

RYAN WHITE CARE ACT TITLE I DENTAL IMPACT EVALUATION & COST EFFECTIVENESS STUDY:

FINAL REPORT



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**Broward Regional
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I. INTRODUCTION

In the Fiscal Year (FY) 2005 Title I grant guidance, the HIV/AIDS Bureau (HAB) of the Health Resources and Services Administration (HRSA) identified a set of “essential core services” to be funded by Title I grantees.¹ Oral health care, or dentistry, is one of six core services along with primary medical care, substance abuse and mental health treatment, case management, and HIV related medications.

The Broward County Human Services Department (BCHSD), in its role as lead agency for the administration of Title I of the Ryan White CARE Act in Broward County, has consistently funded oral health services. Title I funds were allocated to oral health services in recognition of the significant contribution that these services have on quality of life, ability to adhere to medication regimens, and avoiding opportunistic infections (OIs). The Broward County Title I Program defines oral health services as diagnostic, prophylactic and therapeutic services rendered by dentists, dental hygienists, and similar professional practitioners.²

II. GOALS AND OBJECTIVES OF THE PROJECT

The Broward Regional Health Planning Council (BRHPC) contracted with Positive Outcomes, Inc. (POI) in July 2005 to conduct an assessment focusing on several aspects of oral health services. Goals and objectives addressed by the assessment include:

Goal 1: Determine the cost effectiveness of Broward County Eligible Metropolitan Area (EMA) Ryan White CARE Act Title I dental services.

Objective 1: Determine cost and utilization by analyzing FY 2004-2005 oral health claims data by the types of services performed.

Objective 2: Compare CARE Act dental services in Broward County to other Title I EMAs and other funding streams on variables such as types of procedures offered, reimbursement rates per procedure, and average costs for routine dental care, as well as specialty care (cost-effectiveness).

Goal 2: Evaluate the impact of dental services on Broward County HIV seropositive, or HIV+, residents.

Objective 1: Determine the extent to which standards and outcomes were achieved through a chart review process.

Objective 2: Identify client perceived barriers to access and retention in dental care through multilingual client interviews and focus groups.

Objective 3: Determine client perceived barriers preventing access to specialty dental care.

Goal 3: Determine overall effectiveness, as measured by client impact, of dental services.

Objective 1: Determine the relationship between cost-effectiveness and client outcomes in the EMA.

This report summarizes the findings of the various aspects of the project. Supporting instruments and documents are included in a separate technical addendum.

III. OVERVIEW AND SUMMARY

This report provides information on an array of topics related to HIV oral health and dental practice. As HIV oral health is a relatively technical field, Chapter IV summarizes the epidemiological and clinical scientific findings that form the basis of our understanding of HIV-related oral manifestations and conditions. A table summarizes the manifestations and conditions observed in HIV+ persons and the rates of prevalence of those conditions estimated in the U.S. population. Chapter X contains a glossary of dental terms in easy to understand non-professional language to assist readers.

The report stresses that early recognition and management of oral conditions associated with HIV infection are important to sustain the health and quality of life of HIV+ persons. Periodontal disease also may contribute to illness and death due to systemic diseases. Human periodontal disease is associated with oral conditions that promote oral microbes and human viruses, many of which possess significant potential for serious threats to health. Detecting and controlling infection within the mouth may eliminate adverse conditions such as systemic infection. Access to oral care also is important in aiding proper nutrition for HIV+ persons. Oral care early in the course of HIV infection can help to prevent or slow wasting. Moreover, with the advent of highly active antiretrovirals (HAART), the ability to sustain proper nutrition and to ingest oral medication is critical in achieving the optimal benefit of antiretroviral (ARV) and adherence to ARV regimens. Dental experts are needed to ensure the proper diagnosis and management of oral complications in HIV and AIDS and should be viewed as an important component of the HIV clinical team.

Chapter IV also stresses that indigent HIV+ adults, many of whom have not received basic dental care since childhood, commonly need dental care. Many of these individuals demonstrate the legacy of Medicaid programs that did not ensure access to pediatric dental care. Moreover, many indigent adults enrolled in Medicaid only have access to tooth extractions as a dental benefit. As a result, HIV+ adult patients receiving treatment in HIV clinics across the U.S. have numerous missing teeth, gum disease, and untreated oral infections.

Chapter IV also offers an overview of the general oral health of HIV+ persons, as well as a summary of what is known regarding the use of dental care by U.S. HIV+ adults, sources of payment for those services, and the impact of dental care on clinical outcomes. The chapter highlights that the cost of dental care largely falls on the CARE Act and other public systems for HIV+ indigent patients. Despite this support, many indigent patients must make out-of-pocket payments to obtain dental care. These expenditures are identified as a barrier to accessing dental services. The impact of oral manifestations on the quality of life of HIV+ persons is described, with a strong link found between receipt of dental care and good physical and mental health. We also examine the literature regarding unmet need for HIV oral health care. Findings presented in the chapter underscore the high rates of unmet HIV oral health care needs throughout the U.S.

Chapter V provides an overview of the findings of a telephone survey by POI of other Title I programs to identify best practices in purchasing oral health services. Detailed information is offered about the approaches taken in other communities to fund HIV oral health care. Detailed information also is provided regarding HIV dental clinical standards and outcome measures used in other communities. This information is provided to inform the Title I Planning Council in their development and refinement of HIV oral health standards and measures. A summary of best practices in the delivery of HIV oral health care also is provided from two sources, an earlier national best practices study conducted by POI and a best practices report outlining best practices among HIV oral health programs in New York State.

In Chapter VI, we summarize an analysis of the utilization and expenditure patterns associated with patients treated at Broward County Health Department (BCHD) HIV dental clinics. A general overview of the patterns of regular and specialty dental care is outlined. Based on those utilization patterns, POI presents the results of forecasting to estimate the likely fiscal impact on Title I or other funders if increased access to HIV dental services was insured through expanded funds.

During the period between late 2002 through mid-2005, almost 3,000 HIV+ Broward County adult residents received regular dental visits at Title I-funded BCHD clinics. This represents 25% of the estimated 10,748 HIV+ Broward County residents "in care."³ Adult patients had an average of 3.7 regular visits, with total visits ranging from one to 31 visits per patient. Twelve children also received regular dental services at the Children's Diagnostic and Treatment Center (CDTC) at a dental clinic staffed by BCHD dental personnel. Title I-funded specialty dental services were provided to 363 adult HIV+ Broward County residents, with an average of one visit per patient. During the study period, Title I paid \$128 per regular dental visit. During the study period, an average of \$526 was spent per patient on regular dental visits and an average of \$791 on specialty dental services.

Chapter VII provides a summary of the results of an assessment of the quality of services provided by BCHD HIV dental clinics. An independent, nationally recognized HIV oral health expert conducted the clinical component of the chart reviews. The methods used to conduct a review of 92 charts are discussed and detailed findings are offered in this chapter. Based on the chart reviews, quality indicators were met and exceeded for all but one of six indicators. A summary of the recommendations for continuing to achieve and enhance high quality HIV dental care are offered. Feedback is provided in the chapter regarding methods for fine tuning HIV oral health outcomes.

Chapter VIII weaves together the results of the expenditure and quality assessments conducted by POI. We use that information to assess the relationship between cost-effectiveness and client outcomes associated with Title I funding in Broward County. Using a cost-effectiveness analysis framework provided by HAB, Title I-funded services were determined to be cost-effective in achieving identified process measures and outcomes.

The perceptions of consumers regarding barriers to access and retention in HIV primary and specialty oral health care are summarized in Chapter X. The results of consumer focus groups are described. An overview also is provided of the results of a survey of Broward County HIV+ residents. Due to the methods used to design the survey, a comparison of Broward County survey responses is made to a nationally representative survey of almost 3,000 U.S. HIV+ residents.

A separate technical appendix is provided which includes instruments used for the chart review and survey, materials distributed for the survey and focus groups, and other materials of interest.

IV. REVIEW OF THE LITERATURE

A. Oral Manifestations of HIV+ Persons

Early recognition and management of oral conditions associated with HIV infection are important to sustain the health and quality of life of HIV+ persons living with HIV.⁴ Periodontal disease may contribute to illness and death due to systemic diseases.⁵ Human periodontal disease is associated with oral conditions that promote oral microbes and human viruses, many of which possess significant virulence potential. *Porphyromonas gingivalis* and other periodontal bacteria that are unique to the oral cavity may disseminate to other body sites and comprise the best-documented form of dental focal infection. Detecting and controlling a focal infection within the mouth may eliminate adverse conditions such as systemic infection.⁶ Access to oral care also is important in aiding proper nutrition for HIV+ persons. Oral care early in the course of HIV infection helps to prevent or slow wasting. Moreover, with the advent of HAART, the ability to swallow oral medication is critical in achieving the optimal benefit of ARV and adherence to ARV regimens. Among HIV+ children with untreated or poorly controlled HIV, inability to chew properly due to decayed and painful teeth or untreated soft tissue problems can lead to poor nutrition.⁷ Due to the importance of high quality treatment, dental expertise is needed to ensure the proper diagnosis and management of oral complications in HIV and AIDS.⁸

Due to the association between HIV infection and oral lesions, staging systems for HIV disease progression, such as that used by the CDC, include oral conditions.

Oral lesions also are used commonly as an entry criteria or endpoint in clinical trials of ARVs and protease inhibitors (PIs).⁹ Oral lesions are important

markers in the clinical spectrum of HIV infection. As illustrated in Figure 1, declining CD4 count is associated with the presentation of HIV oral manifestations and the number of concurrent oral mucosal lesions found in HIV+ persons.¹⁰ Among HIV+ women, the prevalence rates of HIV oral manifestations were almost nine times higher among patients with CD4 counts less than 200 cell/mm³.¹¹ Aphthous ulceration and candidiasis, for example, indicate acute seroconversion illness. Conditions such as candidiasis, hairy leukoplakia, Kaposi's sarcoma (KS), and necrotizing and ulcerative gingivitis may suggest HIV infection in undiagnosed individuals. For patients in advanced stages of HIV infection, candidiasis and hairy leukoplakia indicate clinical disease progression and predict development of AIDS.^{12, 13} Oral candidiasis and oral hairy leukoplakia were found to be eleven times more likely to occur among women with severe immunodeficiency than other women.⁹ Immune suppression in HIV+ persons also is associated with necrotizing periodontal disease, long-standing herpes infection, and major aphthous ulcers.

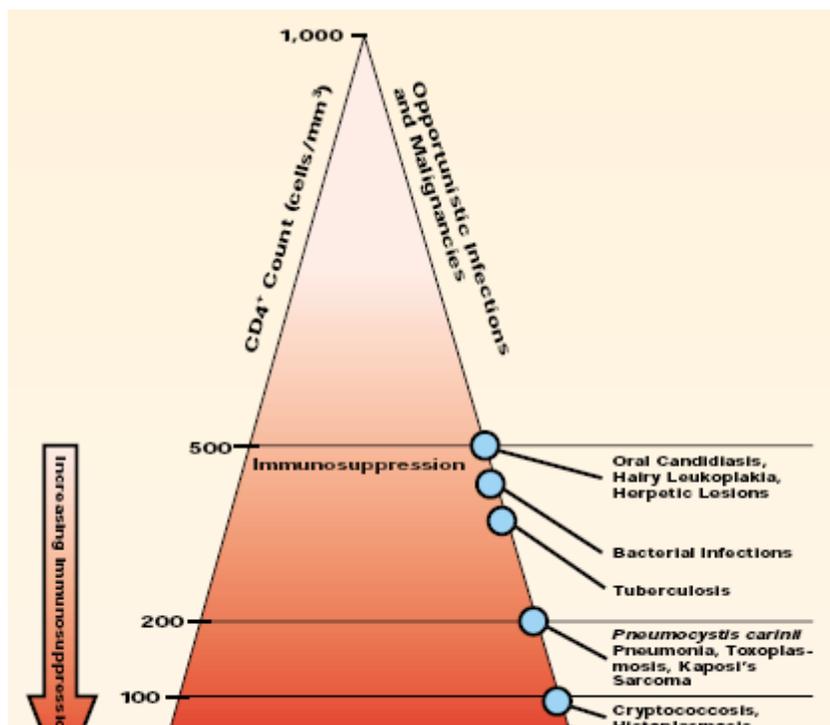


Figure 1. Immune suppression and increasing risk of OIs and malignancies. Adapted from: Patton LL, Shugars DC. Immunologic and viral markers of HIV-1 disease progression: implications for dentistry. J Am Dent Assoc. 1999 Sep;130(9):1313-22.

A review of the literature identified several major HIV-related oral manifestations or conditions.¹⁴ These conditions may be seen or palpated during physical examination, while producing symptoms that are noticeable to the patient. Most conditions are suppressed by systemic medication. Table 1 describes the manifestations and conditions observed in HIV+ persons.

Manifestation or Condition	Description
Angular cheilitis	Cracking or fissures at corner of the mouth. It appears as erythema or fissures of the labial commissures and frequently accompanies intra-oral candidiasis. In patients with deeply pigmented skin, de-pigmentation may occur at the site of angular cheilitis. Angular cheilitis is common among dental patients, regardless of HIV serostatus. Examination of a cytologic smear of the pseudomembrane revealing hyphal forms confirms the diagnosis. This procedure may not be necessary if the lesions are clinically consistent with oral candidiasis and resolve with antifungal therapy.
Aphthous ulcerations	Painful ulcerations characterized by a halo of inflammation and a gray or yellow pseudomembrane. Aphthous ulcerations present on non-fixed or non-keratinized tissue such as the buccal mucosal, posterior oropharynx, and lingual surface of the tongue. Viral culture (isolation), mucosal smear, or biopsy may be necessary to rule out ulcers caused by OIs for ulcers not exhibiting these clinical features or when therapy fails. The cause of this condition is unknown. Conditions may be painful and associated with eating salty or acidic foods or beverages, as well as due to trauma when ingesting hard or rough food.
Cytomegalovirus (CMV) oral ulceration	CMV is a herpes-type virus. Serologic evidence of CMV infection is present in up to 80% of HIV+ adults. Cases of CMV-related oral ulceration have been reported in patients with HIV infection. The presence of CMV suggests immunosuppression. Oral ulcers due to CMV may occur anywhere in the oral cavity; characteristic clinical features have not been identified. Diagnosis of an oral ulcer due to CMV should be established by biopsy and histologic examination. Cells exhibiting characteristic intranuclear and intracytoplasmic inclusions are seen on microscopic examination.
Erythematous candidiasis	Red, flat subtle lesions, usually found on the dorsal surface of the tongue and /or the hard or soft palate. Lesion tends to be symptomatic, with patients complaining of burning or sensitivity, most frequently while eating salty or spicy foods or drinking acidic beverages. Erythematous candidiasis is less well recognized than pseudomembranous candidiasis, and its clinical appearance is not specific to candidiasis. Thus, the identification of hyphal forms on a mucosal smear or biopsy and/or response to antifungal therapy is important for confirmation of this diagnosis.
Herpes simplex virus (HSV)	HSV-1 infection and associated lesions are common. Recurrent intraoral HSV outbreaks begin as a small crop of vesicles that rupture to produce small, painful ulcerations. Lip lesions are commonly easy to recognize. In the mouth, lesions on keratinized or fixed tissues, including the hard palate and gums, should raise suspicion of HSV infection. Herpetic lesions are commonly short-term. Oral ulcers caused by HSV occur in primary infection (primary herpetic gingivostomatitis) and recurrent forms (herpes labialis and recurrent intra-oral herpes simplex ulceration). Recurrent ulcers occur due to reactivation of latent infection. In HIV+ patients with advanced immune deficiency, ulcers caused by HSV infection tend to be persistent, painful, and superficial. In HIV+ patients, persistent herpetic lesions that do not resolve after four weeks meet the CDC criteria for an AIDS diagnosis These ulcers in HIV+ patients are larger, can occur anywhere in the oral cavity, present for longer periods, and are non-responsive to routine therapy.

