Perceived Oral Health Status, Unmet Needs, and Barriers to Dental Care Among HIV/AIDS Patients in a North Carolina Cohort: Impacts of Race

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Abstract

Objective: *This prospective observational study examined differences in perceived oral health status, treatment needs, dental care utilization patterns, and barriers to care between HIV-infected non-Hispanic blacks and whites in North Carolina.* ***Methods:*** *632 adult HIV-infected medical clinic attendees provided information on their oral health status and dental care history during face-to-face interviews with a trained interviewer.* ***Results:*** *Compared to whites, blacks were significantly more likely to be female, older, less educated, have lower income, and have acquired HIV by heterosexual sex or injecting drug use. Although two-thirds of patients reported good oral health, blacks were significantly more likely to have loose teeth, need extractions, and be episodic dental care utilizers. Primary barriers to dental care were cost (30%), fear (19%), and low motivation (13%). Sixty-five percent of patients had unmet dental needs in the last three years. Race, cost, fear, and immune competence were significantly associated with unmet dental need in a multivariable model.* ***Conclusions:*** *Disparities exist within this HIV-infected population in oral symptoms, utilization patterns, and perceived unmet dental need. Targeted interventions that address barriers to care are needed to help establish preventive dental care patterns in this region, especially among blacks. [J Public Health Dent 2003;63(2):86-91]*

Key Words: HIV, AIDS, dentistry, dental care, oral health, health behaviors, health care accessibility, ethnic groups, blacks.

Human immunodeficiency virus (HIV) infection and acquired immune deficiency syndrome (AIDS) disproportionately affect people of color in the United States, with blacks outnumbering whites in new AIDS diagnoses and deaths since 1996 and in the number of persons living with AIDS since 1998 (1). Higher rates of unmet dental need have been reported for blacks than whites in several national surveys (2,3). Among HIV-infected adults of all races, the need for dental care and maintenance of oral health is important, yet needs often remain unmet (4,5).

Several recent analyses regarding oral health service utilization and unmet needs have originated from the HIV Cost and Services Utilization Study (HCSUS) cohort, a nationally representative probability sample of adult HIV-infected persons in medical care interviewed initially in 1996 (6-8). In this cohort of people with HIV, unmet dental needs were more than twice as prevalent as unmet medical needs (8). Coulter and coworkers (6) reported that of the HCSUS cohort, overall, 42.3 percent had seen a dental health professional in the previous 6 months; however, significantly fewer blacks (33.2%) had seen a dentist than whites (47.9%). In a logistic regression analysis, variables associated with nonuse of dental care included: African-American ethnicity, having less than a college education, being employed, having Medicaid without dental coverage or no dental insurance, and reporting blood transfusions as their HIV exposure risk.

Marcus and coworkers (7) reported on perceived unmet need for oral treatment among a HCSUS sample of 2,864 subjects. While they estimated that across the United States, on average, 19.3 percent of HIV-infected medical patients had a perceived unmet need for dental care in the last six months, unmet need varied by region and was significantly (P=.0001) higher for patients in the South (28.1%) than the Northeast (13.0%), and 2.35 times higher in the South than in the West. Blacks also were significantly more likely to have unmet needs than whites (P=.001).

With high national rates of unmet oral health needs among people living with HIV and among blacks regardless of HIV status, a significant burden of HIV/AIDS among blacks in the US South (9), and reports of higher levels of perceived unmet dental needs in this southern region of the country (7), a more thorough understanding of factors affecting oral health care utilization in this population is essential for planning effective regional public health interventions. Exploration of self-perceived oral health status and barriers to care may help to identify areas where health promotion campaigns are needed and resources could be directed to improve the oral health status and quality of life for these individuals.

The purpose of this study is (1) to examine black and white racial differences in perceived oral health status, self-assessed dental treatment needs,

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dental care utilization patterns, and barriers to dental care among a population of HIV-infected adults in a state in the South where Medicaid covers adult dental services; and (2) to examine unmet dental need in this population in relation to several potential explanatory variables. Because race and socioeconomic status are intricately linked in the United States, information on the subjects' level of education, employment status, and annual income are included in an attempt to account for socioeconomic status in this analysis; however, other unidentified social factors may be residual confounders (10).

