provider strata. Of the 4,042 eligible participants sampled, we interviewed 76 percent, with 71 percent yielding long-form interviews (2,864 interviews) and 5 percent yielding shortform or proxy interviews. For a further 16 percent, we obtained some basic nonresponse data from providers. The overall coverage rate (i.e., the ratio of the population directly represented to the population that would have been directly represented if we had complete responses at all levels) is approximately 73 percent for all interviews, and 68 percent for long-form interviews. The analyses presented in this paper are based on the baseline longform data only. These analyses incorporate nonresponse adjustment based on the additional nonresponse data collected as described below.

The inverse of a respondent's sampling probability is his or her sampling weight, which adjusts for the differential selection probabilities across subgroups of the population. We also constructed nonresponse weights to adjust for differential cooperation rates using the supplemental data (shortform and proxy interviews, and nonresponse data) collected on nonresponding patients and providers, and multiplicity weights to adjust for the fact that some patients had more than one opportunity to enter the sample. The product of these three weights forms the analytic weight for each respondent (14), which is equivalent to an estimate of the number of persons represented by that respondent.

Interviews were conducted using computer-assisted personal interviewing instruments designed for the study (15). Fieldwork for the baseline interview began in January 1996 and ended 15 months later. Ninety-one percent of the interviews were conducted in person and the rest were conducted by telephone. We approached anonymously selected subjects for interview only after providers or their agents obtained permission. RAND and a local institutional review board reviewed all consent forms and informational materials. Wherever a local board was unavailable, selected providers signed single project assurances or independent investigator agreements as appropriate.

Independent Variables. The selection of variables that might be associated with unmet needs for dental and medical services was guided by the predisposing, enabling, and need factors specified in the Behavioral Model of Health Services Use (16,17). The predisposing factors are based on the proposition that characteristics such as age, sex, and race influence an individual's propensity to use different types of health services. Enabling factors include the social and economic resources that facilitate access to care. Need-related factors refer to the presence or severity of illness.

Predisposing factors included in this study were age, sex, race/ethnicity, education, employment status, and mode of HIV exposure. Race/ethnicity was categorized as African American, Hispanic, white, and other ethnicity. The latter category included participants who identified themselves as Alaskan Native, American Indian, Asian, Pacific Islander, or mixed racial background. Education was categorized as bachelor's degree or higher, associate degree or some college, high school diploma or general equivalency degree, and less than high school or no degree. Employment was measured as a dichotomous variable of full- or part-time employment versus being unemployed. Mode of HIV exposure was categorized as heterosexual, men who have sex with men (MSM), IDU, and "other" exposure. Participants who identified as both MSM and IDU were categorized as IDU. The "other" exposure category refers to participants who reported that their HIV status was related to having hemophilia or receiving an infected blood transfusion, or to participants for whom HIV exposure mode was not defined.

Variables for income, health insurance, and region of residence were included to measure enabling resources. Income was categorized as >\$25,000, between \$10,001 and \$25,000, between \$5,001 and \$10,000, and ≤\$5,000. Because of missing data on dental insurance, the combined dental-medical insurance variable was constructed with information from an additional source. Of the 483 participants with missing dental insurance data, 291 had indicated that their medical care was covered by the state Medicaid program. Using a national directory of state and territorial dental directors, health agencies within the 50 states and the District of Columbia were contacted and asked if adult dental benefits were included in their Medicaid or other public programs during the 1995-97 period. States that financed solely emergency dental services, such as those for acute pain or infection, were categorized as not including an adult dental benefit in their programs. The state dental data were then linked to the 291 Medicaid recipients with missing dental insurance data. Of the 192 remaining cases with missing data, 154 indicated that they had no public or private medical insurance. Because the likelihood of having dental but no medical insurance seemed extremely low, these cases were categorized as having no dental coverage. The number of cases remaining with missing dental insurance data was 38. These 38 cases were excluded from the multivariate analysis. When individuals reported more than one type of medical care coverage, they were assigned to an insurance category according to the following priority: (1) private coverage, (2) Medicare, and (3) Medicaid.