Table 1. Oral Manifestation and Conditions Observed in HIV+ Persons

Manifestation or Condition	Description
Herpes Zoster	A reactivation of the varicella zoster virus can occur along any branch of the trigeminal nerve. The external lesions will start as vesicles, break open, and then crust over. Intraoral lesions start as vesicles, burst, and then present as oral ulcerations. Since these presentations are along the trigeminal nerve, the patient's chief complaint may be toothache of unknown origin.
Human Papillomavirus (HPV) Infection	HPV lesions present as papillary lesions that may be of normal mucosal color, slightly erythematous, or hyperkeratotic. Among HIV+ patients, HPV lesions may be florid with numerous small papillomas or present with fewer and larger papillary projections. The strain of HPV infecting the tissue may be determined by immunofluorescence or immunoperoxidase staining for papillomavirus.
Kaposi's sarcoma (KS)	KS can be macular, nodular, or rate and ulcerated, with the color of the lesion ranging from red to purple. Early KS lesions tend to be flat, red, and asymptomatic, with the legion deepening in color as the lesion ages. As legions progress, they can impair normal functions of the oral cavity, becoming symptomatic secondary to trauma or infection. KS is the most frequent oral malignancy associated with HIV infection, although incidence of KS has declined with the adoption of HAART. KS-associated herpes virus (KSHV) is associated in the presentation of KS in HIV+ persons. KS diagnosis should be confirmed by either biopsy or identification of distinct clinical appearance. Clinical appearance may be sufficient to diagnose KS, especially if the patient has a previous biopsy-confirmed diagnosis of KS at another site.
Linear gingival erythema (LGE)	LGE or "red band gingivitis," presents as red bands along the free gingival margin that may present without the presence of dental plaque. Occasional bleeding and discomfort are reported. LGE is most frequently associated with anterior teeth, but commonly extends to the posterior teeth.
Lymphoma	Lymphoma is a common malignancy occurring in HIV+ patients. Most AIDS patients with lymphoma develop lesions in sites other than the lymph nodes. EBV has been found in the lesions. The development of lymphoma in an HIV+ patient is an AIDS-defining event. The appearance of oral lymphoma varies from irregular, necrotic, ulcerated masses to non-ulcerated masses covered by normal or erythematous mucosa. Lesions may be painful. Diagnosis of oral mucosal lymphoma should be made by biopsy and histologic examination.
Mucosal Melanin Pigmentation	Mucosal melanin pigmentation occurs as newly emerging single or multiple brown oral mucosal melanotic macules. These macules are attributed to an increase in the amount of melanin pigment in the basal cell layer of the epithelium and the underlying connective tissue. The prevalence of this condition has not been determined. Melanin pigmentation has been associated with zidovudine therapy in some patients. For newly emerging or changing mucosal-pigmented lesions, biopsy and histologic examination should be considered. However, most of these lesions can be diagnosed presumptively by appearance and observation over time.
Necrotizing ulcerative periodontitis (NUP)	NUP presents as ulcerated, cratered, interdental papillae, mobile teeth, and a fetid odor. Patients may complain or "deep jaw pain" and spontaneous bleeding. NUP is a sign of severe immune deterioration.

Table 1. Oral Manifestation and Conditions Observed in HIV+ Persons

Manifestation or Condition	Description
Neutropenic ulcerations	Neutropenic ulcerations are very painful ulcers that can appear on both keratinized and non-keratinized tissues. These lesions are found with increasing frequency in HIV+ populations, although the cause of this increased rate is unknown. Large, unusual-looking or fulminate ulcers in the oral cavity that cannot otherwise be identified should prompt suspicion of neutropenic ulcerations.
Non-Hodgkin's lymphoma	This AIDS-defining condition may present in the oral cavity. This lesion tends to present as a large, painful, ulcerated mass on the palate or gingival tissue.
Oral hairy leukoplakia (OHL)	White corrugated lesion normally appearing on the lateral border(s) of the tongue that does not wipe away. OHL is normally asymptomatic and does not require therapy unless there are cosmetic concerns. Patients on HAART who present OHL may be experiencing a failure in their ARV regimen. Epstein-Barr virus causes OHL. Diagnosis of OHL in HIV+ patients should be confirmed by identification of distinct clinical lesions. If the lesions are clinically consistent with OHL and the patient is known to be HIV+, no further diagnostic procedure is necessary. Biopsy and microscopic examination should be considered when an HIV+ patient presents with a white lesion on the lateral border of the tongue that cannot be diagnosed on the basis of its clinical appearance.
Other oral ulcerations	Diagnosis of oral ulceration due to other infectious agents, such as <i>Histoplasma capsulatum</i> (histoplasmosis), <i>Cryptococcus neoformans</i> (cryptococcosis), and <i>Aspergillus</i> organisms, should be made by biopsy and histologic examination. Ulcers related to HIV therapeutics also has been noted in the literature, including ulcers associated with use of zalcitabine (ddC) and foscarnet. Oral lesions due to these organisms are signs of disseminated disease. Once a diagnosis has been made, the patient should be referred to a physician for evaluation and treatment.
Pseudomembranous candidiasis	Pseudomembranous candidiasis, or thrush, appears as creamy, white, off-white or yellow curdle-like patches that can appear anywhere in the oral cavity. These lesions will wipe away, leaving a red and/or bleeding surface. <i>Candida albicans</i> is commonly associated with thrush, although non- <i>albicans</i> species have been reported. Antifungal resistant <i>Candida</i> strains are an increasing problem in treating mucocutaneous candidiasis. ^{15, 16} The diagnosis is confirmed by examining a cytologic smear of the pseudomembrane revealing hyphal forms. This procedure may not be necessary if the lesions are clinically consistent with oral candidiasis and resolve with antifungals.
Salivary gland disease	Salivary gland disease presents as a bilateral enlargement of the parotid salivary glands and is accompanied often by symptoms of dry mouth. It is clinically apparent by an increase in the size of the major salivary glands, notably the parotids. Lymphocytic infiltrates (CD8 cells) have been found through biopsy of large parotid salivary glands. This condition has been reported in greater frequency with the adoption of HAART.
Xerostomia	Xerostomia, or dry mouth, is a condition common among HIV+ persons. Presentation of xerostomia is associated with salivary gland disease, use of HAART, smoking, and a viral load of greater than 100,000 mm. Change in the quantity and quality of saliva, including diminished antimicrobial properties, may lead to increased caries.

Cherry-Peppers G, Daniels CO, Meeks V, Reznik D. Oral manifestations in the era of HAART. J Natl Med Assoc. 2003 Feb;95(2 Suppl 2):21S-32S. Reznik D. Oral manifestations in HIV disease. Top HIV Med. 2005 Dec-2006 Jan;13(5):143-8. AIDS Institute. Oral Health Care for People with HIV Infection. Albany: New York State Department of Health. 2001. HIV/AIDS Bureau. Oral health and HIV disease. HRSA Care Action. Rockville: HRSA April 2002.

B. HIV Oral Manifestations and Conditions in Observed Populations and Clinical Practices

Several oral manifestations and conditions diagnosed with persons living with HIV but not AIDS are diagnosed commonly. A cross-sectional descriptive study of 51 adult HIV+ persons in the United Kingdom reported that 77% had one or more oral manifestations of HIV infection, including hairy leukoplakia (45%), erythematous candidiasis (22%), HIV necrotizing ulcerative gingivitis or periodontitis (16%), pseudomembranous candidiasis (14%), angular cheilitis (6%), KS (4%), and oral ulceration (4%).¹⁷

While HIV oral manifestations and conditions in adults are documented generally in the clinical literature, the prevalence of the various oral diseases associated with HIV is becoming better documented. Xerostomia, or dry mouth, can negatively impact a patient's quality of life by affecting dietary habits, nutritional status, speech, taste, tolerance to dental prosthesis (e.g., dentures), and increased susceptibility to dental caries (cavities).¹⁸ An estimated 10 to 30% of HIV+ patients experience xerostomia.^{19, 20} Rates of periodontal disease have been found at higher rates among HIV+ persons than non-infected individuals. The prevalence rates of gingivitis and chronic adult periodontitis are reported to be higher among HIV+ persons than other populations.^{21, 22}

The HIV Cost and Services Utilization Study (HCSUS) was the first major research effort to collect information on a nationally representative sample of HIV+ persons in care. HCSUS was funded through a cooperative agreement between the Agency for Healthcare Research and Quality (AHRQ), RAND, and several federal agencies including CDC, HRSA, and NIH.²³ HCSUS data collection was undertaken from September 1994 to October 2000. Rand and their contractors completed an initial interview and two follow-up interviews at 12 months and 24 months. A total of 2,864 adults participated in HCSUS at baseline. Unlike other observational studies of HIV oral health status in which dentists conducted oral examinations, HCSUS respondents self-reported oral health conditions, perceptions of their symptoms, and other oral health data.²⁴

Over one-fourth (29%) of the HCSUS study population reported dry mouth. Among this nationally representative group, 37% of individuals reporting oral dryness reported they were extremely uncomfortable, 33% had a moderate level of discomfort, and 30% said that they had little or no discomfort. After controlling for other factors, current smokers were found to have statistically significantly higher rates of dry mouth.¹⁴ Individuals with viral load of $>100,000/\text{mm}^3$ were 2.5 times more likely to report dry mouth than others with undetectable viral load. Individuals not receiving HAART were 33% less likely to report dry mouth, although weakly significant statistically. Based on a weighted sample, 64,947 U.S. HIV+ adults report having dry mouth. Among this group, 24,030 individuals are estimated to have extreme discomfort and 21,433 are estimated to have moderate discomfort.

The epidemiology of pediatric HIV-associated oral lesions differs from adults in the developing world.²⁵ Orofacial lesions commonly associated with pediatric HIV infection in the U.S. and other developing countries include oral candidiasis, HSV infection, linear gingival erythema, parotid enlargement, and recurrent oral ulcerations.^{10, 26, 27} Clinical signs of oral candidiasis have been reported in 20 to 70% of HIV+ children, compared to about 40% of the general pediatric population.²⁸ Oral candidiasis is commonly the first infection to appear in approximately one-half of all HIV+ children.²⁹ Esophageal candidiasis, an AIDS-defining condition, is reported to develop in about 20% of HIV+ children. Parotid swelling is an oral clinical lesion that can vary in prevalence from 10% to 30% of HIV+ children depending on the immune suppression of the individual child or adolescent.^{30, 31} In some studies, rates as low as 1% have been noted in ARV-treated children with no evidence of immune suppression.³² In patients with severe immune

suppression, the manifestation of parotid swelling is more likely. While the parotid glands are most commonly affected, other salivary glands may become affected as well.

Reports suggest that HIV+ children are at greater risk for dental caries and gingivitis than other children. The increased risk is due, in part, to baby-bottle tooth decay, progressive immunodeficiency, effects of medications on salivary flow and oral flora, developmental delay, and/or failure to thrive. Other factors may be risk factors such as diet, inadequate oral hygiene, socioeconomic status, lack of caregiver knowledge, and frequent use of the bottle while going to sleep. HIV infection, changes in saliva, and xerostomia contribute to the severity of plaque-related diseases. Dental eruption can be delayed in children with HIV infection.³³

Among a cohort of HIV+ children treated at a New York HIV specialty dental clinic, 69% had evidence of oral pathology and 31% were disease free.³⁴ The proportion with disease was: 21% had conventional gingivitis, 20% had dental caries in their primary and permanent teeth combined, 14% had depapillated tongue, 4% had early childhood caries, 3% had oral candidiasis, 2% had bilateral enlarged parotid gland, 1% had median rhomboid glossitis, 1% had enlarged cervical lymph nodes, and 2% had other developmental abnormalities. In the group with no evidence of suppression, 15% had gingival lesion, 14% tongue lesion, and 1% parotid enlargement. In the severe suppression group, 55% had gingival lesions, 45% had tongue lesions, 9% had enlarged cervical lymph nodes, and another 9% had parotid gland enlargement.

In comparing demographically similar HIV+ and seronegative women, the Women's Interagency HIV Survey (WIHS) found that HIV+ women had more abnormal gingival papilla and fewer teeth than other women.³⁵ Among HIV+ women, persons with <200 CD4 counts had more decayed, missing, or filled (DMF) teeth than HIV+ women with higher CD4 counts. Among HIV+ women with low CD4 counts, there was an inverse relationship between an increasing number of DMF surfaces and decreasing CD4 counts. Women meeting the CDC AIDS criteria also were more likely to have more DMF teeth, DMF surfaces, and decayed and/or filled root surfaces than HIV+ women without AIDS. Women with AIDS had greater risk for cavities than HIV+ women without AIDS. Among the WIHS study population, only 30% of HIV+ women had a dental visit in the previous six months.

In following the WIHS cohort over time, a cross-sectional increase was observed in average DMF surfaces among HIV+ women compared to HIV seronegative women at both their baseline assessment and at the fifth year of observation.³⁶ Reasons for DMF surfaces were not explained by the cross-sectional or longitudinal analyses.

Several studies have focused on the prevalence of HIV oral health conditions among patients served at HIV dental clinics. At the Bering Dental Clinic, an HIV specialty dental clinic in Houston, patients receiving ARV has a lower rate of dental caries than patients not on ARV, while patients who were on antimicrobials were more likely to have more filled surfaces than patients not taking these medications.³⁷ Older age, higher numbers of missing and filled surfaces, and use of ARVs were factors

DMF Index

Dental health surveys commonly use the DMF index to estimate the dental caries experience of individuals and groups. Measuring lifetime caries experience, the DMF index is a simple, rapid, and universally applicable instrument that has been used for decades. Data collection for this index involves performing dental screenings and recording the numbers of decayed, missing, and filled teeth. In the DMF index "D" is the number of decayed teeth, "M" the number of teeth missing due to caries, and "F" the number of satisfactorily filled teeth. For a tooth to be scored as "decayed," it must have "an unmistakable cavity." Incipient lesions are not scored. The average number of decayed, missing, and filled teeth of a sample population is reported as that population's DMF index. A lower DMF index indicates better dental health. Since the DMF score of individuals cannot decrease over time, the DMF index is directly associated with age.

associated with salivary flow rates.

The charts were studied of 51 American Indian and Alaska Natives (AI/AN) treated in a Native American community health center in California.³⁸ Over one-half (55%) of patients studied had periodontal disease, with 41% having moderate periodontitis and 14% having severe periodontitis. Over one-third (37%) of patients were diagnosed with gingivitis, while only 6% were assessed to have “healthy” gums and bone. Most patients (80%) had tooth decay and 88% had missing teeth. Among patients with missing teeth, 25% were missing anterior (front) teeth with an average of 4.6 teeth missing. Nearly all (89%) patients studied were missing posterior (rear) teeth, with an average of 7.5 missing posterior teeth. Substance abuse was strongly associated with decayed teeth, 88% of substance abusers compared to 73% for non-abusers. The average rate of DMF teeth was 19%. Data regarding the group of HIV+ AI/AN patients studied were also compared to nationwide Indian Health Service data for dental patients between 35 and 44 years of age.³⁹ The HIV+ AI/AN group had more decayed teeth (an average of 4.3 versus 2.5), more missing teeth (7.8 versus 2.6), and more DMF teeth (6.7 versus 14.3), but had few filled teeth (6.7 versus 9.2).

C. Oral Health of HIV+ Persons

Among HCSUS respondents, 17% report that their overall oral health was excellent, 22% very good, 28% good, 22% fair, and 12% poor.⁴⁰ While 60% of the respondents had no untreated carious teeth, 22% had one to two untreated carious teeth, 12% had three to five untreated various teeth, and 7% had greater than six untreated carious teeth. Almost one-half (47%) of respondents reported unreplaced missing teeth. Among respondents with unreplaced teeth (excluding third molars), 38% had one to two missing teeth, 37% had three to six missing teeth, 11% had seven to twelve missing teeth, 9% had greater than twelve but not all missing teeth, and 4% were missing all their teeth.

While 52% of HCSUS respondents reported that their gingiva was healthy and had no bleeding, 37% reported bleeding occasionally when brushing, and 10% reported swollen, red, and bleeding gingiva, painful gingiva, or loose teeth.⁴⁰ Over one-third (37%) of respondents reported having xerostomia, 24% had pain in their mouth, lips or gingiva, and 20% with white patches, and 8% with changes in color or texture of their tongue. Xerostomia was reported by 37% of respondents. Pain in the mouth, lips, or gingiva was reported by 24% of respondents. White patches were reported by 20% of respondents. Changes in the color or texture of the tongue were reported by 8% of respondents.

Variable oral self-care was reported by HCSUS study participants.⁴⁰ About two-thirds of respondents report that their frequency of brushing and flossing since learning their HIV serostatus was the same. In contrast, 34% report that frequency of brushing and flossing was more or much more often since learning of their HIV serostatus. Another 4% report that their frequency of brushing and flossing was less or much less. An estimated 9,500 HIV+ adults in care reported that they brushed and flossed much less or less often since learning about their HIV serostatus. About one-quarter (26%) of respondents reported their frequency of flossing to be daily, compared to 18% that flossed at least twice per week, 9% once per week, and 12% less than once per week. Over one-third of respondents (36%), or a weighted estimate of 79,000 HIV+ adults, reported that they never flossed since learning their HIV serostatus. Patterns of oral self-examination also were reported. Almost one-half (44%) of respondents reported conducting daily self-examination. Another 16% of respondents reported conducting self-examination at least twice per week, 11% once per week, 10% at least twice per month, 8% every few months, and 11% never. A weighted estimate of 24,600 HIV+ adults report never having conducted an oral self-examination since learning of their HIV serostatus.

D. Utilization of Dental Care and Source of Care

HIV+ adults in care tend to have maintained the same frequency of dental visits since learning about their HIV serostatus. One-half (50%) of HCSUS respondents report the same frequency of seeing a dentist since they learned their HIV serostatus.⁴⁰ In contrast, 27% of respondents report seeing a dentist more often or much more often since learning their HIV serostatus. About one-fourth of respondents (23%) report that they see a dentist much less or less often since learning their HIV serostatus. Using weighted responses, about 50,500 HIV+ adults in care had less or much less frequency of dental visits since learning their serostatus.

About two-thirds of HCSUS respondents reported having a usual source of dental care.⁴⁰ Over one-half of this group received their dental care at a dentist's office or private clinic while 19% received their dental care at a public clinic, 14% at an AIDS program dental clinic, 3% at a dental school, and 4% at another location. The reason for their most recent dental visit was reported by 32% of respondents to be because something was wrong. Another 31% of respondents thought it was time for a cleaning or examination, 17% were reminded by their dentist that it was time for a cleaning or examination, 17% had a visit as part of a course of treatment, and 4% went to the dentist for another reason.