Methods

Subjects were 632 volunteer participants enrolled between February 1995 and May 2000 in a study of oral disease and health behaviors and practices among HIV-infected adults who receive medical care at the University of North Carolina Hospitals. Subjects were at least 18 years old and self-identified with black or white, non-Hispanic racial groups. All black and white HIV-infected Infectious Disease Clinic attendees were offered participation in this study regardless of medical, immunologic, or socioeconomic status. Hispanic and other racial groups were excluded by study design based on exceedingly low local population prevalence. The 632 subjects represent approximately one-half of the total number of individuals who receive HIV medical care at the institution. Black and white racial distribution in this convenience sample did not differ significantly from the parent population. No established referral mechanisms between the institution's medical and dental services based on race or insurance coverage existed that would impact on access to dental care in this population at the time the interviews were completed. Access to the hospital-based dental program was based on the patient having one or more AIDS indicator illness or a CD4 <200 cells/mm^3. The research protocol received approval from the Committee for the Protection of Human Subjects and all participants provided written informed consent before enrollment.

Subjects participated in a face-to-face interview with a trained social research assistant addressing perceived current oral health status, perceived dental treatment needs, dental care utilization patterns, and barriers to care. The survey instrument had been previously developed by a medical sociologist (RPS), pretested and used in other epidemiology studies in North Carolina including the Piedmont 65+ Dental Study (11). Dental care utilization pattern of regular versus episodic attendance was determined by response to the question: "Do you usually see a dentist on a regular basis or because you are in discomfort or need something fixed?" Primary barriers to care were identified by an open-ended question: "Are there any things, such as cost, fear, illness, or other problems, that have kept you from going to the dentist?" The interviewer coded the first response by selecting the barrier that matched one of 15 possible responses, including an "other, write in" response.

Medical records were reviewed for information about current and previous HIV-associated opportunistic infections/malignancies, other symptomatic HIV conditions, and current and historical CD4 count variations, allowing assignment of HIV disease classification according to criteria set forth by the Centers for Disease Control and Prevention (CDC) (12). Also obtained were current medications, laboratory data, self-reported HIV transmission risk behaviors, and other demographic information.

Data for this analysis was entered and analyzed in Epi Info Version 6.03 (CDC, Atlanta, GA) and the SAS version 6.12 statistical package (SAS Institute, Inc., Cary, NC). Demographic, perceived oral health status, barriers to dental care access, dental care utilization patterns, and medical status variation by race were assessed in separate bivariate analyses. Mantel-Haenszel chi-square *P*-values were reported. Stratified analyses guided selection of explanatory variables as potential effect modifiers and confounders for multivariable modeling.

Perceived unmet need was defined as a "yes" response to the question "In the past 3 years, have you ever felt that you needed to see a dentist but did not go to one?" Unconditional logistic regression models were performed for self-report of perceived unmet need. Relationships were analyzed controlling for race as an indicator of disparity in access to dental care. Variable selections for model building using unconditional logistic regression were based on statistical significance of Wald *P*-values and –2 log likelihood ratio tests (13). Potential effect modification was evaluated in stratified analyses using Breslow-Day test of homogeneity and in modeling using –2 log likelihood ratio tests. To evaluate confounding, a 10 percent change in parameter estimates of the main exposure was assessed while individual variables were entered and dropped from the modeling procedures. Variables were retained as confounders if a parameter estimate for race was altered 10 percent or more. In addition, Wald chi-square *P*-values for each variable in the model were assessed for statistically significant ($P<.05$) relationships with the outcome of interest. Hosmer and Lemeshow tests of goodness of fit were performed on saturated and fitted models. Independent variables were assessed for collinearity and omitted from the model where high correlations and variance inflation were found.

Results

The demographic, HIV risk behaviors, socioeconomic, and HIV disease status are shown in Table 1 for the entire sample of 632 adults and compared by race for the 413 blacks (65.4% of sample) and 219 whites. HIV-infected blacks were significantly more likely than HIV-infected whites to be female, older than 37 years old, have less than a high school education, have lower annual income, and have been at risk of contracting HIV through injecting drug use or heterosexual behaviors. HIV clinical disease categories varied significantly by race, with more blacks having asymptomatic HIV disease. A majority of patients (59.7%) reported having some third party dental coverage, either private dental insurance (9.2%) or Medicaid dental benefits (50.5%).