One need-related clinical factor was used to account for the effect of disease severity on perceived unmet need. We included self-reported data on helper T4 lymphocyte (CD4) count, categorized as $<.050 \times 10^9$ /L, between $.050 \times 10^9$ /L and 0.199×10^9 /L, between 0.20×10^9 /L and 0.499×10^9 /L, and $>0.500 \times 10^9$ /L. Previous work supports the reliability and validity of self-reported CD4 count data (18).

Dependent Variables. Unmet needs for dental and for medical care were determined separately by the following two questions: (1) "In the last six months, was there a time when you needed dental care but could not get it?" (2) "During the last six months, did you ever need medical care but could not get it?" Response categories for both questions were yes/no. A four-category composite variable was derived from the responses to these questions to represent patients with unmet need for dental services only, medical services only, both medical and dental services, and patients with neither unmet service need. Similar questions have been used extensively in studies of unmet needs for care in both the general population and patients with HIV, supporting the validity of these measures (5,8,19,20-22).

Analysis. Using data from the baseline interview, the main analysis in this study concerns the identification of variables that are independently associated with having unmet needs for dental care only, medical care only, and for both medical and dental care. We used weighted sample means to estimate population prevalence parameters. We also imputed missing values for essential variables using a standard "hot-deck" strategy (23). Briefly, for each variable being imputed, we classified all respondents into imputation classes based on observed values for other variables. Then, for each respondent missing a value for the variable being imputed, we randomly selected a donor value from those respondents not missing a value in the same imputation class. We imputed less than 5 percent of CD4+ lymphocyte counts, less than 3 percent of insurance and income values, and less than 0.5 percent of other key variables in the analyses (11). This resulted in a final analytic sample of 2,820. Had we not imputed missing CD4 count values, the analytic sample size would have been 2,680.

To adjust the standard errors and statistical tests for the differential weighting and complex sample design, we used linearization methods (24) available in the SUDAAN and Stata software packages (14). Our standard errors are not adjusted for imputation; however, given the slight amount of missing data, any underestimation of the variability should be small. Using the analytic weights, descriptive statistics were calculated for each category of unmet service needs. In addition, the distribution of unmet needs was calculated for each category of the independent variables. Because the dependent variable had more than two categories, standard logistic regression was not adequate for the multivariate analysis. The weighted data

therefore were fitted to a multinomial (polytomous) logit regression model, to identify variables that were independently associated with having unmet needs for dental care only, medical care only, and for both medical and dental care. The group with no unmet service needs served as the reference category. Odds ratios and 95 percent confidence intervals were calculated.

Results

Table 1 shows the distribution of unmet service needs for the HCSUS cohort and for national samples of persons in the general US population, persons with asthma, and persons with heart disease from previously unpublished tabulations of the 1994 National Access to Care Survey (19). Compared with a national probability sample of the general population, patients receiving medical care for HIV disease have considerably higher levels of unmet need for care. The weighted data show that approximately 14 percent of patients with HIV disease (representing 32,900 people nationally) have unmet dental care needs alone, in comparison with approximately 9 percent in the general population. Although the 6 percent prevalence (representing 14,300 people nationally) of unmet needs for medical care in the HCSUS sample is virtually identical to that in the general population (5.7%), unmet needs for both dental and medical care were twice as high in comparison, at 5 percent (11,600 persons) and 2.5 percent, respectively. Table 1 also provides comparisons with two other chronic disease samples. A higher proportion of patients in care for HIV disease report unmet need for dental care alone (14%) than patients with either asthma (10%) or ischemic heart disease (8%). In contrast, the level of unmet need for medical care among HIV patients is approximately equal to that for people with ischemic heart disease (6.2% and 5.9%, respectively), but substantially lower than for patients with asthma (approximately 10%). The prevalence of unmet needs for both types of care is twice as high for patients with HIV than for those with heart disease (5% vs 2.4%), and slightly higher than for those with asthma (4%).