Perceptions of the accessibility of dental care for HIV+ people were mixed. About one-half (51%) of HCSUS respondents agreed or strongly agreed with the statement, "*most people with HIV who want a dental appointment can get one when they want it.*"⁴⁰ About one-quarter (26%) disagreed or strongly disagreed with the statement and 24% were unsure.

HCSUS respondents tended to have had recent dental care.⁴⁰ About two-thirds (62%) of respondents had their last dental visit in the previous twelve months. In contrast, 16% reported having their last dental visit 13 to 24 months since the interview, 13% reported their last visit occurred between two to five years since the interview, and 9% reported that their last visit was greater than five years since the interview. Using weighted responses, an estimated 26,300 HIV+ adults in care did not have a dental visit in the last five years. Among respondents receiving dental care in the year preceding the interview, 30% of respondents had one dental visit, 25% had two dental visits, 26% had three or four visits, and 19% had five or more visits. Among respondents receiving dental care in the preceding year, dental services received include a dental examination (94%), an HIV-related consultation (10%), dental radiographs (83%), cleaning (77%), fluoride treatment (28%), fillings (38%), crowns or bridges (16%), full or partial dentures (9%), gingival surgery or treatment (10%), endodontic treatment (10%), extractions (29%), oral biopsy (2%), and a prescription from a dentist (3%).

Most HCSUS respondents (89%) reported that they agreed or strongly agreed that they were satisfied with the dental care they received.⁴⁰ In contrast, 9% of respondents disagreed or strongly disagreed that they were satisfied with the dental care they received and 1% were unsure. Almost one-half (44%) of respondents agreed or strongly agreed that their dentist is careful when examining their mouth, teeth, and gingiva, while 10% disagreed or strongly disagreed and 46% were unsure. Only 25% of respondents agreed or strongly agreed with the statement, "*my dentist discusses my treatment my physician.*" Over one-half (58%) of respondents disagreed or strongly disagreed with the statement and 17% were not sure.

It is unclear the extent that dentists coordinate their care of HIV+ patients with the medical provider. The importance of understanding a dental patient's medical status in treating an HIV+ patient has been stressed.⁴¹ Information regarding concurrent disease, laboratory data to identify severe cytopenias and disease progression, use of HAART and other medications are important in dental care planning.

While HCSUS respondents report that they trust their dentist to protect their privacy and believe that they are knowledgeable about treating HIV-related oral disease, almost one-fifth (18%) of

respondents report that their dentist does not know that they are HIV+.⁴⁰ About three-quarters (77%) of respondents agreed or strongly agreed that their dentist was knowledgeable about treating HIV-related oral disease. In contrast, 7% of respondents disagreed or strongly disagreed that their dentist is knowledgeable about HIV-related oral disease. Interestingly, 15% of respondents were not sure if their dentist is knowledgeable about treating HIV-related oral disease. Most respondents (84%) reported that they trusted their dentist to protect their privacy regarding their HIV serostatus. In contrast, 8% of respondents disagreed or strongly disagreed that they trusted their dentist and 8% were unsure.

General attitudes of HCSUS respondents regarding dentists were of concern. While 56% of respondents agreed or strongly agreed that dentists in general are knowledgeable about treating HIV-related oral disease, 22% of respondents disagreed or strongly disagreed and 22% that were not sure.⁴⁰ About one-quarter of respondents (27%) agreed or strongly agreed that persons with HIV *cannot* trust dentists in general to protect their privacy regarding HIV status, compared to 30% that disagreed or strongly disagreed and 43% that were unsure.

E. Paying for HIV Oral Health Services

HIV+ persons encounter substantial financial barriers to accessing dental care.^{42, 43, 44, 45} Only 15% of HCSUS respondents report that they agreed or strongly agreed that most people with HIV can afford dental treatment. In contrast, 46% disagreed or strongly disagreed and 39% were not sure. Dental insurance was reported by about one-fourth (23%) of HCSUS respondents.⁴⁰ An additional 29% of respondents were enrolled in a state Medicaid program with dental coverage and 19% of respondents were enrolled in a state Medicaid program with no dental coverage. An additional 29% of respondents had no dental benefits through private insurance or Medicaid, for a weighted estimate of 62,900 uninsured HIV+ adults in care. Race and ethnicity are associated with having no dental insurance, with Black and Hispanic HIV+ persons less likely than whites to have no dental insurance.

Out-of-pocket dental expenditures incurred by HIV+ patients in 1996 are estimated at over \$20.5 million per year.⁴⁶ These expenditures were associated with patients treated in private dental practices. Patients served by public dental programs had the lowest expenditures, with actual costs of care likely to be subsidized by federal and other government funds. HIV+ dental patients spend an average of \$152 in annual per capita payments. This amount is comparable to the estimated \$157 out-of-pocket expenditures for dental services during the same period for the U.S. among indigent individuals living at the federal poverty level (FPL).⁴⁷ Inflationary health care payments have been experienced since 1996. If the out-of-pocket payments are adjusted for inflation, HIV+ dental patients made an estimated out-of-pocket payment of \$217. Among the HCSUS population, no out-of-pocket expenditures for dental care were reported among 56% of respondents compared to \$1-\$100 for 20% of respondents, \$101-\$200 for 8%, \$201-\$500 for 9%, and greater than \$500 for 8% of respondents.

Factors associated with out-of-pocket expenditures suggest that some groups have less out-of-pocket expenditure due to disparities in access to HIV dental care. Among the HCSUS population, blacks had lower out-of-pocket expenditures and reported that they had a higher rate of unmet need for oral health care than other whites and Hispanics.³³ Men who had sex with men paid more out-of-pocket (\$215) than IV drug users (\$90) and heterosexuals (\$51). Not surprisingly, income also is associated with out-of-pocket dental expenditures. Patients with incomes greater than \$25,000 paid almost five times more for their dental care than patients with annual incomes less than \$5,000. Having private dental insurance also was associated with out-of-pocket payments, with privately insured patients paying \$213 per year compared to \$47 for Medicaid beneficiaries with dental benefits and \$84 for Medicaid beneficiaries enrolled in states without dental benefits.

Published literature regarding the contribution of oral health services to improved clinical outcomes, quality of life, and reduced mortality have not explored the relative cost of preventing and treating oral health conditions versus ARVs and other HIV-related therapeutics. Many of the therapeutics used are relatively inexpensive.

F. Role of Medicaid in Paying For HIV Oral Health Services

State Medicaid programs have significant latitude in designing dental benefits, as dental services under Title XIX of the Social Security Act (the law that authorizes the Medicaid program) are an optional service for the adult population age 21 and older.⁴⁸ Dental services are a required service for most Medicaid-eligible individuals under 21 years of age, as a component of the Early and Periodic Screening, Diagnostic and Treatment (EPSDT) benefit.

In Florida, adult dental services are restricted. Medicaid reimburses for adult dental services provided by a dentist participating in the Medicaid program.⁴⁹ Acute emergency dental procedures to alleviate pain or infection, dentures and denture-related procedures are provided to recipients 21 years of age or older. Covered adult dental services include a comprehensive oral exam; problem-focused oral exam; radiographs needed to make a diagnosis; extractions; surgical procedures essential to the preparation of the mouth for dentures; incision and drainage of an abscess; and complete dentures and denture-related procedures. Exams for adults are limited to determining the need for dentures or for acute emergency services. Medicaid does not cover preventative procedures (including prophylaxis); partial dentures (including relines and repairs); or restorative fillings, root canal treatment, or crowns.

Medicaid reimburses for complete adult dentures and medically necessary emergency services for all Medicaid recipients 21 years of age and older. Medicaid reimbursement for adult emergency dental services is the maximum Medicaid fee or the provider's customary fee, whichever is lower. Adult Medicaid recipients are responsible for paying a 5% co-payment for all dental procedures, unless otherwise exempt. Collection of the 5% co-payment is the responsibility of the provider and is based upon 5% of the Medicaid fee or the provider's charge, whichever is less. Medicaid automatically deducts the 5% from the provider's payment.

Medicaid reimburses for pediatric dental services provided by a licensed dentist participating in the Medicaid program. Medicaid-reimbursable pediatric dental services include: diagnostic exams; radiographs necessary to make a diagnosis; preventive services; restorations; endodontics/periodontal treatment; complete and partial dentures; and oral surgery. Covered orthodontics are limited to treatment of severely handicapping malocclusions or correction of a dental condition deterring physical development. Medicaid reimburses for the application of sealants on permanent first and second molars once per three years, per tooth. Prior authorization is required for all orthodontic services except the initial evaluation.

Medicaid reimburses for children's dental services for all Medicaid recipients under the age of 21. Medicaid reimbursement for children's dental services is the maximum Medicaid fee or the provider's customary fee, whichever is lower. No co-payments are required for pediatric Medicaid dental patients.

G. Effect of Dental Practice Models on HIV Outcomes

A review of the published literature identified only one article that compared different models of HIV dental care on patient outcomes. Brown and his colleagues in the Kaiser Permanente system randomized patients into two year-long controlled trials.⁵⁰ The control group received professional protective dental treatment, dental care, and checkups at baseline, six months, and twelve months. The enhanced care subjects received bimonthly protective treatment and twice-daily chlorhexidine mouth rinse to treat gingivitis. Both groups experienced improved active decay, gingivitis, oral pain, oral health function, and global functioning. The enhanced group experienced significantly greater decreased of mean depth of periodontal pockets than the

control group. The effect of enhanced treatment did not differ significantly for AIDS-related complications, symptoms, or mortality. The Kaiser researchers concluded that access to dental screening, prophylaxis, and repair could significantly improve oral health.

H. Oral Health and Quality of Life

HCSUS data were used to assess the association of oral health with quality of life. HSCUS researchers considered the fundamental components of oral health to be oral function, psychosocial function, and pain.⁵¹ Oral function relates to activities of daily living such as speaking and eating. Psychosocial functioning was assessed by evaluating the effect of oral health problems on role obligations, general social activities, self-evaluation of oral appearance, and perceived seriousness of oral health conditions. Oral pain was assessed by self-report of the frequency of pain episodes and use of pain medication. A five point scale was used, ranging from “*all of the time*” to “*none of the time*.”

Among HCSUS respondents, 6% reported that oral health interfered with social activities all or most of the time in the four weeks preceding the interview and 11% reported interference with social activities some of the time.⁴⁰ Oral problems that limited the kind or amount of food eaten in the four weeks preceding the interview were reported to occur by 7% of respondents all or most of the time and by 12% some of the time. Ability to swallow comfortably in the four weeks preceding the interview was reported by 85% of the respondents, while 6% reported problems swallowing (dysphagia) comfortably some of the time and 9% reported being able to swallow comfortably a little or none of the time. Being worried about problems with their mouth, teeth, or gingiva in the four weeks preceding the interview was reported by 15% of respondents to occur all or most of the time and by 16% of respondents some of the time. About two-third (62%) of respondents reported that they were happy with the appearance of their mouth, teeth, or gingiva in the four months preceding the interview. In contrast, 15% of respondents reported that they were happy with their appearance only some of the time and 23% a little or none of the time. Using weighted responses, an estimated 49,700 HIV+ adults in care reported that they were happy with their appearance a little or none of the time.

HCSUS Oral Health Measures

- In the last 4 weeks, how much time did your oral health interfere with social activities?
- In the last 4 weeks, how much of the time did you limit the kinds or amounts of foods you ate because of problems with your mouth, tongue, teeth, or gums?
- In the last 4 weeks, how much of the time were you able to swallow comfortably?
- In the last 4 weeks, how often were you worried or concerned about problems with the mouth, tongue, teeth, or gums?
- In the last 4 weeks, how much of the time were you pleased or happy with the look of your mouth, teeth, or gums?
- In the last 4 weeks, how much of the time did you have pain or discomfort with the mouth, tongue, teeth, or gums?
- In the last 4 weeks, how much of the time did you use medication to relieve pain or discomfort with your mouth, tongue, teeth, or gums?

Better oral quality of life measures were associated with decreasing oral symptoms, decreasing physical symptoms, and better physical functioning. Mental health was associated with fewer oral symptoms, declining number of physical symptoms, better oral quality of life, and better emotional well-being. After controlling for demographic, living situation, dental insurance, income, CD4 count, smoking, region, employment status, and AIDS diagnosis, intravenous drug users had worse oral quality of life compared with men who have sex with men. Survey respondents with some high school education had worse oral quality of life compared with persons with a baccalaureate degree. Individuals with few oral symptoms had better oral quality

of life. Having fewer physical symptoms, better physical functioning, and emotional well-being were associated with better oral quality of life.

I. Unmet Need for Oral Health Care Among HIV+ Persons

Unmet need for oral care is reported by 11% of U.S. HIV+ adults.⁵² Prior to the wide use of HAART, reports of unmet need for oral care among HIV+ adults ranged from 5% to 52%.^{33, 34, 35, 53, 54, 55, 56} Unmet need estimates vary based on how unmet need for oral health is defined, the representative nature of the samples of HIV+ persons, and stage of HIV disease.⁵⁷

Based on HCSUS findings, 40% of HIV+ persons report unmet need for oral health care.⁵⁸ Based on the HCSUS sampling frame, an estimated 88,000 U.S. HIV+ adults had an unmet need during a 24-month period in the late 1990s. Men were more likely than women to report unmet need for oral care. Persons with some college, high school graduates, and persons with some high school education were all more likely to report unmet need than college graduates. Unmet need was highest among injecting drug users, heterosexuals, and persons infected with HIV through hemophilia or blood transfusion compared to men that had sex with men. HCSUS respondents without any dental insurance had twice the reported unmet need for dental care than persons with private dental insurance. Enrollees in a state Medicaid program without an adult dental benefit were 2.5 times more likely to report unmet need than the privately insured. Unemployment was associated with unmet need. Factors found not to be associated with unmet need for oral care included CD4 count, AIDS diagnosis, and taking HAART.

Further analysis of HCSUS data found that being low income and living in the U.S. western or southern regions were associated with unmet oral care needs.⁴² In a separate analysis of HCSUS data, ethnicity, HIV exposure group, education, employment status, and dental access were predictors of use of dental care.⁵⁹ This second report also concluded that unmet dental needs were twice as prevalent as unmet medical needs in the same cohort. Intervening factors of mental, physical, and oral health also were explored by HCSUS researchers.⁴⁶ Higher educational attainment was associated with better mental, physical, and oral health. Older HIV+ adults had worse physical health but better mental and oral health than younger people. Women, persons with more HIV symptoms, and injecting drug users had worse health in all three domains. Persons with more severe HIV disease had relatively poorer oral health and a greater need for dental care. Physical and mental health; however, may be a barrier to the use of oral care. Adults with poorer physical health also were less likely to have received any oral care than their healthier counterparts. Physical health was associated with whether a person received any dental care, with individuals in poorer physical health less likely to have received any dental care. Mental health was associated with how much dental care a person received, as persons with poorer mental health receiving fewer dental visits. Poor oral health was found to be associated with increased likelihood of dental care, with more visits among those who did receive care. Early use of HAART was found to be associated with reduced severity of HIV symptoms and improved oral health. In this, as in earlier analyses of HCSUS data, persons with dental insurance were more likely to have received oral care and to have had more dental visits than persons with no dental insurance. Racial and ethnic differences were found in use of oral care, with African American and Hispanic adults less likely than whites to use oral care. Compared to whites, Hispanics had lower rates of oral care use, while African Americans with oral health care use had a fewer number of visits than Whites.

Few studies have documented unmet need for oral health care among HIV+ children. In New York, 102 HIV+ children between 3 and 15 years of age were studied.⁶⁰ Based on caregivers' report during medical visits, only 50% of the children studied had a dentist visit in the past twelve months. Another 12% had a dental visit 13 to 36 months prior to the interview and 38% had never visited a dentist. Younger children tended to have different visit patterns than older children. Among children three to seven years of age, 39% were seen in the past twelve

months, 6% had a dental visit 13 to 36 months before the interview, and 55% had never visited a dentist. For youth between 8 and 15 years of age, 60% were seen within the past twelve months, 17% had a dental visit 13 to 36 months before the interview, and 23% had never seen a dentist.

J. Role of Patients in Identifying HIV Oral Conditions

Patients play an important role in maintaining good oral health and identifying oral manifestations of HIV infection. Few studies, however, assess the ability of patients to identify HIV-related oral conditions and the impact of education on their detection of conditions. The ability of HIV+ patients of a North Carolina university HIV dental program to self-diagnose common HIV-related OIs was evaluated.⁶¹ Patients had the greatest self-diagnosis accuracy for pseudomembranous oral candidiasis (PSOC), oral ulcers, and oral hairy leukoplakia. Patients were found to be moderately accurate in self-assessment, with a tendency to under-report the presence of lesions unless they have had previous experience with at least moderately bothersome lesions. About two-thirds of patients who were in complete agreement with their dentist in the diagnosis of PSOC had prior experience with this condition.

At a California university HIV dental clinic, a single-blind randomized controlled pilot study assessed the efficacy of a behavioral intervention to reduce the time to recurrence of oral candidiasis in susceptible HIV+ adults.⁶² The intervention, PRO-SELF, involved training by dentists on improving patients' oral hygiene, minimizing sugar intake, and self-diagnosing candidiasis. At two to three weeks of follow-up visits, a dentist examiner blinded to intervention assignment quizzed the patient about the presence of candidiasis and examined them for the presence of candidiasis. A second instructor trained the intervention arm patients using the behavioral intervention program. Intervention arm participants recorded dietary and oral hygiene practices in 24-hour recall diaries at each dental visit, compared to controls that recorded their practices at the initial and final visits. The six-month candidiasis recurrence rate was 78% among the intervention arm and 88% in controls. The intervention group had a 24% greater improvement in the proportion of high sugar diets. Self-diagnosis of candidiasis was not reliable. Weak results were found in using regular instruction by dental providers to help patients delay candidiasis recurrence by improving oral hygiene.