Differences and similarities in perceived oral health status, dental problems, and dental treatment needs between black and white subjects are illustrated in Table 2. There were no significant differences by race in dentate status (defined as having any remaining natural teeth), perception of having good oral health, and awareness of gum disease. Blacks were significantly more likely to report having

TABLE 1
Racial Variance in Sociodemographic/Medical Variables

	Total (N=632)	Blacks (N=413) (65.4%)	Whites (N=219) (34.6%)	P-value
Sex				<.01
Male	473 (74.8%)	286 (69.2%)	187 (85.4%)	
Female	159 (25.2%)	127 (30.8%)	32 (14.5%)	
Age (years)				<.01
≤37	314 (49.7%)	191 (46.3%)	123 (56.2%)	
>37	318 (50.3%)	222 (53.7%)	96 (43.8%)	
Education (years)				<.01
<12	168 (26.6%)	137 (33.2%)	31 (14.2%)	
12	221 (35.0%)	145 (35.1%)	76 (34.7%)	
>12	243 (38.4%)	131 (31.7%)	112 (51.1%)	
Employment status				.01
Unemployed/never worked	125 (19.8%)	93 (22.5%)	32 (14.6%)	
Disabled	368 (58.2%)	246 (38.9%)	122 (55.7%)	
Employed	139 (22.0%)	74 (17.9%)	65 (29.7%)	
Annual income*				<.01
<$5,000	132 (21.0%)	104 (25.2%)	27 (12.3%)	
$5,000–$9,999	247 (39.3%)	179 (43.3%)	68 (31.1%)	
≥$10,000	250 (39.7%)	128 (31.0%)	122 (55.7%)	
HIV risk behavior				<.01
MSM	250 (39.6%)	111 (26.9%)	139 (63.5%)	
IDU	111 (17.6%)	93 (22.5%)	18 (8.2%)	
MSM & IDU	24 (3.8%)	14 (3.4%)	10 (4.6%)	
Heterosexual	210 (33.2%)	174 (42.1%)	36 (16.4%)	
Blood	29 (4.6%)	14 (3.4%)	15 (6.9%)	
Unknown	8 (1.3%)	7 (1.7%)	1 (0.5%)	
HIV clinical disease category†				.05
Asymptomatic	196 (31.2%)	139 (33.8%)	57 (26.3%)	
Symptomatic	218 (34.7%)	130 (31.6%)	88 (40.6%)	
AIDS	214 (34.1%)	142 (34.6%)	72 (33.2%)	
Recent CD4 count <200/mm^3‡	273 (43.6%)	193 (46.7%)	86 (39.3%)	.07
Any dental coverage				<.01
Medicaid	319 (50.5%)	236 (57.1%)	83 (37.9%)	
Private dental insurance	58 (9.2%)	30 (7.3%)	28 (12.8%)	
No third party coverage	255 (40.4%)	147 (35.6%)	108 (49.3%)	

*For this response, n=629 due to 3 respondents who did not know or refused to answer.
†Reference CDC, 1992. Asymptomatic=asymptomatic HIV; symptomatic= symptomatic HIV conditions; AIDS=any AIDS indicator condition. For this response, n=628; missing clinical disease history data on four patients.
‡For this response, n=626 due to 6 missing CD4 count.
MSM=men who have sex with men; IDU=injecting drug users.

loose teeth (P<.01) than whites. No significant differences by race were identified with the symptoms: hot and cold tooth sensitivity, dry mouth, bad breath, and bleeding gums. Whites were significantly more likely to have oral pain (P=0.02) than blacks.

Among both blacks and whites, dental prophylaxis/periodontal care was the most common self-perceived dental treatment need. This need was recognized by 36.9 percent of the subject population. The next most common response varied significantly by race between tooth extraction (28.3% of blacks versus 15.5% of whites) and restorations/crowns (26.0% of whites compared to 10.9% of blacks).

Dental care utilization and barriers to care for blacks and whites are compared in Table 3. Although most patients from both racial groups visited the dentist episodically—e.g., when in pain or when they needed a problem fixed—the responses differed significantly by race, with whites (25.1%) more likely than blacks (15.7%) to be regular attendees. Few patients (19.3%) reported having had their teeth cleaned during the last 12 months.