Unmet Service Needs and Respondent Characteristics. Table 2 shows that most of the predisposing and enabling factors were associated with un-

met dental and medical needs. In general, traditionally vulnerable groups and those with fewer enabling resources were more likely to have unmet needs for care. In comparison with whites, greater proportions of African Americans, Hispanics, and persons of other minority backgrounds had unmet needs for both dental and medical care, with African Americans and Hispanics also reporting relatively greater levels of need for dental care alone. Further, significantly fewer African Americans than whites reported having no unmet service needs. People exposed to HIV through heterosexual contact or drug use had higher levels of needs for both types of care than MSMs and—along with persons in the "other exposure" category—these same groups more frequently reported unmet dental needs alone. People with less than a bachelor's degree more frequently reported unmet needs for dental care alone and for both types of services. The enabling variables were associated with unmet medical need; but the differences between respondent characteristics were generally greater for unmet needs for dental care alone and for having no unmet service needs. For example, only 56 percent of Medicaid recipients without dental insurance reported having no unmet needs, compared with 90 percent of patients with private medical and dental insurance. Unemployed persons had higher levels of all three types of unmet need than the employed, and people living in the South more often reported unmet dental need alone and both types of unmet service needs than people living in the Northeast.

Multivariate Analysis. Multinomial logit regression analysis was used to estimate the strongest determinants of unmet service needs. In the multivariate analysis, several of the associations of predisposing and enabling characteristics with unmet service needs were reduced, but many remained significant (Table 3). Further, the general pattern of relationships between predisposing, enabling, and need factors and unmet service needs observed in the bivariate analyses also held in the multivariate analyses.

All of the predisposing factors were significantly associated with unmet service needs in the multivariate analysis. Compared with patients aged 18 to 34 years, those aged 50 years and older had significantly reduced odds of having unmet needs for medical care only and for both types of care. Sex, mode of HIV exposure, and education were each associated with unmet dental need alone, though not with any other category of service

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Prevalence of Unmet Needs for Dental and Medical Services among National
Samples of Patients in Care for HIV, the US General Population,* and Patients
with Ischemic Heart Disease* or Asthma*

	Unmet Needs			No Unmot
	Dental Only	Medical Only	Dental & Medical	Service Needs
HCSUS cohort				
Unweighted <i>n</i>	403	201	131	2,123
Weighted <i>n</i>	32,900	14,300	11,600	172,100
Weighted % (SE)	14.3 (1.7)	6.2 (0.8)	5.0 (1.1)	74.5 (2.2)
US general population (%)†	8.5	5.7	2.5	83.3
Ischemic heart disease population (%)‡	7.7	5.9	2.4	84.0
Asthma population (%)¶	9.8	9.6	4.2	76.4

*Comparative data are from the 1994 National Access to Care Survey. The following question measured unmet needs for medical care: "During the past 12 months, was there a time when you wanted medical care or surgery but could not get it at that time?" This question was then repeated substituting "dental care" for "medical care or surgery" (Berk, Schur, and Cantor, 1995).

[±]Age range=3-97 years; mean age=65 years.

Age range=1-84 years; mean age=31 years.

⁺Age range=0-95 years; mean age=35 years.

 TABLE 2

 Weighted Percent Distribution (SE) of Categories of Unmet Service Needs, by Selected Respondent Characteristics