V. BEST PRACTICES OF PURCHASING, ASSESSING, AND DELIVERING CARE ACT-FUNDED ORAL HEALTH SERVICES

Oral health care is funded by Titles I, II, III and IV of the CARE Act. Additionally, the Dental Reimbursement Program retrospectively compensates dental schools and post-doctoral dental programs for providing oral health care to HIV+ persons. The Community-Based Dental Partnership Program funds eligible organizations to increase access to oral health care for underserved and underserved rural and urban HIV+ populations.⁶³ Funding supports oral health service delivery and provider training in community settings. Community-Based Dental Partnership grants are intended for a period of up to three years. The relative amount of CARE Act funds allocated to dental care by these CARE Act programs has consistently been low, particularly in light of the high level of unmet demand for care and the importance of good oral health in sustaining high quality of life and supporting HIV treatment. Moreover, the amount of Title I funds allocated by Title I Eligible Metropolitan Areas (EMAs) across the U.S. decreased from \$20.6 million in FY 2003 to \$17.8 million in FY 2004.

A. Assessing Best Practices in Purchasing Oral Health Services

POI contacted CARE Act grantees to identify the best practices of oral health programs in performing cost-effectiveness and impact evaluations. To undertake this task POI:

- Sent an email query to the 74 programs funded by the HAB Dental Reimbursement Program or the Community Based Dental Partnership Program requesting similar information.
- Requested CARE Act Data Reports (CADRs) from HAB to identify Title I or Title II-funded HIV dental programs.
- Sent a request for information to 55 HIV dental programs not funded by the Dental Reimbursement Program or the Community-Based Dental Partnership. These agencies were selected because they provide CARE Act-funded dental services to 300 or more patients.
- Requested that HIV programs share articles, unpublished data, or presentations make at national clinical meetings.
- Used the NIH PubMed Internet literature search engine to identify published reports regarding the organization and financing of HIV oral health programs in the U.S., as well as the assessment of the cost-effectiveness, quality, and outcomes associated with publicly funded HIV oral health services.
- POI also summarized their unpublished report funded by HAB regarding best practices in HIV dental care.

Questions Explored During Telephone Interviews with CARE Act Grantees Regarding the Purchase of Oral Health Services

Is a standard fee schedule used to pay for dental procedures?

- If so, can we get a copy of that fee schedule?
- On what were the payments in the fee schedule based (e.g. usual and customary dental fees, unit-based reimbursement, Medicaid or other insurance payment rates, etc.)?
- When was the payments used in the fee schedule last updated?
- Are standard definitions used in the fee schedule?
- If so, can we get a copy of those definitions?

If another method of payment for dental procedures was used, please describe that method (e.g., cost-based reimbursement, payment based on a proposal by the vendor, etc.)?

Although POI contacted many Title II and/or Title III-funded oral health programs, few agencies provided information about the services they fund. Due to an absence of responses from Title II or Title III-funded programs, POI focused on gathering information from Title I grantees.

POI focused on Title I grantees that allocate a significant amount of funds to oral health. A cut-off of \$500,000 in Title I direct services funds allocated to dental services was set to identify a manageable number of Title I EMAs for interviews. Table 2 identifies EMAs selected for interviews. An e-mail message was sent to the contact person for each selected EMA. A follow-up call was placed to the contact person to discuss how dental service funds were distributed (e.g., contract, unit-based payment, other fee-for-service, other mechanism). POI staff requested the fee schedules used, the basis of the fee schedule (e.g. usual and customary dental fees, other unit-based reimbursement mechanism, Medicaid or other insurance payment rates, etc.), the date the fee schedule was last updated, and the procedure definitions used in the fee schedule. POI staff also inquired about evaluations of Title I-funded dental services, including any cost-effectiveness or outcomes studies. Other materials, such as quality indicators were gathered.

EMA	Total FY 2004 Dental \$	% Total FY 2004 Direct Service \$ to Dental	MAI FY 2004 Dental \$	% Total FY 2004 MAI \$ to Dental
Miami	\$1,286,359	5.60%	\$0	0.00%
Washington, DC	\$1,144,437	5.10%	\$39,300	3.40%
Chicago	\$1,040,943	4.50%	\$0	0.00%
Houston	\$884,175	5.20%	\$0	0.00%
Baltimore	\$858,455	5.10%	\$0	0.00%
Los Angeles	\$841,290	2.70%	\$39,002	4.60%
Atlanta	\$824,882	4.80%	\$0	0.00%
New York	\$802,298	0.80%	\$222,872	27.80%
San Francisco	\$726,007	2.60%	\$0	0.00%
Dallas	\$700,482	6.00%	\$0	0.00%
Ft. Lauderdale	\$658,734	5.20%	\$0	0.00%
Philadelphia	\$653,156	3.00%	\$0	0.00%
San Diego	\$650,795	7.30%	\$0	0.00%
Boston	\$556,619	4.10%	\$0	0.00%
Phoenix	\$530,000	8.90%	\$0	0.00%

Source: HAB. Title I Program Allocations by Service Type. Rockville: HRSA HAB. Available at: <http://hab.hrsa.gov/reports/data2b.htm>

POI interviewed Title I grantee staff to identify the best practices of oral health programs in performing cost-effectiveness and impact studies. Agencies participating in the interview include: Baltimore, Boston, Chicago, Dallas, Houston, Jacksonville, Los Angeles, Miami, New York City, Philadelphia, San Diego, San Francisco, Washington, DC.⁶⁴

The interviews with Title I grantees yielded several findings of interest to Broward County:

- None of the Title I grantees interviewed had assessed the cost-effectiveness or impact studies.

- Grantees tended to use somewhat similar approaches to purchasing oral health services: fee-for-service, negotiated rates, and payment rates based on Medicaid or other existing payment systems.
- Grantees using Medicaid fee-for-service payment rates tend to supplement those rates to ensure that dental providers will participate as a subgrantee. They report that Medicaid rates tend to be below usual and customary rates paid by commercial dental insurers or by patients as out-of-pocket payments.
- Several Title I grantees use the CDT, or Current Dental Terminology, to standardize the procedures covered for payment.⁶⁵ CDT codes have been adopted by several Title I grantees because they have been promulgated by members of the American Dental Association (ADA). The CDT code set uses a standard format, is appropriately specific, can be applied uniformly, and is used to report dental procedures provided under public and private dental insurance benefit plans. CDT codes were adopted by the Centers for Medicare and Medicaid Services (CMS) as the standard code set for dental services that meet Health Insurance Portability and Accountability Act (HIPAA) requirements for transmission of electronic or paper dental claims. Thus, use of the CDT code set brings Title I grantees that have adopted them into HIPAA code set compliance.

A summary of the interviews with Title I grantees is outlined:

- **San Francisco:** A cost-reimbursement fee-for-service payment system is used, based on payment rates negotiated with the provider. The provider, the University of the Pacific School of Dentistry CARE Program, submits a budget that averages about \$100 per procedure. Dental services are provided by dental residents under the direct supervision of a faculty member. Title I pays for instructors and administrators. The grantee estimates that approximately 8.11 procedures are conducted per client per year. A unit of service is defined as a single visit with a face-to-face encounter between a patient and a dentist or dental hygienist. Services provided include emergency, diagnostic, preventive restorative (fillings), fixed prosthetics (crowns and bridges), removable prosthetics (removable partial or complete dentures), periodontal treatment, endodontics (root canal therapy), and oral surgery, and oral medicine services. Title I funds do not cover orthodontics, cosmetic dentistry, dental implants, treatment of temporomandibular joint disorders (TMJ or TMD), or hospital dentistry. Dentists are on call outside the normal office hours. The benefits identified by the grantee in providing dental services include:

- ◆ Elimination of dental-related pain and discomfort;
- ◆ Improved general health and well-being;
- ◆ Increased ability to chew food and eat, therefore achieving proper nutrition and possible improved adherence to medications because some drugs require simultaneous food intake;

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POI acknowledges the Title I staff that participated in interviews conducted by POI:

- **Baltimore** (Gail Williams-Glasser)
- **Boston** (Richard Stevens)
- **Chicago** (Linda Young)
- **Houston** (Charles Henley)
- **Los Angeles** (Diana Vasquez)
- **Miami** (Theresa Fiano)
- **Philadelphia** (Jane Baker)
- **Dallas** (Karen Perez)
- **San Diego** (Jim Patterson),
- **San Francisco** (Herman Lovias, Marsha Hersing, Joseph Cecere)
- **Washington, DC** (Lawrence Frison)

- ◆ Improved self-esteem by restoration of dentition, with a resulting healthier smile;
- ◆ Enhanced quality of life by giving people a sense of pride in their rehabilitation efforts; and
- ◆ Contributing to the goals of harm reduction of substance abusers.⁶⁶

Several impact measures have been adopted in the San Francisco Title I dental contract:

- ◆ At least 95% of the dental patients that receive treatment will demonstrate an improvement in dental health through the resolution of presenting problems.
 - ◆ To improve customer service, dental clients will be provided a client satisfaction survey on a twice-year basis to assess satisfaction with the services received.
- **Philadelphia:** A budget based on full-time equivalents (FTEs) is negotiated with subgrantees. Title I-funded dental care is provided at an array of organizational settings including: AIDS service organizations, county health departments, community health centers, and university dental schools.
 - **Chicago:** A budget based on FTEs is negotiated with subgrantees. The grantee has promulgated an extensive set of quality standards, most of which relate to general program operations and accessibility standards.⁶⁷ Several standards relate, however, to oral health services:
 - ◆ Quality standard: services are individualized and tailored to client needs. Each client is required to have a complete treatment plan, which is monitored appropriately. Indicator: A client's initial non-emergency visit includes thorough exam with radiographs and treatment plan. Documentation of initial visit includes a signed consent form for treatment, complete health history from the patient, diagnostic x-rays as determined by oral health care provider, comprehensive head and neck examination, complete intra-oral exam (including evaluation for HIV-associated lesions), full medical status information from the medical provider (including documentation of HIV/AIDS status, medications, stage of illness, and psychosocial assessment), as needed; and caries risk assessment and prevention strategy, including home care and oral self-exam instruction.
 - **Baltimore:** Payment is based on a line-item budget submitted by subgrantees, with costs negotiated by each of eight providers. The Baltimore EMA does not use a unit-cost payment system based on CDT codes.
 - **Washington, DC:** Payment is based on cost-based reimbursement. Dental services are provided at a university dental school, community health center, and AIDS service organization.
 - **New York City:** Payment is based on cost-based reimbursement.
 - **Los Angeles:** Oral health services are purchased on a cost-based reimbursement basis. A unit of service is defined as reimbursement for oral health treatment services that are based on the number of diagnostic and prophylactic procedures and dental visits. Detailed standards of care were developed in 2005 by a panel of local HIV oral health experts.⁶⁸ Covered oral health services may be provided by a licensed dentist, registered dental assistant, or registered dental hygienist. Covered services include:
 - ◆ Comprehensive medical history and consulting primary medical provider, as necessary.
 - ◆ Providing education, prophylactic, diagnostic, and therapeutic dental services to patient with a written confirmation of HIV disease.

- ◆ Providing medication appropriate to oral health care services, including all currently approved drugs for HIV-related oral manifestations.
- ◆ Providing or referring patients, as needed, to health specialists including, but not limited to, periodontists, endodontists, oral surgeons, oral pathologists, and oral medicine practitioners.

A comprehensive oral evaluation includes:

- ◆ Documentation of the patient's presenting complaint, caries charting, full mouth radiographs or panoramic and bitewings and selected periapical files, complete periodontal exam or periodontal screening record (PSR), comprehensive head and neck exam, completed intra-oral exam, including evaluation for HIV-associated lesions, and pain assessment.
- ◆ Biopsies of suspicious oral lesions should be taken and patients should be informed about the test results.
- ◆ Full medical status information should be obtained from the patient's medical provider, including most recent laboratory test results, should be obtained and considered by the dentist.
- ◆ The medical history and current medication list should be updated on a regular basis to ensure all medical and treatment changes are noted.

A comprehensive, multidisciplinary treatment plan should be developed by the dental provider in conjunction with the patient. The behavioral, psychological, developmental, and physiologic strengths and limitations of the patient should be considered by the dental professional when developing the treatment plan. The ability to withstand treatment for an extended amount of time or return for sequential visits should be determined when a treatment plan is prepared or a dental procedure is initiated. The patient's primary reason for the visit should be considered by the dental professional when developing the dental treatment plan. Treatment priority should be given to the management of pain, infection, traumatic injury, or other emergency conditions. The dentist should attempt to manage the patient's pain, anxiety, and behavior during treatment to facilitate safety and efficiency. The goal of treatment should be to maintain optimal functioning. When developing the treatment plan, the dentist should consider: tooth and/or tissue supported prosthetic options; fixed prostheses, removable prostheses, or a combination of these options, soft and hard tissue characteristics and morphology, ridge relationships, occlusion and occlusal forces, aesthetics, and parafunctional habits; restorative implications, endodontic status, tooth position, and periodontal prognosis; and craniofacial, musculoskeletal relations, including the clinical apparent status of the temporomandibular joints,

Emphasis should be on prevention and early detection of oral disease by educating patients about preventive oral health practices, including instruction in oral hygiene. Additionally, dental professionals may provide counseling about behaviors (e.g., tobacco use, unprotected oral sex, body piercing in oral structures) and general health conditions that can compromise oral health. The impact of good nutrition on preserving good oral health should be discussed. Basic nutritional counseling may be offered to assist patients in maintaining oral health. Patient should be scheduled for routine exam and regular prophylaxis twice a year. Other procedures, such as root planning/scaling, should be offered as necessary, either directly or by periodontal referral.

Treatment plans should include appropriate recall/follow-up schedules. A six-month recall schedule is necessary to monitor any oral changes. If the patient's CD4 count is below 100,

a three-month recall schedule should be considered. Treatment plans should be updated as necessary, as determined by the dental provider or the director of the dental program.

Several outcomes are used:

- ◆ Improvement in Oral Health. Measurable performance indicators include: (1) 100% of patients at initial dental exam will receive a diagnosis and documentation of dental problems/conditions. (2) 90% of patients will receive a comprehensive treatment plan and will make progress toward resolution of the identified dental problems/conditions.
- ◆ Satisfaction with Care. Measurable Performance Indicators: Percent of patients who report satisfaction with oral health services they received. (The percentage is still to be determined). The LAC expert panel recommended that a standardized instrument for measuring satisfaction with oral health services be developed and implemented, including a perceived oral health measurement.
- ◆ Engagement and Retention in Care. Measurable Performance Indicator: Percent of patients who complete the prescribed treatment plan. Percent of patients who achieve the maintenance phase of care within one year of entering care. The percentage of patients to be attained by these indicators has not been set.

Los Angeles County requires that prior to performing HIV oral health care, all dental staff be oriented and trained in policies and procedures of the general practice of dentistry, and specifically, the provision of dental services to HIV+ persons. The training program must include, at a minimum: basic HIV orientation, orientation to policies related to the oral health of HIV+ persons, infection control and sterilization techniques, methods of initial evaluation of HIV+ patients, education and counseling of patients regarding maintaining their health, recognition and treatment of common HIV oral manifestations and complications, and recognition of oral signs and symptoms of advanced HIV disease, including treatment and/or appropriate referral.

- **Dallas:** A fee-for-service payment system supports a Dental Reimbursement Program-funded dental program at the Baylor College of Dentistry. The payment rates ranged between private sector and Medicaid rates. Standard dental procedure definitions are based on Medicaid's definitions. Rates are updated annually.
- **Boston:** Payments are made based on a standard fee schedule. Payment rates are based on Medicaid and are updated annually. Standard definitions are used. Title I and the Massachusetts Department of Public Health also support the HIV Dental Ombudsperson Program (HIV DOP), a comprehensive dental access program for HIV+ persons in Massachusetts and Southern New Hampshire. The HIV DOP is designed to remove or reduce barriers to oral health services for persons living with HIV/AIDS through:
 - ◆ Referring persons seeking treatment to a dental provider who is sensitive to the needs of HIV+ patients.
 - ◆ Advocacy to HIV+ persons and oral health professionals by investigating potential discrimination by dental providers and assisting clients with any other problems they may have in getting quality dental care.
 - ◆ Education to HIV+ persons and their providers pertaining to oral health.
- **San Diego:** Payment is made "somewhat" on a standard fee schedule. Some services are reimbursed on Dent-Cal plus supplement basis: 170% of their rates up to \$300 and 130% of their rates over \$300. Payments for some specialty procedures are negotiated with subgrantees. It was unclear when the fee schedule was last updated or if standard definitions

are used. Americhoice (ASO) handles claims processing and makes payments on behalf of the Title I grantee.