When questioned about the primary reasons they did not receive care, cost was most often reported as the primary barrier. Cost was reported as the primary barrier by 30.0 percent of the entire study population and it was a more common barrier for whites than blacks (P=0.05). Blacks were 1.76 times (odds ratio [OR]; 95% confidence interval [CI]=1.24, 2.49) more likely than whites to have some third party coverage, most of this being Medicaid dental coverage. The North Carolina Medicaid dental program covers basic diagnostic, preventive, restorative, and surgical care for adults, including removable full and partial dentures and anterior tooth root canal procedures, for a $3.00 copayment per visit. Those with some third party coverage were significantly (P<.01) less likely to report cost as a barrier to care. Fear, reported by 18.8 percent of subjects, was the second most common barrier for both blacks and whites. Of note, blacks (16.0%) were significantly more likely than whites (8.2%) to report motivation, time, importance, or knowledge as their primary barrier to care.

Of the entire population, 64.6 percent reported they had unmet dental needs. Significantly more blacks (67.6%) than whites (58.9%) had not gone to a dentist in the last three years, although they had perceived a need. Table 4 shows the significant bivariate relationships of sociodemographic, health, dental third party coverage, and barriers to dental care variables with unmet need for blacks and whites and after adjusting for race as the predisposing variable. Among blacks, lack of recent immune suppression (recent CD4≥200), cost as the primary barrier, and fear as the primary barrier

TABLE 2
Racial Variance in Perceived Oral Health Status, Dental Problems, and Dental Treatment Needs

	Total (*N*=632)	Blacks (*N*=413)	Whites (*N*=219)	P-value
Oral health status				
Dentate (≥1 natural tooth)	611 (96.7%)	398 (96.4%)	213 (97.3%)	.55
Have good oral health	413 (65.4%)	272 (65.9%)	141 (64.4%)	.71
Have gum disease	205 (32.4%)	129 (31.2%)	76 (34.7%)	.38
Current problems				
Hot & cold sensitivity	372 (58.9%)	254 (61.5%)	118 (53.9%)	.06
Dry mouth	287 (45.4%)	177 (42.9%)	110 (50.2%)	.08
Oral pain	223 (35.3%)	132 (32.0%)	91 (41.6%)	.02
Bad breath	200 (31.7%)	132 (32.0%)	68 (31.0%)	.81
Bleeding gums	198 (31.3%)	131 (31.7%)	67 (30.6%)	.77
Loose teeth	126 (19.9%)	100 (24.2%)	26 (11.9%)	<.01
Perceived primary needs				
Cleaning/gum treatment	233 (36.9%)	149 (36.1%)	84 (38.4%)	.57
Extraction	151 (23.9%)	117 (28.3%)	34 (15.5%)	<.01
Restoration/crown	102 (16.1%)	45 (10.9%)	57 (26.0%)	<.01
Exam and X-rays	67 (10.6%)	47 (11.4%)	20 (9.1%)	.38
New dentures or repair	34 (5.4%)	26 (6.3%)	8 (3.7%)	.16
Other needs	24 (3.8%)	16 (3.9%)	10 (4.6%)	.68
None/don't know	19 (3.0%)	13 (3.2%)	6 (2.7%)	.77

TABLE 3
Racial Variance in Dental Care Utilization, Barriers to Care, and Unmet Dental Need

	Total (*N*=632)	Blacks (*N*=413)	Whites (*N*=219)	P-value
Dental care utilization patterns				
Regular attendance	120 (19.0%)	65 (15.7%)	55 (25.1%)	<.01
Episodic attendance	512 (81.0%)	348 (84.3%)	164 (75%)	
Professional cleaning in ≤12 months	122 (19.3%)	72 (17.4%)	50 (22.8%)	.10
Primary barriers to care*				
Cost	188 (30.0%)	112 (27.1%)	76 (34.7%)	.05
Fear	118 (18.8%)	82 (19.9%)	36 (16.4%)	.30
Low motivation/not important/don't have time	84 (13.4%)	66 (16.0%)	18 (8.2%)	<.01
Can't get there/can't find dentist	25 (4.0%)	20 (4.8%)	5 (2.3%)	.12
Other	48 (7.7%)	26 (6.3%)	22 (10.1%)	.09
No dental needs	59 (9.4%)	45 (10.9%)	14 (6.4%)	.06
No barriers, i.e., goes as needed	104 (16.6%)	57 (13.8%)	47 (21.5%)	.01
Unmet dental need in last 3 years	408 (64.6%)	279 (67.6%)	129 (58.9%)	.03

*For this response, *n*=626 due to 6 patients who did not know or refused to answer.

to care were significantly associated with having unmet dental needs. Among whites, education, employment status, and cost as the primary barrier to dental care were significantly associated with having unmet dental needs. Adjusted for race, education, employment status, cost, and fear as primary barriers to care remained significant predictors of having unmet need for dental care.