	Unmet Needs			Nolinmet
Characteristics (n)	Dental Only	Medical Only	Medical & Dental	Service Needs*
Predisposing		······································		
Age				
18-34 years (985)†	14 (1.8)	7 (0.9)	6 (1.4)	73 (2.8)
35–49 years (1,587)	14 (1.6)	6 (1.0)	5 (1.1)	74 (1.8)
50+ years (286)	14 (4.5)	3 (1.1) [¶]	3 (1.0) [¶]	81 (4.3) [¶]
Sex			- (= = =)	
Female (845)	16 (2.8)	7 (1.3)	7 (2.9)	71 (4.4)
Male (2,013)†	14 (1.6)	6 (0.7)	4 (0.7)	76 (1.8)
Race/ethnicity	10 (2 0)*	((1,0))	(1)08	70 (2 0)
African American (958)	18 (3.0) 14 (3.5)¶	6 (1.0) 7 (1.5)	6 (1.0) ⁵	70 (3.0)
Hispanic (412)	14 (2.5) *	/(1.5)	6 (1.4) ⁵	73 (2.9)
Other (91)	13 (3.6) 13 (1.5)	(3.9)	8 (2.1) ^m	79 (1.0)
	12 (1.5)	6 (0.9)	4 (1.4)	78 (1.9)
Heterosexual (578)	20 (4 M§	5(19)	6 (1 9)¶	69 (4 3) [§]
MSM (1 300)+	11(15)	6(0.9)	4 (0.8)	79 (2.0)
IVDU (693)	$15(25)^{\bullet}$	7(1.3)	(0.0)	$72(3.3)^{II}$
Other (287)	17(2.2)	7(1.5)	6 (2 2)	70 (2 7)¶
Education	17 (2.2)	7 (1.0)	0 (2.2)	, (2)
\geq Bachelor's (529)†	6 (1.0)	6 (1.1)	3 (1.1)	85 (1.7)
AA/some college (808)	13 (1.2) [•]	5 (1.2)	5 (1.2)¶	77 (2.1) [¶]
HS diploma (804)	$14(1.9)^{\bullet}$.8 (0.9)	4 (0.7)¶	73 (2.2) [•]
<hs (721)<="" td=""><td>$21(4.1)^{\bullet}$</td><td>5 (1.6)</td><td>8 (1.7)[•]</td><td>65 (4.4)[•]</td></hs>	$21(4.1)^{\bullet}$	5 (1.6)	8 (1.7) [•]	65 (4.4) [•]
Enabling	(/		- ()	
Income				
>\$25,000 (778)+	7 (1.4)	5 (0.9)	1 (0.4)	86 (1.6)
\$10,001-\$25,000 (734)	14 (1.6) [•]	4 (0.6)	5 (2.1) [§]	77 (2.2) [●]
\$5,001-\$10,000 (738)	18 (3.0) [•]	8 (1.7) [¶]	6 (1.3) [•]	68 (3.1) [•]
\$0-\$5,000 (608)	21 (3.2)	8 (1.6) ⁵	8 (1.2) [•]	63 (3.1) [•]
Insurance‡				
Private w/dental (570)†	5 (1.3)	3 (0.7)	1 (0.5)	90 (1.4)
Private, no dental (320)	13 (2.2)	4 (1.1)	2 (0.6)	82 (2.1) ^S
Medicaid w/ dental (596)	13 (1.9)	8 (1.3) ⁹	5 (0.6)	74 (2.2)
Medicaid, no dental (281)	26 (5.0)	8 (2.7) ^S	10 (2.7)	56 (5.5)
Medicare w/dental (292)	11 (3.2)	9 (2.0) ⁹	5 (1.7) ⁹	75 (2.9)
Medicare, no dental (222)	18 (3.4)	3 (1.8)	8 (3.1)	70 (4.2)
No insurance (539)	19 (2.7) [*]	8 (1.5)	7 (1.8)	66 (3.1) °
Employment	11 (1 ()	F (0,0)	2 (0.8)	82 (2 0)
Full or part time (1,013)	11(1.6)	5 (0.9) 7 (0.9)¶	3(0.8)	62 (2.0) 70 (2.8)●
Coorenabio region	16 (0.2)	7 (0.8) -	/ (1.4)	70 (2.6)
Geographic region Midwest (331)	13 (4 7)	7 (0 5)	4 (0.5)	76 (4 0)
Northeast (706)t	9(11)	7(10)	4 (0.5)	80 (1 4)
South (913)	$20(2.6)^{\bullet}$	6 (1.5)	\$ (2.1)\$	66 (3 3) [•]
West (908)	11 (2.0)	6(15)	3(04)	80 (3.0)
Need: CD4 count	(****)	0 (1.0)	0 (0.1)	00 (0.0)
≥500 (253)†	15 (3.0)	7 (1.3)	3 (0.8)	75 (3.1)
200-499 (1,092)	17 (2.0)	5 (0.8)	5 (1.6)	73 (3.0)
50-199 (853)	12 (2.5)	7 (1.3)	4 (0.7)	77 (2.0)
0-49 (660)	13 (1.7)	7 (1.1)	6 (2.2)	73 (3.1)
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*Bivariate multinomial logit was used to test for significant differences across population characteristics. \pm Reference group. \pm Insurance data were missing for 38 participants. These observations were not included in the analyses. Significant at *P*<.05 level. Significant at *P*<.01 level.