- **Miami:** A standard fee schedule is based on Medicaid reimbursement rates set in the Florida Medicaid Dental Coverage and Limitations Handbook, with a 3% adjustment.⁶⁹ Their standard definitions are CDT codes. A total of \$3,000 per client per fiscal year in Title I funds may be used for dental procedures. There are no exceptions to that ceiling. Patients receiving Title I-funded dental services may not have a household income that exceeds 300% of the FPL. The Title I Dental Formulary includes basic and special dental services. Basic dental services include those procedures that provide routine care to prevent further complications and pain to eligible HIV+ clients. Specialty dental services are procedures that provide more advanced care to eligible HIV+ patients.
- **Houston:** One dental provider is funded. The contract averages \$91 per visit, with no multiple fees. Fees are updated every three years, with the last update made in FY 2004. Unit definitions are used. Patients covered for dental care must be 15 years of age or older and have an income no greater than 300% of the FPL. The funded agency must demonstrate that the primary patient care dentist has at least two years prior experience treating HIV disease and/or an ongoing HIV education programs that are documented in personnel files and updated regularly. A unit of service is defined as one dental visit that includes restorative dental services, oral surgery, root canal therapy, fixed and removable prosthodontics, and periodontal services (subgingival scaling, gingival curettage, osseous surgery, gingivectomy, provisional splinting, laser procedures and maintenance). Dental services are defined as restorative dental services, oral surgery, root canal therapy, fixed and removable prosthodontics, and periodontal services (subgingival scaling, gingival curettage, osseous surgery, gingivectomy, provisional splinting, laser procedures, and maintenance). Oral medications (including pain control) for HIV patients 15 years or older must be based on a comprehensive individual treatment plan. Services must include but not be limited to: individual comprehensive treatment plan, diagnosis and treatment of HIV-related oral pathology (oral KS, CMV ulceration, hairy leukoplakia, xerostomia, lichen planus, aphthous ulcers and herpetic lesions, diffuse infiltrative lymphocytosis), standard preventive procedures (oral hygiene instruction, diet counseling and home care program), oral prophylaxis, restorative care, oral surgery (dental implants), root canal therapy, fixed and removable prosthodontics (crowns and bridges), periodontal services (subgingival scaling, gingival curettage, osseous surgery, gingivectomy, provisional splinting, laser procedures, and maintenance). Title I-funded providers must have a mechanism in place to provide oral pain medication, as prescribed for patients by a dentist.

B. Best Practices in Ensuring High Quality HIV Oral Health

Professional associations or funders have not promulgated national HIV oral health clinical guidelines. Guidelines are available; however, from the Florida HIV/AIDS Community Planning Group and the New York State AIDS Institute to inform funders, oral health providers, and consumers regarding best practices in HIV oral health care.^{70, 71}

1. Florida HIV/AIDS Community Planning Group

Staff

- The dental program director will have training and experience in clinical aspects of oral hygiene, dental treatment planning, and dental care.
- All practitioners should use universal precautions and adhere to the infection-control practices identified in the most recent CDC publication, *Recommended Infection Control Practices for Dentistry*.

Treatment/Service Plan

- The patient's main reason for the visit, concerns and expectations should be considered by the dentist.
- The dentist should perform a comprehensive oral evaluation, when indicated by his or her professional judgment, to include: caries charting, full mouth radiographs or panoramic and bitewings and selected periapical films, and complete periodontal exam or periodontal screening record for minimal periodontal involvement
- Treatment priority should be given to the management of pain, infection, traumatic injuries, or other emergency conditions with the goal of treatment being the optimal functioning possible.
- The dental and medical histories and most recent lab work results should be obtained and considered by the dentist to identify medications and predisposing conditions that may affect the diagnosis and management of the oral health condition.
- An intra-oral examination should be performed by the dentist to determine existing conditions, the presence of disease and structural abnormalities.
- All restorations, including fixed and removable prostheses, should be examined.
- Diagnostic tests relevant to the evaluation of the patient should be performed and used by the dentist in diagnosis and treatment planning.
- The patient should be provided with appropriate information by the dentist about the diagnostic procedure(s) to be performed prior to giving consent.
- Biopsy of suspicious oral lesions should be taken and the patient should be informed of the findings.
- The dentist should recommend treatment, present alternative treatments, if any, and discuss the probable benefits, limitations and risks associated with treatment, and the probable consequences of no treatment and costs if applicable prior to obtaining informed consent.
- Any treatment performed should be with concurrence of the patient and the dentist. If the patient insists upon treatment considered by the dentist to be non-beneficial or harmful for the patient, the dentist may decline to provide treatment, subject to local program limitations.
- In consideration of the individual circumstances, the dentist should decide whether the dental condition(s) should be monitored, treated, or removed.
- The dentist may utilize all procedures as allowed by licensure by the state, subject to local formulary restrictions.
- Dental care providers should consult with the client's other health care providers prior to prescribing any new medications.
- Periodontal therapy to maintain gingival and bony support with periodontal maintenance should be provided every four to six months, pending disease progression.
- The treatment plan is reviewed and updated as deemed necessary by the dental provider or director of the dental program.
- Treatment of oral OIs is coordinated with the patient's medical provider.

Referrals

- When the dentist considers it necessary, (an) other health care professional(s) should be consulted to acquire additional information.
- Provide appropriate referrals to any necessary specialty care in accordance with the client's treatment plan and communicate relevant and appropriate information to the referred provider.

Client Education

- The dentist should emphasize prevention and early detection of oral disease through patient education in preventive oral health practices, which may include oral hygiene instructions.
- Counseling may be provided regarding tobacco use or other behaviors and general health conditions that may compromise oral health.

2. New York AIDS Institute

The New York AIDS Institute general principals outlined by *Oral Health Care For People With HIV Infection: Clinical Guidelines For The Primary Care Practitioner* for adult HIV+ patients include:⁷²

- Comprehensive primary care includes primary oral health care.
- Oral health should be an integral part of primary health care for all patients with HIV/AIDS.
- Asymptomatic HIV+ patients and clinically stable, fully functional AIDS patients should receive routine, comprehensive oral health care in the same manner as all other patients.
- The provision of care should be coordinated between medical and oral health care providers.
- Oral health care services should be fully integrated into other available primary care services for HIV+ patients.
- To ensure adequate access to oral health care services, structural, financial, personal, and cultural barriers should be considered and addressed.
- Oral health care services should be fully integrated with available primary care services for HIV+ patients. The medical provider should encourage all patients under his/her care to schedule a semi-annual oral health examination and to adhere to the oral health care provider's recommendations regarding appropriate follow-up. All medical health care providers should be aware of oral health referral sources for patients under their care. Documentation that a dental referral was made or that the patient is under the care of a dental provider should be evident within the clinical care plan of the medical record. The medical provider should forward any requested clinical information to the patient's oral health care provider in a timely fashion.
- To ensure adequate access to oral health care services, structural, financial, personal, and cultural barriers should be considered and addressed by the oral health care staff. The oral health care provider should promptly communicate to the patient's medical provider any clinical findings that may signify a change in the patient's systemic health or any planned, extensive surgical procedures that may impact the patient's systemic health.
- Every patient, regardless of HIV serostatus, should receive a comprehensive initial evaluation. To provide the best oral health care possible, oral health care professionals should perform a medical and social history along with a comprehensive medical systems review at recall visits for stable patients and at each visit for unstable patients. The dental

provider should determine and document the patient's chief complaint(s) and health history. HIV+ patients may develop associated skin manifestations and cervical lymphadenopathy. Therefore, extraoral head and neck examinations and oral soft-tissue examinations should be performed at each visit. Findings should be discussed with the patient and the patient's primary care provider.

- A comprehensive treatment plan that includes preventive care and maintenance should be developed and discussed with the patient. Definitive treatment planning should include the incorporation of past and present medical history; past and present history of tobacco, alcohol, and other substance use; assessment of hard and soft intra- and extra-oral tissues; evaluation of existing radiographs; and thorough periodontal evaluation. As HIV-related medications may affect dental treatment and cause adverse effects, the patient's oral health care provider should review all medications being used by the patient and should understand the potential for these medications to affect oral health care. Dental treatment modifications for patients with HIV infection should be based on the patient's general medical status rather than his/her HIV infection.
- The clinician should practice evidence-based caries management in patients with HIV/AIDS. The clinician should be aware that salivary gland disease, xerostomia, or HIV-related medications with high sugar content may be associated with increased risk for dental caries. When there are non-cavitated lesions, remineralization should be performed with fluoride varnishes and homecare fluoride products. When there are cavitated lesions, proper restorative procedures and materials should be used according to the need of the patient.
- The clinician should perform a comprehensive gingival and periodontal examination, which includes a periodontal probing depth record
- Essential treatment and medications, including the use of appropriate analgesics, should be prescribed appropriately for all patients, including those patients who have a history of substance use or are active substance users. Because a significant number of HIV patients have a history of substance use or are active substance users, the following oral complications, which may be related to drug addiction, should be considered: xerostomia, rampant dental caries (especially cervical caries), poor oral hygiene, gingival and periodontal disease, and occlusal wear as a result of bruxism. Injection drug users have a high incidence of bacterial endocarditis. Oral health care providers should address antibiotic prophylaxis before performing dental procedures
- Dentists and dental hygienists should be aware of HIV testing procedures and confidentiality requirements. Dentists who become aware of a patient's risk for HIV infection or who identify a clinical condition that may be associated with HIV infection should refer the patient for HIV counseling and testing. When evaluating an oral lesion indicative of immune deficiency in a patient with unknown HIV status, the provider should consider HIV infection, particularly in the absence of other causes of immunodeficiency. HIV counseling and testing should be recommended in these cases.
- Oral lesions in HIV+ patients should be evaluated and diagnosed in the same manner as lesions in all other dental patients. An unexplained lesion that does not resolve following appropriate clinical management or empiric therapy warrants consideration of a biopsy and histologic examination of the tissue. If the decision is made not to obtain a biopsy, the reason for the decision should be documented. As with any procedure, the risks involved in performing a biopsy should be weighed against the benefits. HIV+ patients may be at an increased risk for post-operative bleeding. Prior to biopsy procedures, the need for obtaining the patient's platelet count, prothrombin time and/or international normalized ratio (INR), activated partial thromboplastin time, and bleeding time should be evaluated.

- The need for patient referral to a dental or medical specialist for management of oral lesions or for assessment or management of underlying systemic disease should be individualized. The patient's primary care provider should be informed of the results of diagnostic procedures for all lesions as well as medications prescribed or any change in medications. Management of a patient with HIV infection often requires a multidisciplinary approach coordinated by the patient's primary care provider or case manager. Any patient not known to be HIV+ should be referred for HIV counseling and testing when he/she presents with an oral lesion that is associated with an immunodeficiency status or a sexually transmitted disease and when the presence of the lesion cannot be explained by a confirmed underlying condition or by a medication.

The New York AIDS Institute general principals outlined by *Pediatric and Adolescent Guidelines* include:

- The primary care clinician should perform an initial dental screening at about twelve months of age in HIV+ children. Preventive information and anticipatory guidance regarding bottle-feeding, eruption sequence, and infant oral hygiene should be given to parents at this time. By 24 months of age, children should be referred to an oral health care provider.
- The primary care clinician should inform the oral health care provider of important changes in the patient's status and supply current information that may influence dental treatment, including staging of the patient's disease, medications, nutritional status, and laboratory tests (e.g., recent CD4/CD8 counts, viral load, and platelet count).
- The primary care clinician and the oral health care provider should discuss preventive and restorative dental treatment plans, work collaboratively to resolve questions of contraindications to dental procedures, and coordinate medical appointments with dental appointments. The primary care team should follow the American Association of Pediatric Dentistry (AAPD) guidelines for anticipatory guidance.⁷³ The primary care clinician should instruct patients and caregivers on how to maintain oral hygiene.
- The clinician should stress the role of the caregiver in maintaining oral hygiene for young children. Residue of food and medicine on the oral tissues (mucosa, gingivae) and on the teeth should be removed by the caregivers of young children and independently by older children through rinsing with water or mechanical cleansing.
- Dental treatment modifications for children and adolescents should be based on the patient's medical condition and treatment rather than HIV status. The clinician should consider the following factors when devising the best treatment strategies for each patient:
 - ◆ Age of the child/adolescent (the frequency of cleanings, sealant application, and specific dental hygiene routines will vary with age),
 - ◆ Medical condition (progression of HIV may affect risk of procedure or may increase infections, specific medications may be cariogenic or may affect risk of anesthesia), and
 - ◆ Oral health history (history of dental problems may warrant more aggressive measures) HIV+ adolescents should be evaluated for and should receive appropriate orthodontic care.
- Oral health preventive strategies include:
 - ◆ Supervision of all bottle use for feeding or pacification,
 - ◆ Management of cariogenic medications,
 - ◆ Dental sealants,

- ◆ Optimal systemic and topical fluoride,
 - ◆ Fluoride varnish supplementation,
 - ◆ Management of nutrition,
 - ◆ Low frequency and chronicity of fermentable carbohydrate intake (e.g., juices, milk, dietary supplements),
 - ◆ Removal of food and medicine residue via rinsing with water or mechanical cleansing, and
 - ◆ Appropriate orthodontics.
- Oral and primary healthcare providers should work together to provide diagnoses, observation, and management of any lesions that disrupt the integrity of the oral mucosa in children.
 - Primary care clinicians should clearly instruct patients and caregivers on the following oral hygiene measures, which will help control oral *Candida* and delay the progression of oral candidiasis. These preventive measures should begin at birth and should be performed by the caregiver of younger children and independently by older children:
 - ◆ Rinsing or mechanical cleansing of food and medicine residue on the oral tissues (mucosa, gingivae) and on the teeth,
 - ◆ Nutrition and medication management, and
 - ◆ Cleansing the entire mucosal and gingival tissue area.
 - The clinician should assess the diet, oral habits, and/or HIV status of a child with angular cheilitis. The primary care team should collaborate regarding nutritional support and vitamin supplementation for HIV+ children with angular cheilitis.
 - Primary care clinicians should refer patients with extensive caries or chronic demineralization for comprehensive restorative care as soon as possible.
 - Clinicians should recommend sugarless gum and frequent consumption of water or highly diluted fruit juices to alleviate xerostomia.
 - Clinicians should manage aphthous ulcers with topical corticosteroids and anesthetics.

3. Title I HIV Quality Management Program Performance Indicators of Oral Health

The New York AIDS Institute was funded by the New York City Title I Program to develop indicators for measuring the quality of oral health services provided by dentists or other oral health providers to HIV+ persons.⁷⁴

- A health history assessment should be obtained annually, and include contact information for primary care provider, and whether patient is receiving care, current medications and changes in regimen, allergies (baseline), laboratory data (baseline Hepatitis B and C status), and CD4 and viral load results.
- An intraoral exam should be performed annually and include a dental caries examination and soft tissue examination. Documentation regarding any of the following will be sufficient to generate a 'YES' response for soft tissue examination: pathology of cheeks, tongue, palate, gingiva, mucosa, pharynx, frenum, or floor of mouth.

- A periodontal exam should be performed annually. Documentation regarding any of the following will be sufficient to generate a “YES” response for a periodontal exam having been performed: examination of pocket depths, gingival inflammation, plaque index, fremitus, recession, bleeding assessment, or tooth mobility.
- An extraoral (head and neck) exam should be performed annually. Documentation for any of the following will be sufficient to generate a “YES” response for an extraoral exam having been performed: examination of facial symmetry, lymph nodes, thyroid glands, or lips.
- A written treatment plan should be updated annually. Documentation showing evidence of a treatment plan should include a summary of existing conditions, problems, course of action, and a maintenance program.
- Oral health education should be provided to the patient annually, and include the following components: caries prevention (e.g., oral hygiene instruction, dietary counseling) and smoking cessation

C. Best Practices In HIV Oral Health: A National Overview

Few articles or reports describe successful HIV oral health projects and the elements that contribute to their success. To address this lack of information, HAB contracted in 2001 and 2002 with POI to assess HIV oral health and insurance programs to learn about the services they provide and their successful strategies in meeting the oral health care needs of HIV+ persons.⁷⁵ Site visits were conducted throughout the U.S. by a team of HIV oral health experts formed by POI. This assessment was the first and only systematic assessment of best practices in HIV oral health care funded by HAB.

POI found that HIV oral health programs tended to be established in response to significant unmet need identified by individual dental providers or through the CARE Act needs assessments. These programs are designed to fit their unique community settings.

The populations served by HIV oral health programs reflect the HIV epidemics in their communities. Most programs serve adults, a small number of programs serve only children, and some programs serve all age groups. Among programs serving adults, the service population may be HIV+ persons generally, the homeless, youth, substance abusers, or a particular racial or ethnic group. Service areas range from local neighborhoods or communities to entire regions.

The physical design and atmosphere of HIV oral health programs are important to their success. Several HIV oral health programs report that they strive to create a professional atmosphere that emulates a private dental practice. Efforts are made to make HIV+ persons feel that they are not treated differently than other dental patients. Some programs report that they strive to be an integrated component of an AIDS service organization (ASO).

Staffing models differ widely. Some programs purchase contractual services with dentists in private practice. Others employ dentists directly, pay them as contractual employees, or contract with dental outsource agencies. Some programs work with dentists who provide care in their own offices on a fee-for-service or pro bono basis. Many programs supplement their staffing with students and faculty from local dental education programs that rotate personnel. Staffing of clinic-based HIV oral health programs commonly includes one or more dentists, dental hygienist, dental assistant, office manager, billing clerk, and reception staff. Some programs also include dental students and fellows, a health educator, case manager, and outreach worker. The number of personnel staffing the program is determined by patient volume, the array of services provided, the number of operatories, and the hours of operation.