Finally, a multivariable model for factors significantly associated with unmet dental need is shown in Table 5. Although cost (30.0%) was reported by more people as being the primary barrier to receiving dental care than fear (18.8%), fear had the strongest association (OR=3.84; 95% CI=2.86, 6.48) with unmet need in the multivariable model. In this model for unmet need among HIV-infected adults in a state in the US South, where Medicaid covers dental care, blacks were 1.61 times (95% CI=1.03, 2.14) as likely as whites to have unmet dental needs, after controlling for traditional sociodemographic variables (sex, age, education, employment status, and annual income), HIV-related variables (HIV transmission risk behaviors, HIV/AIDS clinical disease, and immune suppression) and dental care variables (third party coverage, barriers of cost, and barriers of fear).

Discussion

Approximately one-third of this predominantly dentate HIV-infected cohort of adults under medical care did not consider themselves to have good oral health. Prevalence of oral symptoms, including dry mouth, oral pain and tooth sensitivity, are consistent with other national reports (14,15) and have been shown to have significant impact on health-related quality of life (16). Analysis of the impact of symptoms on the health-related quality of life among a nationally representative sample of 2,267 adults with HIV interviewed in 1996 showed that dry mouth was associated with worse perceived health status and pain in the mouth, lips, and gums was associated with worse perceived health status and worse quality of life (16).

Utilization of oral health care among this North Carolina cohort demonstrated self-reported care patterns that were episodic and problem oriented, rather than preventive, with episodic care being more prevalent

TABLE 4
Bivariate Analysis of Sociodemographic/Medical Variables Associated with Unmet Dental Need in the Past 3 Years, Adjusted for Race, in a Sample of HIV-infected Medical Patients in a North Carolina Cohort (*n*=632)

Variable	*P*-value Blacks	*P*-value Whites	Mantel/Haenzel *P*-value, Adjusted for Race
Sex	.85	.74	.75
Age	.68	.48	.45
Education	.19	.05	.02
Employment status	.18	.02	.01
Annual income	.60	.91	.72
HIV risk behavior	.61	.60	.50
Recent CD4<200 cells/mm^3	<.05	.64	.06
HIV clinical disease category	.55	.36	.30
Any dental coverage	.95	.23	.49
Cost as primary barrier	.03	.02	<.01
Fear as primary barrier	<.01	.08	<.01

TABLE 5
Unconditional Multivariable Logistic Regression Modeling of Sociodemographic/Medical Variables Associated with Unmet Dental Need in the Past 3 Years in a Sample of HIV-infected Medical Patients in a North Carolina Cohort (*n*=632)

Variable	Odds Ratio (95% Confidence Interval)	*P*-value
Race (black)	1.61 (1.03, 2.14)	.02
Sex	1.23 (0.78, 1.94)	.38
Age	0.92 (0.65, 1.30)	.62
Education	0.93 (0.74, 1.19)	.58
Employment status	0.83 (0.63, 1.11)	.21
Annual income	0.97 (0.76, 1.24)	.79
HIV risk behavior	0.93 (0.81, 1.07)	.33
Recent CD4<200 cells/mm^3	0.67 (0.46, 0.98)	.04
HIV clinical disease category	0.94 (0.64, 1.40)	.77
Any dental coverage	1.09 (0.76, 1.58)	.64
Cost as primary barrier	2.46 (1.64, 3.71)	<.01
Fear as primary barrier	3.84 (2.28, 6.48)	<.01

among blacks than whites. This is consistent with findings among 213 HIV-infected northern Californian women (54% black, non-Hispanic) interviewed in the Women's Interagency HIV Study in 1995–96, where 43 percent reported they had not used dental care in the previous year and nonuse of dental services was significantly higher among black women (50%) than among white women (33%; *P*=.03) (17). As a consequence of utilization patterns, blacks in this North Carolina cohort were significantly more likely to report their primary dental need being extraction (28.3%) compared to whites (15.5%), as the former were more likely to suffer from loose teeth and toothache from thermal changes.