need. Women had significantly lower odds of unmet dental need than did men, and persons exposed to HIV through heterosexual contact had approximately 50 percent greater odds of unmet dental needs than MSMs. Compared with patients with a bachelor's degree, the odds of having unmet dental needs only were significantly greater for patients with less than a high school education, a high school degree, or some college education. Among racial/ethnic minorities, the odds of unmet needs for either dental or medical care alone were not greater than those for whites; however, patients of Alaskan Native, American Indian, Asian, Pacific Islander, or mixed racial background had more than twice the odds of unmet needs for both types of care by comparison (OR=2.31; 95% CI=1.08, 4.97).

The enabling factors of income, region of residence, and employment status were associated with unmet needs for dental care only and for both types of care. Compared with patients who had annual incomes above \$25,000, patients in any income category of \$10,000 or below had nearly twice the odds of unmet needs for dental care alone and for both dental and medical care. Patients living in the western or southern regions of the United States had greater odds of unmet dental needs than those in the Northeast, and southern patients also had greater odds of unmet need for both types of care (OR=2.21; 95% CI=1.18, 4.12). The unemployed had nearly twice the odds of unmet needs for both dental and medical care than did those working full- or part-time (OR=1.96; 95% CI=1.13, 3.40).

Unlike any other enabling factor, health insurance coverage was strongly associated with all three categories of unmet service need. The uninsured and Medicaid recipients had increased unmet needs, compared with the privately insured. The odds of having unmet needs among Medicaid patients without dental coverage were more than twice as high for dental care only (OR=2.83; 95% CI=1.35, 5.94) and more than three times as high for both types of care (OR=3.16; 95% CI=1.05, 9.53) compared with the privately insured. The magnitude of these effects was similar to that for the uninsured, who had more than twice the odds of having unmet dental needs only (OR=2.63; 95% CI=1.61, 4.30) and