The HIV oral health programs studied generally establish a long-term, individualized care or treatment plan. The care plan is considered long term, with full restorative and preventive care

undertaken over several visits. Commonly programs schedule patients for routine hygiene visits every three to four months, with more frequent visits scheduled based on the care plan, patient wishes, and availability of appointment slots. Components of the plan include a formal intake process, review of general medical history, x-rays, and laboratory results before the initial examination; and ongoing comprehensive preventive care, restoration, cosmetic care, placement of prosthetics, oral surgery, and urgent and emergency care. Most programs studied identified dental education as an important aspect of their care. Dental education is begun commonly at the initial visit by dental hygienists and conducted by dental staff at each visit.

New roles for dentists are being identified to address the need to offer access to HIV counseling and testing. The dental setting has been identified recently as a setting in which HIV counseling and testing might take place, particularly in light of the availability of rapid HIV oral testing.^{76, 77}

Adequate financing of HIV oral health programs is critical to success in meeting the oral health care needs of persons living with HIV. Lack of dental insurance is addressed in several ways by state and local jurisdictions, as well as providers. Several statewide dental reimbursement programs have been successful in forming networks of community-based dentists that provide services under a fee-for-service basis. The Minnesota Access to Dental Care Program was designed to remove financial barriers to primary oral health care for HIV+ persons by purchasing dental insurance at a discounted rate.⁴ Title I funds in Miami-Dade and San Diego EMAs have been used to form fee-for-service and capitated dental networks. Several community-based organizations (CBOs) have successfully used Title III funds to form dental networks.

Several strategies were used to lower the costs of operating HIV oral health programs. Most programs studied by POI actively seek laboratories and suppliers willing to accept reduced payment rates. Programs affiliated with dental education programs have negotiated price reductions based on volume. Equipment costs are reduced by seeking used equipment from private dental practices, public health dental clinics, or dental schools. Renovation costs were funded through State construction bonds and Bureau of Primary Health Care (BPHC) 330 program funds.

In addition to CARE Act funds, HIV oral health programs commonly receive support from an array of other funding sources. These sources include Medicaid, commercial insurance, State and/or local government funds, charitable and corporate donations, and public and private sector grants. Most programs studied report significant challenges in financing their operations and that their institutions must make up their deficit. Several solutions to achieve fiscal solvency are adopted including capping the number of patients served, limiting the types of services provided, and seeking other sources of care for prohibitively expensive procedures.

Several strategies are used by the HIV oral health programs studied to coordinate dental, medical, and other HIV-related services. Co-location with medical clinics is common, enabling dental providers to confer with medical providers when medical problems are identified. Co-location also affords the opportunity for dental exams to be conducted as part of the medical visit. Co-location also has been used to identify HIV+ dental patients that are not in routine primary care and to arrange for primary care while the patient is onsite. Medical and dental records are integrated in several of the programs studied to further care coordination.

Coordination of care is achieved in other HIV oral health programs that are not co-located with medical providers. Multidisciplinary team meetings or case conferences are convened routinely, in which dental personnel actively participate in care planning and management. In some agencies, a disease management model is used with a liaison nurse coordinating the provision and scheduling of medical and dental care.

HIV oral health programs used several strategies to ensure accessible services. Such strategies include: selecting a location that is physically accessible and acceptable to patients, co-location

in ASOs, offering convenient office hours, rapid intake and appointment scheduling, use of appointment reminder systems, effective methods for decreasing no-show and cancellation rates, triage procedures for walk-in and urgent patients, identifying sources of care during after-hours, provision of transportation, linkages with case managers for case finding and assistance in appointment keeping, home visiting, outreach to persons living with HIV not in dental care, and provision of culturally competent services through staffing and materials.

The HIV oral health programs studied developed an array of strategies to address dental phobia and pain aversion. These concerns are reported to be widespread among their patients. An effort is made to establish a trusting relationship with the patient in a safe, comfortable atmosphere. Several programs initially focus on an oral exam, without treatment or cleaning. Alternatively, patient education may be the focus of the care plan until the patient is comfortable. Several other programs have developed pain management strategies to provide pain-averse patients enough time to become comfortable with dental procedures. The physical programmatic setting is important in supporting this approach, with an effort made to make the environment inviting and comfortable.

D. Best Practices In Oral Health: Examples in New York State

In 2001, the New York AIDS Institute published *Promoting Health Care for People with HIV Infection*.⁵ The report highlights the effective design and practices of HIV oral health programs in New York that can be applied in other communities. The report suggests that several best practices in HIV oral health be applied:

- Increasing patient knowledge through education;
- Increasing access to oral health care; and
- Using a multidisciplinary approach to HIV oral health care.

Several specific activities are recommended to increase patient knowledge about the benefits of oral health care:

- Develop simple, easy to read written materials in the languages used by a dental practice's patients. These materials should highlight the importance of oral health care for HIV+ persons, what to expect during an oral health exam, and the importance of follow-up care. Design simple, easy to read oral care brochures in multiple languages illustrating techniques for self-exam, brushing, and flossing.
- Use waiting rooms for educational opportunities by providing print and video training materials. Provide these materials through a patient lending library.
- Provide and reinforce prevention messages throughout the patients' course of treatment. Use a team approach to prevention messaging to underscore the importance of self-management.
- Organize and conduct patient education sessions. These sessions such be offered in medical settings and CBOs that HIV+ persons are likely to congregate or feel comfortable visiting for a training session.
- Offer smoking cessation counseling. Provide patient education that outlines the contribution of smoking on compromised oral health, delayed wound healing, breakdown of periodontal attachment, and oral and pharyngeal carcinoma.
- Educate the community about oral health care by distributing materials and presenting lectures.

VI. UTILIZATION AND TITLE I EXPENDITURE EXPERIENCE OF BROWARD COUNTY HIV DENTAL CLINICS

A. Analysis of Title I Oral Health Claims

During the period between December 2002 through June 2005, 2,738 HIV+ Broward County adult residents received regular dental visits at Title I-funded BCHD clinics. This represents 25% of the estimated 10,748 HIV+ Broward County residents "in care."⁷⁸ During the observation period, adult patients had an average (mean) of 3.7 regular visits (median=three visits), with total visits ranging from one to 31 visits. Table 3 illustrates utilization and expenditure data for the three years studied.

Twelve children also received regular dental services at the Children's Diagnostic and Treatment Center (CDTC) at a dental clinic staffed by BCHD dental personnel. The contract between the BCHSD Substance Abuse and Health Care Services Division (SAHCSD) and CDTC was initiated at the end of the observation period. POI did not conduct an analysis of the pediatric dental utilization data due to the low number of children served by Title I.

Title I-funded specialty dental services were provided to 363 HIV+ Broward County residents, with an average of one visit per patient. Total visits per patient ranged from one to three specialty dental services.

During the period between December 2002 through June 2005, Title I paid \$128 per regular dental visit. An average of \$526 was spent per patient during the study period (median=\$408), with expenditures ranging from \$128 to \$4,237 per patient. An average of \$791 was spent per patient (median=\$800) for specialty dental services, with expenditures ranging from \$42 to \$8,050 per patient.

Utilization patterns among adult BCHD HIV clinics patients reflect availability of other funds to pay for dental services and the impact of expanding dental contractors. Figure 2 illustrates the influence of Title II funding for specialty dental services from August 2003 to March 2004. A decrease in utilization of general dental services in March 2005 reflects funding by Title I of the University College of Dental Medicine. Specialty and regular dental services provided by Nova Southeastern University were not included in the analysis conducted by POI.

Data quality and completeness problems precluded detailed analysis of Title I-funded regular and specialty dental services:

- The absence of dental procedure coding precluded analysis of the nature of regular dental visits, dental hygiene visits, and specialty dental services. While BCHD provided visit-specific invoice data, it is unclear which specific services were provided or at which BCHD clinic they were provided.
- Inconsistent data coding and missing data prevented analysis of differences in use or expenditures by age, gender, race, ethnicity, income, or HIV dental clinic. It appears that while demographic data were collected by the BCHD clinics, they were not transferred routinely and accurately in all submitted invoices. A summary of the demographic data quality problems is outlined in the technical addendum to this report.

Name and Location of Current Title-I Funded HIV Dental Clinics in Broward County

- **Nova Southeastern University College of Dental Medicine, South University Drive, Ft Lauderdale**
- **Paul Hughes Health Center Dental Clinic, NW 6th Ave, Pompano Beach**
- **Northwest Health Center Dental Clinic, NW 15th Way, Ft Lauderdale**
- **Children's Diagnostic and Treatment Center Dental Clinic, S Federal Hwy, Ft Lauderdale**
- **South Regional Health Center Dental Clinic, Pembroke Rd, Hollywood**

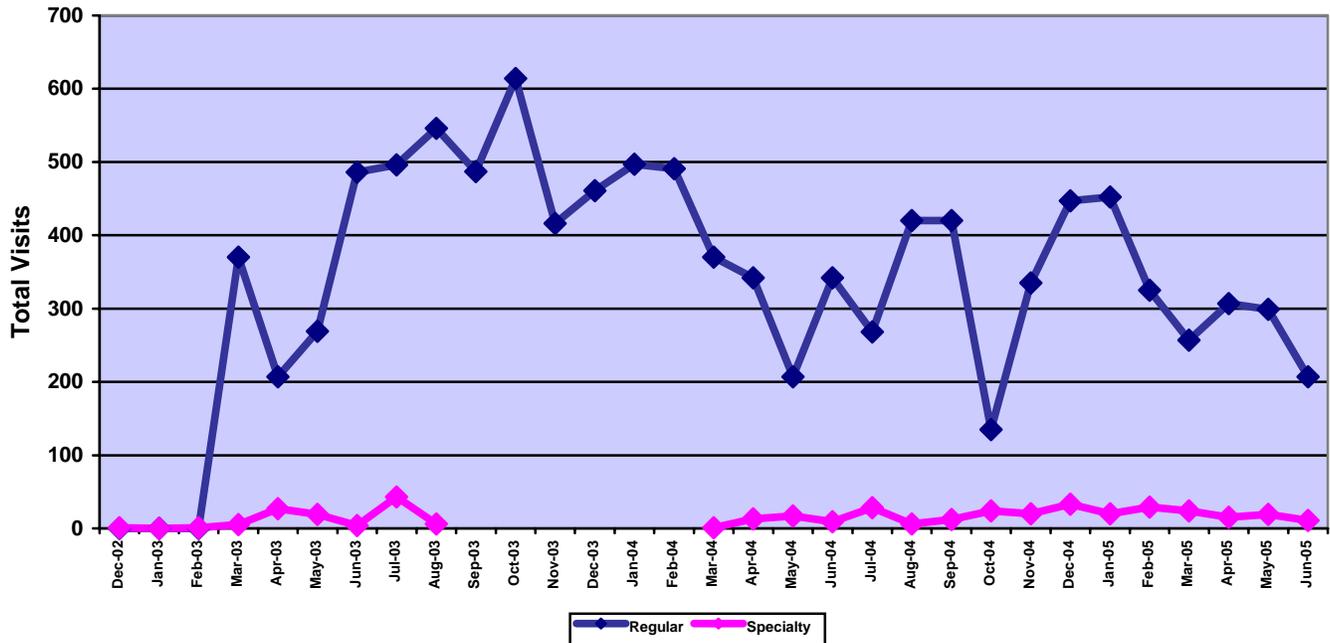
Table 3. Utilization and Expenditure Patterns of Adult HIV+ Broward County Residents Receiving HIV Oral Health Services at Broward County Health Department Dental Clinics (2003-2005)

Type of Dental Service and Year	Number of Patients Served	Mean Cost per Patient	Median Cost per Patient	Total Cost per Year	Mean # of Visits per Person	Median # of Visits per Person	Total Visits per Year
Regular Dental Visits							
2003¹	1,492	\$396	\$280	\$590,913	2.8	2.0	4,120
2004	1,649	\$371	\$277	\$612,316	2.6	2.0	4,249
2005²	970	\$244	\$257	\$237,092	1.9	2.0	1,846
Specialty Dental Services							
2003¹	100	\$751	\$930	\$75,142	1.0	1.0	100
2004	154	\$825	\$800	\$127,083	1.0	1.0	162
2005²	116	\$778	\$800	\$90,303	1.0	1.0	118

¹ Claims data from February through December 2003.

² Claims data from January through June 2005.

Figure 2. Regular and Specialty Dental Services Provided to Adults by Broward County Health Department HIV Clinics, December 2002 – June 2005



B. Estimating Future Title I Expenditures for HIV Oral Health Services

POI explored the fiscal impact of providing universal coverage of HIV dental care to Broward County HIV+ residents. The process used to calculate the estimated expenditures is outlined:

1. Estimates produced for the FY 2006 Broward County Title I grant application were used to calculate the number of Broward County residents living with AIDS who were eligible for publicly funded dental services. To estimate this figure, POI used the estimated number of Broward County residents living with AIDS who received HIV primary medical care services through public sources in a twelve-month period. POI did not exclude Medicaid beneficiaries because routine dental visits are not a benefit covered by Medicaid. Patients receiving HIV primary medical care was used in the calculation because these individuals are in medical treatment and thus can be referred to Title I-funded dental services. Using these assumptions, **4,158** Broward County residents living with AIDS were estimated.
2. Similarly, the FY 2006 Broward County Title I grant application data were used to calculate the number of Broward County residents who are aware that they are HIV+ and who were eligible for publicly funded dental services. To estimate this figure, POI used the estimated number of Broward County residents who are aware that they are living with HIV and who received HIV primary medical care services through public sources in a twelve-month period. As in the AIDS calculation, POI did not exclude Medicaid beneficiaries because routine dental visits are not a benefit covered by Medicaid. Patients receiving HIV primary medical care was used in the calculation because these individuals are in medical treatment and thus can be referred to Title I-funded dental services. Using these assumptions, **3,105** Broward County HIV+ residents were estimated.
3. Data from Estimates 1 and 2 were summed for a total of **7,263** Broward County HIV+ residents who are eligible for publicly funded and who received HIV primary medical care services through public sources in a twelve-month period.
4. POI used the current amount paid to Title I-funded Broward County dental providers for a regular visit (\$133.09) as the amount to be paid in future years for Title I-funded dental care. This is a conservative estimate, as it is likely that increased payments will be necessary to compensate contractors for increased supply costs, cost-of-living-adjustments, fringe benefit costs, and other direct costs related to providing dental care.
5. No national guidelines specify how frequently per year an HIV+ individual should receive a routine dental examination. Two approaches were used for the purposes of these estimates. It was hypothesized that one visit per year per patient for non-AIDS HIV+ patients would be the standard. The standard for AIDS patients is hypothesized to be one regular visit per year.
6. The estimates do not take into consideration specialty dental care charges. Insufficient data were obtained from the BCHD HIV dental clinics to project specialty dental visits for AIDS and HIV/not-AIDS patients.
7. Based on the conservative utilization estimates used by POI, 11,421 dental visits would be conducted in a twelve-month period to achieve universal access to HIV dental services. Using a fixed payment of \$133.09 per visit, a total of \$1,520,021 would be expended. This figure falls short by \$842,636, the amount of FY 2006-2007 Title I funds allocated for dental services. In the current Title I grant year, \$677,385 was allocated for **both** regular and specialty dental services.
8. It is likely that the estimated expenditures significantly under-represent the likelihood that patients will have a relatively small number of dental visits. For example, only 30% of HCSUS respondents had one dental visit in a twelve-month period.³¹ One-quarter of

HCSUS respondents had two visits, 26% had three or four visits, and 19% had five or more visits.

9. The capacity of existing Title I HIV dental provider to provide a significantly greater number of dental visits is unclear. BCHD dental invoice data, for example, do not provide sufficiently detailed data needed to estimate productivity data. The productivity of the Nova dental program, a new Title I subgrantee, is not yet clear.

Table 4. Estimated Regular Dental Visit Expenditures for Publicly Funded Broward County Residents Living with AIDS and/or Aware That They Are HIV+ and Receiving Publicly Funded HIV Primary Care					
	Estimated Number of Patients	Estimated Number of Visits Per Year	Total Number of Visits	Payment Per Visit	Total Title I Funds
AIDS	4,158	2	8,316	\$133.09	\$1,106,776
HIV, Not-AIDS	3,105	1	3,105	\$133.09	\$413,244
Total	7,263		11,421		\$1,520,021
FY 2006-2007 Allocation to Dental Services					\$677,385
Difference Between FY 2006-2007 Title I Allocated Funds and Projected Expenditures					\$842,636

VII. ASSESSING QUALITY OF TITLE I-FUNDED ORAL HEALTH SERVICES

A. Introduction

POI conducted a review of dental charts at three Broward County Health Departments (BCHD) clinic, Paul Hughes Health Center Dental Clinic, Northwest Health Center Dental Clinic, and South Regional Health Center. POI was authorized to conduct chart reviews by a Business Associates Agreement between BRHPC and POI.

A chart abstraction tool was designed by POI, in consultation with Dr. Carol M. Stewart, Associate Professor in the Division of Oral Diagnostic Sciences, Department of Oral and Maxillofacial Surgery and Diagnostic Sciences, University of Florida College of Dentistry in Gainesville. Dr. Stewart is Dental Director of the Florida/Caribbean AIDS Education and Training Center (AETC). A copy of the tool is included in the technical appendix.