The finding of HIV-infected blacks in this North Carolina cohort being significantly more likely to report episodic dental attendance patterns than whites is supported by a study (18) among a relatively homogeneous group of HIV-infected gay and bisexual men, without the traditional socioeconomic barriers. Kass and coworkers' (18) analysis of health service use in the Baltimore center of the Multicenter AIDS Cohort Study revealed that among this cohort of well-educated, highly insured, professional men, whites were more likely to use dental services, although blacks were more likely to have dental insurance. These authors concluded that in their population, environmental, social, and/or psychological factors may help to explain differences in the use of dental services.

Previous work on access to care for HIV-infected patients at a national level has explored the financial barriers to dental care and suggested that dental coverage with private dental insurance or Medicaid dental coverage will improve access, but not totally alleviate barriers to care (8). Specifically, in the HCSUS study, the odds for unmet oral health needs were highest for those on Medicaid in states without Medicaid dental benefits (OR=2.21), for those with no dental insurance (OR=2.26), for those with incomes under $5,000 (OR=2.20), and for those with less than a high school education (OR=1.83) (7). Although North Carolina is a state with adult Medicaid comprehensive basic dental benefits suggested to improve access, this North Carolina HIV cohort otherwise comprises patients at high risk for unmet dental needs as described in the HCSUS cohort (7)—i.e., location in the South; majority (65.4%) blacks; limited (9.2%) private dental insurance; most (60%) with annual income below $10,000, of which 21 percent are below $5,000; and 27 percent with less than a high school education.

The multivariable model of factors associated with having unmet dental needs in this North Carolina cohort identified the traditional barriers to care of cost and fear of dental procedures, not included in previous national studies. Adjusting for these and other important sociodemographic and HIV-related factors, blacks were still almost 1.61 times more likely to report unmet needs than whites. Of importance is the observation that cost remained a primary barrier in the model for unmet dental needs regardless of third party dental coverage, possibly because patients are unaware of the dental benefit under Medicaid in North Carolina or they are unable to find dental providers who accept

Medicaid-covered patients.

Rather than focusing piecemeal on unmet dental need and identifying specific barriers to dental care, an appreciation of unmet needs suggests a need for public health policy to provide the conditions of opportunity, information, motivation, and confidence that people, particularly those of color with HIV, need to seek and accept dental health care. The social risks of HIV infection are poorly understood and those of being black and disadvantaged in America are still widely discussed (19,20). Specific interventions are needed to improve oral health-seeking behavior and access to care among blacks with HIV disease.

This study has several limitations. First, caution should be used in generalizing findings to all HIV-infected individuals in the larger region. The study population is representative of individuals in medical care at a state-supported academic medical center, rather than being a random sample of HIV-infected individuals from the state or region regardless of access to or source of medical care. Second, other elements that may potentially contribute to greater unmet dental need were not evaluated in this study. These factors also may lead to episodic care patterns and include: health beliefs, e.g., a lack of perceived benefit of preventive oral health care; lack of a regular source of dental care; foregoing what are considered to be discretionary services because of a feeling of disenfranchisement from or distrust of health care providers; or personal priority for health care services being focused on alleviating overwhelming medical needs. Additionally, in this study no clinical assessment of dental treatment needs was obtained that would allow evaluation of the accuracy of patient perception of unmet need. Nevertheless, these findings suggest a need for further research into cultural, social, and psychological factors that might help to explain why blacks with HIV infection have greater perceived unmet dental needs and are less likely to have established preventive oral health care attendance behaviors than whites.

In conclusion, disparities in perceived oral signs and symptoms, utilization patterns, barriers to care and unmet oral health needs exist among HIV-infected adults in this study population in the US South. Significantly higher rates of perceived unmet dental needs are found among blacks and those who report cost and fear as barriers. To help eliminate the oral health disadvantage of blacks with HIV-infection, a culturally sensitive health promotion campaign to attack the obstacle of fear and a political effort to assist the disadvantaged with the cost of dental care may be needed.

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