	Unmet Needs						
	Der	Dental		Medical		Dental and Medical	
Characteristics	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	
Predisposing		<u> </u>	<u> </u>				
Age +							
35-49 years	1.22	(0.96, 1.55)	1.01	(0.64, 1.59)	0.94	(0.62, 1.41)	
50+ years	0.77	(0.47, 1.28)	0.38‡‡	(0.21, 0.68)	0.41++	(0.19, 0.87)	
Sex (female)	0.72**	(0.53, 0.98)	0.95	(0.66, 1.35)	0.97	(0.37, 2.52)	
Race/ethnicity‡							
African American	0.96	(0.67, 1.38)	0.93	(0.60, 1.46)	0.89	(0.41, 1.95)	
Hispanic	0.93	(0.64, 1.34)	1.11	(0.67, 1.83)	1.26	(0.64, 2.45)	
Other	1.12	(0.33, 3.80)	1.42	(0.60, 3.33)	2.31++	(1.08, 4.97)	
Mode of exposure¶							
Heterosexual	1.49**	(1.02, 2.18)	0.85	(0.34, 2.17)	1.19	(0.67, 2.12)	
IDU	1.23	(0.84, 1.79)	0.97	(0.43, 2.00)	1.36	(0.81, 2.27)	
Other	1.33	(0.57, 3.12)	1.29	(0.74, 2.25)	1.19	(0.63, 2.24)	
Education [§]							
AA/some college	1.80**	(1.12, 2.90)	0.78	(0.43, 1.43)	0.98	(0.48, 1.97)	
HS diploma	1.67**	(1.11, 2.52)	0.93	(0.55, 1.57)	0.70	(0.30, 1.64)	
<hs< td=""><td>2.34‡‡</td><td>(1.46, 3.75)</td><td>0.62</td><td>(0.32, 1.18)</td><td>1.24</td><td>(0.55, 2.79)</td></hs<>	2.34‡‡	(1.46, 3.75)	0.62	(0.32, 1.18)	1.24	(0.55, 2.79)	
Enabling							
Income•							
\$10,000-\$25,000	1.36	(0.84, 2.19)	0.66	(0.38, 1.17)	1.98	(0.82, 4.77)	
\$5,001-\$10,000	1.82‡‡	(1.28, 2.59)	1.24	(0.72, 2.15)	2.33++	(1.04, 5.22)	
\$0\$5,000	1.93‡‡	(1.27, 2.92)	1.31	(0.61, 2.83)	2.77‡‡	(1.50, 5.14)	
Insurance∞							
Private, no dental	2.29**	(1.18, 4.42)	1.19	(0.65, 2.20)	1.31	(0.50, 3.41)	
Medicaid, dental	1.87 ^{+†}	(1.06, 3.28)	2.75‡‡	(0.35, 5.62)	1.97	(0.78, 4.95)	
Medicaid, no dental	2.83‡‡	(1.35, 5.94)	3.62 ^{‡‡}	(1.60, 8.13)	3.16 ⁺⁺	(1.05, 9.53)	
Medicare, dental	1.59	(0.75, 3.37)	3.03‡‡	(1.59, 5.80)	2.41	(0.64, 9.02)	
Medicare, no dental	1.93	(0.89, 4.14)	1.30	(0.43, 3.90)	2.87	(0.83, 9.88)	
No insurance	2.63¶¶	(1.61, 4.30)	3.18‡‡	(1.60, 6.32)	4.19 ^{‡‡}	(1.47, 11.97)	
Unemployed	1.25 ⁺	(1.18, 4.42)	1.15	(0.68, 1.93)	1.96++	(1.13, 3.40)	
Geographic region#		(,,		(0.00)		()	
Midwest	1.92	(0.82, 4.52)	1.27	(0.83, 1.96)	1.73	(0.84, 3.57)	
South	2.25##	(1.39, 3.63)	1.08	(0.59, 2.00)	2.21**	(1.18, 4.12)	
West	1.89‡‡	(1.23, 2.88)	1.09	(0.59, 2.03)	1.11	(0.59, 2.10)	
Need: CD4 count**	1.07	(,)	,		*	(0.07) 2012 0)	
200-499	1.07	(0.64, 1.78)	0.71	(0.46, 1.11)	1.69	(0.74, 3.84)	
50-199	0.72	(0.37.1.39)	0.86	(0.51, 1.46)	1.31	(0.71, 3.84)	
0-49	0.91	(0.53, 1.56)	0.97	(0.53, 1.75)	2.18	(0.84 5 64)	
~ 47	0.71	(0.00, 1.00)	0.77	(0.00, 1.70)	2.10	(0.04, 0. 04)	

 TABLE 3

 Multinomial Logit Regression Analysis of the Odds of Having Unmet Dental Needs, Unmet Medical Needs, and

 Both Unmet Dental and Medical Needs (n=2,820)*

*Reference group is having no unmet service needs. [†]Reference group is 18–34 years old. [‡]Reference group is white. [¶]Reference group is MSM contact mode of HIV exposure. [§]Reference group is bachelor's degree or higher. [•]Reference group is income >\$25,000. [∞]Reference group is private insurance with dental coverage. [#]Reference group is northeast region of the United States. **Reference group is CD4 count \geq 500. ^{+†}Significant at *P*<.05 level. ^{‡†}Significant at *P*<.01 level. [¶]Significant at *P*<.01 level.

four times the odds of having unmet needs for both types of care (OR=4.19; 95% CI=1.47, 11.97) than did patients with private medical and dental coverage.

Discussion

In this nationally representative sample, we estimated that more than 58,000 persons in the United States who were receiving care for HIV disease had unmet needs for dental or medical services in the previous six months. Unmet dental needs were twice as prevalent as unmet medical needs for this cohort. An estimated 5 percent (representing 11,600 persons nationally) reported that they had unmet needs for both types of services, which was higher than the rates reported by national samples of persons in the general population, persons with asthma, and persons with heart disease in a time frame that was twice as long (1 year). Patients aged <50 years, those with low income, the unemployed, and those living in the South were generally more likely to report unmet needs for both dental and medical care. Accounting for all of these characteristics, as well as CD4 counts, the greatest odds of having unmet needs for both types of care were experienced by the uninsured and Medicaid recipients without dental coverage. These findings have important implications for the delivery and financing of dental and medical care for patients with HIV, particularly for those from socially marginalized backgrounds.