The tool was based on standards of oral health care established by the Broward Regional Planning Council in 2002, an HIV dental clinic chart review instrument developed by the New York State Department of Health AIDS Institute, and standards recommended by Dr. Stewart for general dental care.⁷⁹ The tool was used to assess the achievement of these standards by the three dental clinics under contract with the Broward County Human Services Department Title I program in FY 2004 (March 2004 – February 2005). Individual dental practitioners' performance was not assessed as part of this project. Table 4 summarizes the items reviewed in the charts.

ACKNOWLEDGEMENTS

POI wishes to acknowledge the efforts of BCHD staff that assisted in preparing for the chart reviews. These staff include: Julia Ali-John, Dr. Lidia Alonso, Dr. Curtis Barnes, Debbie Cochrane, Susan Dunmore, Marlinda Quintana-Jefferson, Sharanda Richardson, Deloris Williams, Dr. Perminder Wadhwa. Carol Cook of the Broward County Human Services, Department Substance Abuse and Health Care Services Division, also assisted the project team to create the sampling frame.

BCHD staff created an automated file containing summary information for 1,628 dental patients served in FY 2004. A randomized sample was created by POI to assist chart selection by BCHD dental records staff. They were instructed to select for review the first 45 charts per clinic in the randomized sample list. A target of randomly selected 30 charts was set per clinic to ensure statistically significant, generalizable results of the chart review. An additional 15 charts were randomly selected to ensure a sufficient number of charts available if some charts did not meet the period for the review. Power test calculations have been conducted previously by Dr. Karl Heiner for the New York AIDS Institute.⁸⁰ Dr. Stewart and Dr. Julia Hidalgo, POI Chief Executive Officer reviewed 92 charts. An Access data entry screen was created to allow the reviewers to directly record data into the chart abstraction tool. SPSS was used to analyze the chart data.

Figure 3. Items Reviewed in the Dental Chart Review

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Does intake form include? <ol style="list-style-type: none"> 1.1 Patient name 1.2 Social Security Number 1.3 Address and phone number 1.4 Date of birth 1.5 Race/ethnicity 1.6 Gender 1.7 Date of First Visit 1.8 Primary care physician's name and contact information 2. Documentation of HIV+ status? 3. Documentation of income (actual verification required if a criterion for eligibility or assessment of patient fees)? 4. Documentation of Broward County residency? 5. Emergency (secondary) contact information? 6. Signed consent for treatment (clinical programs only)? 7. Documentation of patient receipt of Patient's Rights Statement? 8. Documentation of HIPAA compliance? 9. Signed releases for all referrals made and all disclosures of confidential patient information to a third party? 10. Treatment plan, containing measurable goals, objectives, and time frames for achievement? 11. Treatment plan complies with published program treatment guidelines? 12. Progress notes current, legible, signed, and dated? 13. Progress notes address treatment plan goals? 14. Patient identifier on all documents? 15. Chart reflects original file entries? 16. Chart is organized and orderly, no loose pages? 17. Is patient's medical history recorded and updated at least every six months? <ol style="list-style-type: none"> 17.1 Allergies 17.2 Special conditions 17.3 Current medications 17.4 CD4+ value 17.5 White blood cell count 17.6 Platelet count | <ol style="list-style-type: none"> 17.7 Hepatitis C status 17.8 Tuberculosis status 17.9 Medical clearance for treatment 18. Patient referred to specialist? <ol style="list-style-type: none"> 18.1 Documentation of referral follow-up? 19. Opportunistic infection exam documented? 20. Soft tissue exam documented, including perioral tissue and oral mucosa? 21. Head and neck exam documented? 22. Gingival and periodontal structure exam documented? 23. Hard tissue exam documented? 24. Patient received preventive education on oral techniques and self-care? 25. Patient received nutrition counseling, if appropriate? 26. Patient received tobacco cessation counseling, if appropriate? 27. Preventive fluoride program, if appropriate? 28. Is patient's oral hygiene level noted? 29. Frequency of follow-up visits documented in the treatment plan? 30. Was the dental note written? <ol style="list-style-type: none"> 30.1 Within 24 hours of the visit? 30.2 Within 48 hours of the visit? 30.3 No documentation? 31. All dental notes appropriately signed? 32. Patient with more than one visit has a dental treatment plan recorded in the dental record? 33. Patient examined will have completed their initial treatment plan (Phase I) within six months? 34. Discharge date and discharge plan follow-up or discharge summary? 35. Extraction performed? <ol style="list-style-type: none"> 35.1 Surgical extraction performed? 35.2 Routine extraction performed? 35.3 X-ray of diagnostic quality? 35.4 Medical history charted? 35.5 Was there any kind of complication? <ol style="list-style-type: none"> 35.5.1. Describe complication: |
|---|---|

B. Chart Review Findings

1. Patient Identifiers and Demographic Data

Most dental charts recorded patient identifying information. All dental charts recorded patient name, Social Security number, address, telephone number, and birth date. Primary care physician's contact information was recorded in 84.8% of dental charts. The physician contact information tended to list only the name of the patient's physician or the name of the clinic. Physician contact information, such as telephone number and address, had to be retrieved from laboratory notes or the occasional physician referral form included in the chart. Illegibility of the physician's' names and contact information was a problem in some charts, making it difficult to contact physicians in case of an emergency.

Documentation of income and Broward County residency was included in 91.3% and 90.2% of dental charts, respectively. Case management referral forms tended to be the source of dental clinic referrals. These referral forms were not completed uniformly by the referring case manager. Check off items, such as receipt of a signed release of patient information, were not completed uniformly. No updated case management referral forms were included in patient charts, including patients served for several years.

About one-tenth of patients (12.0%) did not have emergency contact information listed in their chart. Among 13 charts, contact information was included but the relationship of the contact person was not entered in the chart. In one chart, only the first name of the emergency contact was provided.

2. Legal Forms

Most dental charts contained all of the relevant legal forms. Signed treatment consent forms were located in 100% of dental charts, whereas documentation of patient's receipt of Patient's Right Statement and provider grievance procedures, documentation of HIPAA compliance, and signed releases for referrals and disclosures of confidential patient information were each included in 98.9% of dental charts.

3. Treatment Plan Overview

All of the reviewed dental charts (100.0%) documented a treatment plan with measurable goals, objectives, and a timeframe for completion. All of the documented treatment plans (100.0%) complied with published treatment guidelines. More than two-fifths of all treatment plan progress notes (43.5%) did not meet one or more of the current, legible, signed, and dated criteria. Many of the notes contained only initials of the dentist or hygienist rather than a complete signature. The vast majority (96.7%) of progress notes addressed the treatment plan goals.

4. Patient Medical Information

Medical history was recorded and updated at six-month intervals for 95.7% of patients. Allergy information was noted in 97.8% of dental charts, special conditions were noted for 67.4% of patients, and current medications were listed for 81.5% of patients. Slightly more than half (52.2%) of dental charts included documentation of patients' CD4+ values. Some charts contained CD4⁺ counts that were obtained one to two years before this review period. Only 11.0% of dental charts included documentation of Hepatitis C status. This was linked to the finding that hepatitis C was not included on the medical history form. Platelet and white blood cell counts were recorded in 98.9% of dental charts. Tuberculosis infection status was documented for 100.0% of patients. Medical clearance for treatment was documented in 96.7% of dental charts.

5. Examinations and Referrals

Of the 21 patients who were referred to a specialist, 71.4% (15 patients) had referral follow-ups documented in their charts. Opportunistic infection exams and soft tissue exams were each documented in 98.9% of dental charts. Head and neck exams were documented in 95.7% of dental charts, gingival and periodontal structure exams were in 96.7% of charts, and hard tissue exams were documented in 97.8% of patient records.

6. Prevention and Education

Preventive education on oral techniques and self-care was administered to 91.1% of patients. Very low percentages of patients received tobacco cessation counseling (6.6%) and preventive fluoride programs (8.8%). Inquiry about tobacco use was not included on the medical history form. Nutrition counseling did not appear to be a standard practice and was not noted for any patients.

7. Notes and Treatment Plan Details

The level of oral hygiene was noted for most patients (87.8%). The treatment plan contained documentation of the frequency of follow-up visits for 94.5% of patients. Dental notes were written and included in all dental charts, and were written within 24 hours of the visit. However, complete signatures were not present on all dental notes: 78.0% of dental notes were only initialed. Most clients (95.7%) had more than one visit and had a treatment plan noted in their dental records. More than three-quarters (77.2%) of patients will have completed their initial treatment plan (Phase I) within six months. Nearly two-thirds (64.8%) of patients' care ceased without formal discharge from care. They failed to return for care and no follow-up inquiry was apparent. An additional one-third (34.1%) of patients were in ongoing care and were not applicable for discharge. Only one patient (1.1% of charts reviewed) was discharged due to relocation, while some charts noted that patients were planning to move outside the county.

8. Extractions

Extractions were noted in more than one-third (34.8%) of dental charts. Of these, 31.2% (10 patients) had surgical extractions. Three-quarters of patients (75.0%) had routine extractions performed. X-rays of diagnostic quality were present in 84.4% of dental charts. No treatment-related complications were reported for any of the charts reviewed.

C. Clinic-Specific Analysis

Separate analyses were conducted to identify differences in measures between the three BCHD dental clinics. Several statistically significant differences ($p < 0.05$) between clinic sites emerged for items for which the information was not recorded uniformly in 100% of the reviewed charts. There were differences observed in the rate of inclusion in dental charts between sites for documentation of Broward County residency, documentation of special conditions, and documentation of CD4+ value within the review period.

D. Recommendations

Recommendations were developed by Dr. Stewart for BCHD HIV dental practitioners. These recommendations are consistent with the HIV oral health guidelines promulgated by the Florida HIV/AIDS Community Planning Group and the New York State AIDS Institute.^{70, 71}

1. Patient Intake Form

- Modify the intake form to include the patient's physician's name, clinic name (if appropriate), address, telephone number, and fax number. This recommendation is based on the need to communicate with the physician regarding development of the dental plan of care, obtain

clinical laboratory information, and address any clinical management issues that arise in completing the plan of care.

2. Medical History Revisions

- To learn the patient's hepatitis status, the medical history should be modified to include a question about current or a history of hepatitis C and current or past history of hepatitis B infection.
- Blood pressure readings should be a part of the baseline medical history and added to the intake process.
- To provide tobacco cessation counseling, and nutritional counseling, the medical history should be modified to include those items. Suggested items to be included in the history include:
 - Yes No Do you or have you ever smoked cigarettes?
Frequency: ___ packs per day ___ years
 - Yes No Do you chew tobacco or use snuff?
Frequency: ___ times per day ___ years
 - Yes No Do you drink alcohol?
Frequency: ___ times per day
 - Yes No Do you chew gum?
Frequency: ___ sticks per day sugar-free?
 - Yes No Do you drink sugary drinks frequently?
Frequency: ___ times per day
 - Yes No Do you eat sugary snacks or candy frequently?
Frequency: ___ times per day
- The medical clearance form should include CD4⁺ count on it, along with blood values for platelets, white blood cell count (WBC), and TB.

3. Progress Note Charting

- The conceptual approach to the record seemed unclear. All records contained a sheet for treatment notes and a sheet for progress notes. It was difficult to understand the continuity and flow of care using this system. It was necessary to jump between these two entries to review the chronology of events.
- In most dental record systems, the “progress notes” provide a chronology of all events related to the care of the patient. These three practices reviewed should consider implementing such a system to help ensure the continuity of care and easier review of a patient's previous care.
- However, if a second recording process is required for administrative purposes, billing, or for tracking procedure codes, the second system should be more clearly defined.

4. Dental / Medical Management

- The accepted standard of care in dentistry is to take the patient's blood pressure at the initial appointment and at subsequent appointments. This procedure can be done by a trained

auxiliary. It is especially important before any procedures that utilize local anesthetic, such as restorative, surgical, and some periodontal procedures.

- In addition, an entry is expected generally at return visits to note if there have been any changes in the patient's medical status since the last visit. This entry can be addressed by recording, "Update medical history: Patient reports no changes" or "Patient reports a change in medications which includes..."
- A review of the medical history immediately prior to a dental extraction is important to help avoid undesirable outcomes such as drug interactions, prolonged bleeding, delayed healing, or infections. Such a review was recorded infrequently in the treatment or progress notes associated with dental extractions.

5. Periodontal Therapy

- The charts reviewed documented that a gingival and periodontal exam were completed. However, evidence of the results of that exam was difficult to confirm. A periodontal screening exam (PSR), or a periodontal charting that would include attachment loss or periodontal pockets, bleeding upon probing, and tooth mobility were found infrequently. A periodontal diagnosis determined by the dentist, needed to support the periodontal therapy provided, was not found readily in the charts.
- The dental hygienist(s) seemed very conscientious in providing debridement, appropriately recording the patient's level of home care, and consistently recording oral hygiene instruction provided to patients.

6. Management of "Dry Mouth" and Decay Prevention

- The majority of HIV+ patients report discomfort from xerostomia (i.e., "dry mouth"). This is related to salivary gland changes that occur early in the course of this disease. Changes occur in both the quantity of saliva (amount is diminished) and the quality of the saliva produced. The amount of saliva produced is diminished and the proteins normally in saliva that help protect against dental decay are reduced. Salivary changes also occur related to the poly-pharmacy required to manage HIV infection and the related conditions. This condition makes chewing, swallowing, and speaking more difficult, putting HIV+ patients at much higher risk for dental decay. Consequently, it is very important for the dental team to suggest ways to improve oral comfort through strategies to improve salivary flow such as sugar free gums, lozenges, and fluids. Equally important are efforts to minimize the patient's susceptibility to dental decay. The dental team should encourage patients to use a fluoride regimen appropriate for the particular individual. This might include an over-the-counter (OTC) alcohol-free fluoride rinse (e.g., ACT[®]), fluoride home treatments (e.g., OTC Gel-Kam[®]), or prescription fluoride gels (e.g., Prevident[®]).
- Documentation of these issues was absent from most charts. A chart entry would be appropriate if these concerns were discussed with patients.

E. How do the chart review findings compare to Title I oral health standards?

Based on the chart reviews conducted by POI and their expert dental consultant, quality indicators were met and exceeded for all but one of six indicators. Four indicators assess the receipt of preventive care. As shown in Table 5, charts reviewed exceeded the following indicators:

- Patients are assessed for OIs (indicator=90% and chart finding=98.9%);

- Patients received soft tissue examination (including perioral tissue and oral mucosa) (indicator=90% and chart finding=98.9%);
- Patients receive examination of the gingival and periodontal structures (indicator=90% and chart finding=96.7%); and
- Patients receive preventive education on oral techniques and self care (indicator=90% and chart finding=91.1%).

Two indicators assess treatment adherence. The first indicator set a standard of 90% of patients with more than one visit will have a dental treatment plan recorded in the dental record. In contrast, 95.7% of the charts met this indicator. The second indicator specified that 70% of patients examined have completed their initial treatment plan within six months. In contrast, 77.2% of the charts met this indicator.

Table 5. Assessment of Outcomes Achieved By Title I-Funded HIV Oral Health Programs, Based On Quality Indicators

Category	Outcome	Indicator	Chart Review Finding
Morbidity	Patients receive preventive care	90% of patients are assessed for OIs	98.9%
		90% of patients receive soft tissue exam, including perioral tissue and oral mucosa	98.9%
		90% of patients receive exam of the gingival and periodontal structures	96.7%
		90% of patients receive preventive education on oral techniques and self care	91.1%
Treatment adherence	Patients complete treatment	90% of patients with more than one visit will have a dental treatment plan recorded in the dental record	95.7%
		70% of patients examined will have completed their initial treatment plan within six months	77.2%

Source: Broward Regional Health Planning Council. Oral Health Service Delivery Model: 2002. Ft. Lauderdale EMA: BRHPC. 2002

POI assessed the Broward EMA's Oral Health Service Delivery Model in the chart review. Results of the chart review are illustrated in Table 6.

- In the first standard, providers must complete a medical/dental history form during the initial visit. The indicator sets a standard of 100% of patient charts showing a complete medical/dental history. POI found that 95.7% of BCHD charts achieved this standard.
- A standard requires that 100% of patients treated should have a treatment plan developed based on the initial comprehensive examination. The standard and indicator were achieved in 100% of the charts reviewed.
- A standard requires that 100% of patient treatment plans should be reviewed and updated, as necessary, by the dental provider. Chart review indicated that 96.7% of the charts documented that this standard was met.
- A standard requires that 100% of patients are to be referred to specialty care in accordance with the patients' needs and treatment plan. The standard and indicator were achieved in 100% of the charts reviewed.
- A standard requires that follow-up is conducted for 100% of patients that are referred to specialty services. Chart review indicated that 71.4% of the charts documented that this

standard was met.

Additional standards for service delivery shown in Table 7 require the review of personnel and other documents that fall within the scope of responsibility for contract compliance by staff of the BCHSD SAHCSD.