No previous studies have examined the joint prevalence of unmet needs for both dental and medical services among patients with HIV disease. Capilouto and colleagues (5) investigated perceived need for dental care among patients with HIV disease, but did not include need for medical care in their analysis. In previous studies including both dental and medical care, the joint prevalence of unmet needs for both types of services was not determined (8,20). To our knowledge, this is the first study that defines unmet needs for both dental and medical care as an important variable distinct from needs for either service alone. The usefulness of this dependent variable in identifying at-risk populations was supported by the multivariate results regarding insurance coverage. Among uninsured patients, the odds of having unmet needs for both dental and medical care were somewhat greater than the odds of having unmet dental needs alone. By comparison, patients with insurance limited to medical care had increased odds of unmet dental needs, but no significant increase in the odds of having unmet needs for both types of care.

Previous work on access to care among patients with HIV has not examined in depth the associations of dental and medical needs with various health insurance arrangements. Insurance has been often measured as a dichotomous construct, collapsing private insurance with publicly financed plans (5,8) or publicly financed plans with the lack of insurance (25). Moreover, information on dental benefits often is not included in measures of insurance status (8). The present study included seven categories of health insurance, indicating whether each type of insurance provided dental benefits. This permitted a more detailed analysis of the effects of this enabling factor. Even when they had state-sponsored dental benefits, the Medicaid recipients in this sample showed significantly greater unmet needs for dental care alone compared with privately insured persons. In addition, the odds of having unmet needs for either dental or medical care alone were somewhat higher for Medicaid recipients without dental coverage than for the uninsured, which suggests that nonfinancial barriers are impeding access to care for these patients.

There were several limitations to this study. Because one of the goals of the HCSUS was to examine the medical costs of treating HIV disease, the sample consisted entirely of patients receiving medical care. This probably resulted in an underestimation of unmet needs for medical care among patients with HIV, which would also, in turn, affect our comparisons with the general population and other patient groups not sampled directly from medical providers. It is possible that the differences in unmet medical needs between HIV patients and the three comparison groups sampled in the National Access to Care Survey (19) were actually much greater than we observed. Although the sampling strategy probably did not result in an underestimation of unmet dental needs to as great an extent, persons with HIV with no access to both medical and dental care were not included in our study. For this reason, and because all HCSUS participants were receiving at least some medical care, comparisons between dental and medical unmet needs should be interpreted with caution. However, the prevalence of unmet needs for both types of care among all persons with HIV or AIDS is likely to be even greater than in the HCSUS sample, particularly among those who are not in care (11). Finally, because this was a cross-sectional analysis, we have limited ability to make inferences about the causes of unmet needs. However, it seems reasonable to assume that low-income status and lack of insurance largely preceded the incidence of unmet medical and dental needs.

The results of this nationally representative study have important implications for the way that dental and medical services are provided to people with HIV in the United States. Because of the largely separate means of delivering dental and medical services, health care providers with substantial HIV caseloads should create systems to coordinate and monitor the adequate receipt of both types of care. Case management may be a useful strategy for ensuring that HIV patients receive both dental and medical services by assisting with supportive services such as transportation (26). Locating service providers on the same sites also may help ameliorate problems with access. In light of studies suggesting underrecognition of common oral health conditions by physicians (27,28), dental clinicians have critical roles in complementing medical care for HIV by providing regular input into oral health assessments, treatment, and patient education. Unfortunately, HIV patients without the means to pay for dental care are less likely to benefit from the participation of dental clinicians in managing the oral manifestations of their disease. For this reason, it seems important that state insurance programs for people with HIV evaluate the feasibility of expanding their benefit structure to include dental care benefits because the groups among whom the epidemic is spreading most rapidly---that is, minorities, women, and IDUs-often are inadequately insured (11). State programs that already include dental coverage might also consider the potential impact of less generous Medicaid fee schedules and coverage on unmet needs. However, as the results of this study suggest, insurance coverage alone does not guarantee access to care. Concerted and sustained efforts are needed on the part of physicians, dental clinicians, and policymakers to ensure the delivery of comprehensive dental and medical care to patients with HIV disease.

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