Table 6. Assessment of Standards for Service Delivery Achieved By Title I-Funded HIV Oral Health Programs, Based On Adopted Standards

Standard	Indicator	Chart Review Finding
Provider completes a medical/dental history form in initial visit	100% of patient charts show complete medical/dental history	95.7% (medical)
Treatment plan is developed based on the initial comprehensive examination	100% of patients' chart have a treatment plan	100%
Patient treatment plan is reviewed and updated as necessary by the dental provider	100% of patients' charts show review, as needed	96.7%
Patients are referred to specialty care in accordance with the patients' needs and treatment plan	100% of patients' charts show referral to specialty care for clients needing this service	100%
Patients referred to specialty services are followed-up	100% of patients' charts have documentation of referral follow-up	71.4%

Source: Broward Regional Health Planning Council. Oral Health Service Delivery Model: 2002. Ft. Lauderdale EMA: BRHPC. 2002.

Table 7. Standards for Service Delivery Assessed By Broward County

Standard	Indicator	Data Source
Participating dentists possess appropriate license, credentials, and expertise	100% of dentists have copy of documents on file	Documentation in personnel file
Staff is trained on HIV/AIDS and the affected community	100% of staff have documentation of completed training on file	Documentation in personnel file
The program director has training and experience in clinical aspects of oral hygiene, dental treatment planning, and care	Documentation on file demonstrating clinical dental experience	Resume on file
Newly hired staff attend orientation training within probationary period	100% of staff has documentation of completed training on file	Documentation in personnel file
Oral health program is located in physical facilities which meet fire safety and health requirements, observe Occupational and Safety Health Administration (OSHA) infection control practices	100% of facilities have updated documentation of inspection	Documentation on file
Agency has an updated emergency protocol for health and safety- related incidents	100% of provider agencies have safety and security policies on file	Documentation on file
Provider demonstrates accessibility in accordance with Americans with Disabilities Act (ADA)	100% of facilities comply with ADA	City/State ADA Title II forms on file

Source: Broward Regional Health Planning Council. Oral Health Service Delivery Model: 2002. Ft. Lauderdale EMA: BRHPC. 2002.

F. Challenges Likely to be Encountered in Measuring HIV Oral Health Outcomes in Broward County Title I-Funded HIV Dental Clinics

With the input of the dental services provider network, the Continuous Quality Improvement Committee developed client level outcomes for oral health services in FY 2005. All core service categories include a quality of life outcome. Dental service providers are required to administer surveys and collect results but are responsible for achieving the outcome. The provider network (consisting of dentists from both provider agencies) developed outcome indicators. The dental services outcomes and indicators shown in Table 8 were approved by the full HIV Planning Council.

Table 8. Oral Health Outcomes and Indicators Adopted by the Broward County NCHSD SAHCSD for Fiscal Year 2006

Outcome	Indicator		
	Initial	Intermediate	Long Term
Improved quality of life for new clients	Clients have an increase in QOL score after first reassessment over baseline assessment. (Benchmark=80%)	Clients have an increase in QOL score after second reassessment over baseline assessment. (Benchmark=80%)	Clients have an increase in QOL score after third reassessment over baseline assessment. (Benchmark=80%)
Clients are made aware of the benefits of participating in care by oral health providers	80% of clients received oral hygiene instruction	Clients receive verbal or written communication regarding benefits of participating in dental care annually as indicated by client signature	
Reduced incidence of oral opportunistic infections		Absence or reduced episodes of oral candidiasis at follow-up	85% of clients will have documented appropriate management of oral OIs (e.g., oral thrush)
Slow periodontal disease progression			50% of clients show a decrease in their Plaque Index score, bleeding index, or gingival index
Healthier teeth and gums	55% of clients show adequate number of teeth (28)		

Source: BCHSD SAHCSD, March 9, 2006.

POI outlined several issues in attempting to address these outcomes that reflect our experience in reviewing BCHD charts during the February 2006 Dental Study presentation to the HIV Health Services Planning Council's Assessment Committee and the community.

- In implementing several of the new outcome measures, planning is needed to implement detailed baseline and longitudinal data collection. Currently, BCHD dental clinicians do not collect routinely and systematically baseline data for the various outcome domains recently adopted by the BCHSD SAHCSD. It will be important to design and adopt instrumentation for inclusion in Title I-funded dental clinic charts. HCSUS used a validated HIV oral health quality of life instrument that might be adopted in Broward County.

- BCHSD SAHCSD staff plan to use a general HIV quality of life instrument to assess all clients receiving Title I-funded services. It unclear to what extent the instrument, HAT-QoL, can be used to address improvement in quality of life directly related to oral health care. General HIV-related quality of life instruments do not address directly and specifically those measures associated with oral health treatment. Specific instrumentation must be designed in the absence of rigorously validated, predictive instruments. Dental clinic staff will require training to ensure that the instrument is administered routinely at baseline and then periodically, as treatment is undertaken.
- It is likely to be very difficult to evaluate separately the impact on quality of life of dental treatment versus medical intervention for oral conditions associated with HIV infection. A patient may be treated by dental and medical providers during the same observation period. It is unlikely that the dental provider will be aware and reflect in their charts the treatment of oral conditions by other providers.
- Improvement of quality of life following oral treatment may be difficult to measure routinely and accurately if patients do not return for a subsequent visit. In the charts reviewed by POI, some patients received specific treatment for a specific complaint. Some of these patients did not return for a routine visit or for a dental cleaning. In this scenario, it would not be possible to assess the impact of the completed dental intervention on quality of life. BCHD HIV dental clinics also reported to POI that HIV+ patients seeking specialty services tend not to return for routine care.
- There is an absence of precision in reporting required by BCHSD SAHCSD regarding the specific general and specialty dental services provided by their contractors. BCHSD SAHCSD staff should consider the adoption of the CDT procedure codes promulgated by the *ADA Code on Dental Procedures and Nomenclature*. This code set is considered the national standard for dental procedure coding. Adoption of the CDT code set would allow BCHSD SAHCSD to monitor the actual services provided and afford the ability to monitor expenditures, as well as assess provider performance and quality standards.
- There is no systematic assessment of the baseline rates of oral OIs, periodontal disease, or the health of teeth or gums among HIV+ individuals treated in the Title-I funded system. Once again, specific instruments must be designed for uniform use by all dental providers employed by dental clinics funded by Title I. Training in the administration of the instrument also will be required.
- One of the outcomes adopted recently relates to ensuring that clients are made aware of the benefits of participating in care by an oral health provider. This measure is important to ensure that HIV+ persons engage in ongoing oral health care through routine dental exams and treatment. Since the outcome is assigned to be implemented only for those individuals that seek Title I-funded treatment, the benefit of educating HIV+ persons about the value of HIV oral care may not have a wide enough impact. In future years, BCHSD SAHCSD might make this a requirement of Title I medical providers who can emphasize the broader need for routine and periodic assessment, treatment, and prevention of HIV and other oral health conditions among their patients. Since medical providers are likely to have regular contact with the patients, such an education message may have significant clinical and quality of life benefits. In the charts reviewed by POI, for example, there was no evidence recorded that medical providers referred their patients to the dental clinics for treatment. Case managers; however, were a frequent source of referral. It is recognized by POI; however, that the routine referral of all HIV+ patients treated by Title I-funded clinics to dental care is likely to exceed the current funded capacity of Title I-funded dental clinics and the amount of Title I funds allocated for this service category.

- In moving forward with quality assessment, it will be important to address the quality of charting by Title I-funded HIV dental clinic personnel. The POI expert dental consultant reviewed with BCHD dental clinic managers ways to improve charting to ensure that charting quality is not confused in the future with the quality of the services provided.
- It was outside the scope of POI's chart review activities to assess the performance of individual dental providers to quality measurement. POI did find; however, that charting legibility and completeness was associated with individual dental providers. The performance of individual providers should be considered in future quality assessment activities to identify opportunities for feedback and improvement.
- The role of patients is not addressed by the new outcome measures. In measuring HIV oral health outcomes, it is important to assess which baseline dental patient self-management activities should be undertaken. Other factors that should be considered include attitudes about dental care, pain phobia, dental and general health literacy, and beliefs about the benefits of dental care should be assessed and addressed by HIV dental providers. Additionally, the roles of parents and guardians in the care of the oral health of children must be considered and addressed.

VIII. Determining the Relationship Between Cost Effectiveness and Client Outcomes in the EMA

Cost-effectiveness analysis (CEA) is a systematic quantitative method to assess the desirability of programs or policies when it is important to take a comprehensive view of effects and side effects.⁸¹ Cost-effectiveness analysis is used to assess the costs versus the outcomes (or effects) of a specific defined service or set of services. CEA allows policymakers and other stakeholders to weigh the benefits versus the costs of various policy alternatives and identify the trade-offs involved in funding one policy versus another. The costs and outcomes (effects) may be assessed from the point of view of a health care consumer, purchaser of services (e.g., employer, insurance plan, BCHSD SAHCS), or service provider.

Section 2602(b)(4)(C) of the CARE Act requires Title I planning councils to "establish priorities for the allocation of funds within the eligible area, including how best to meet each such priority and additional factors that a grantee should consider in allocating funds under a grant" based on factors that include:

"(ii) demonstrated (or probable) cost-effectiveness and outcome effectiveness of proposed strategies and interventions, to the extent that data are reasonably available...."

Section 2602(b)(4)(E) of the CARE Act states that a Title I planning council can at its discretion, "assess the effectiveness, either directly or through contractual arrangements, of the services offered [in the EMA] in meeting the identified needs."

The HAB Title Manual outlines the application of CEA by Title I grantees.⁸² The Manual states that:

"Title I grantees should be able to compare the relative costs of providing a specific service among different providers. This necessitates having service standards, service units, and unit costs for each service. Quality of service is also a factor in determining cost effectiveness and needs to be considered both in selecting providers and in monitoring Quality Management programs."

Using the HAB approach to CEA, a Title I-funded service or program is considered cost effective when:

- The unit cost is reasonable and acceptable relative to the benefits and outcomes received;
- A service can be provided less expensively than other similar services, but provides an equal or better outcome.; and
- The service provides an additional benefit worth the additional cost.

HAB outlines several steps in undertaking CEA. These steps were undertaken by POI to complete the CEA related to HIV oral health services funded by Title I:

- Define and describe the service to be assessed;
- Agree on the standards of care or benchmarks related to service outcomes;
- Determine the unit or per-client costs of these services;
- Determine the outcomes of the service;
- Describe the cost-effectiveness of the service in terms of a ratio of cost to attain a specific outcome;

- Compare and analyze the cost-effectiveness of several services using these ratios, or compare the service with stated benchmarks or standards of care, and
- Revise the priorities, allocations, and comprehensive plan to reflect the results of the cost-effectiveness evaluation, if appropriate.

As shown in Table 9, application of HAB’s CEA framework, Title I- funded HIV oral health services can be considered cost-effective.

Table 9. Analysis of the Cost-Effectiveness of Title I HIV Oral Health Services Funded

TASK	RESULT
Define and describe the service to be assessed	Regular dental visit defined by <i>Oral Health Service Delivery Model</i> : Diagnostic, prophylactic, and therapeutic services rendered by dentists, dental hygienists, and similar professional practitioners
Agree on the standards of care or benchmarks related to service outcomes	Standards of care defined by the <i>Oral Health Service Delivery Model</i>
Determine the unit or per-client costs of these services	The cost of a dental visit is set as \$128 per general dental visit
Determine the outcomes of the service	Short-term outcomes associated directly with Broward Title-I funded dental services have been achieved
Describe the cost effectiveness of the service in terms of a ratio of cost to attain a specific outcome	It costs \$128 in Title I oral health funds to ensure that a patient receives preventive oral health care and completes treatment*

* The per-visit Title I dental payment made during the observation period.

IX. Perceptions of Barriers to Access and Retention in HIV Primary and Specialty Oral Health Care

POI assessed perceptions of barriers to access and retention in HIV primary and specialty oral health care using two methods: focus group and a survey of Broward County HIV+ residents. POI closely coordinated the design of tasks with the staff of the BRHPC, the BCHSD SAHCSD, and the Broward County Health Department.

A. Focus Groups

Flyers regarding the focus group were prepared, as shown in the technical report. The flyers were distributed to the Planning Council members, Planning Council committee members, Case Management Network members, and the agencies listed in Table 10. Announcements regarding the focus group were made at Planning Council meetings and HIV consumer forums. Only one person registered for the focus group. In consultation with BRHPC staff, POI staff postponed the focus group until late-March. Alternative approaches to recruiting focus group participants were developed, including increasing the consumer compensation from \$20 to \$40 per focus group participant and working directly with two selected HIV service organizations, Broward House and Minority Development and Empowerment, Inc. (MDEI), to recruit participants.

Broward House is a Commission on Accreditation of Rehabilitation Facilities-accredited Behavioral Health Center located in Ft. Lauderdale.

Twelve Broward House clients participated in a focus group convened on the evening of March 27, 2006. Focus group participants were enrolled in Broward House day treatment programs. Most of the participants (10) are enrolled in residential intensive day treatment programs.

Broward House's brochure states,

"Clients come to Broward House with multiple needs. Many may require case management and medical linkage. Others may need mental health and substance abuse treatment." The brochure further states that services provided include "both mental health and substance abuse treatment to adults with or at risk for HIV/AIDS and other health issues." Intensive day treatment is described as providing "the most intense level of health education, support, and therapy to clients with chronic substance abuse and health issues. Clients reside at our Ft. Lauderdale facility where they receive group and individual counseling seven days a week, 24 hour medical supervision, group activities, all meals, and guidance with daily living."

This context is provided because repeated comments from the focus group participants indicate that both what they knew about the importance of dental care for HIV+ persons and the dental

Questions Explored During Focus Groups With HIV+ Broward County Residents

- Why is dental care important to HIV+ Broward County residents?
- To what extent are community dentists in Broward County willing to treat HIV+ adults? Children?
- Dental care for HIV+ residents of Broward County is available from several sources. What barriers do HIV+ Broward County residents experience in getting dental care from community dentists? Nova Dental School? County-operated dental clinics?
- To what extent does the cost of dental *insurance* act as a barrier to HIV+ Broward County residents?
- To what extent do out-of-pocket payments for dental care act as a barrier to HIV+ Broward County residents?
- How can access to HIV dental care in Broward County be improved?
- What is the perception of HIV+ Broward County residents about the quality of dental care they receive?
- In what ways can the quality of HIV dental care in Broward County be improved?

care they received in Broward County stem primarily from their contact with Broward House staff. Seven men and five women chose to attend the voluntary focus group - choosing this activity over bingo, which was a concurrently occurring Broward House activity. All of the participating women were African American, as were four of the men. One participating man was Hispanic, and two were White. One of the African American men and one of the women had noticeably missing front teeth. One of the African American men had a lump on his face near his lower jaw that he considered connected associated with his HIV serostatus.

In response to why dental care is important to HIV+ Broward residents, responses indicated that there were several related reasons. The first reason related to the fact that focus group participants have a history of substance abuse and a related poor history of dental care that must be addressed. Dental care also was reported to be important for people with compromised immune systems because *“infection is bad for the body”* and prevents infection or *“poison”* from entering their bodies. They indicated that physical problems related to dental situations went beyond cavities and included thrush, bleeding gums, and sinus problems. They also spoke about social problems that ensued when lost teeth, gum problems, and *“extreme bone loss”* associated with dental problems led to facial disfigurement. As one participant succinctly put it, *“Being HIV is not a positive thing in our lives; we don’t need another problem.”* Several participants pointed out that it was difficult to maintain self-esteem without confidence in their smiles. They further related dental health to their emotional state in that dental pain and problems are stressful, and therefore impact how well the myriad of drugs they were taking worked. In addition, dental problems impaired eating and getting appropriate levels of nutrition. Dental problems also impacted their ability to take medications that should be taken with food. They finished their discussion of this topic with comments such as *“It’s all about prevention,”* preventing impaired health and sick individuals in the community. Good dental health helps HIV+ individuals *“be successful in the community.”*

In response to the second question concerning the extent to which community dentists in Broward County are willing to treat HIV+ adults, participants indicated that their relationship with Broward House is an element in their general agreement that money is a far greater barrier to dental care than is their HIV status. As one participant put it, thanks to Broward House and CARE Act-related programs, *“We’re funded”* and therefore accepted by dentists at the Broward County dental clinics. Only one man spoke about personally seeking dental care from a community dentist. There was some spirited discussion about the hassle of bringing TB test and laboratory results every time they visited a dentist. None of the participants felt that dentists in Broward County would not treat HIV+ adults because of their medical status. At the clinics, there was general agreement that they (and other HIV+ people) are treated respectfully. The comment, *“They treated me like a person”* was typical.

Concerning the extent to which community dentists in Broward County are willing to treat HIV+ children, three of the women spoke very positively about their experiences at the CDTC dental clinic where they and their children received dental care. No one else had comments about the dental treatment of children.

Concerning barriers for HIV+ persons in getting dental care in Broward County, there was general agreement that the second biggest problem was the lack of knowledge about where to go to receive care. As one participant said, *“If you’re not in a program, it’s hard to find out information.”*

- Even being in a program, such as Broward House, had its information limits. Five of the participants had not heard that Nova Southeastern University had a dental school. The seven who had heard about Nova’s program had heard that it was good.
- The biggest barrier to community dentists was said to be getting *“affordable care”* - even with Medicaid and CARE Act support.

- A lively discussion ensued concerning the barriers to care at Broward's five dental clinics. The clinics differed in appointments scheduling, with some clinics being "overbooked," leading them to schedule one service at a time. This practice was perceived as a barrier to care because of the many dental problems that arose with being immune-compromised and with the increased chance that some other health problem would arise that would interfere with a treatment scheduled at a later date. There was general agreement that whenever possible, all dental-related problems should be attended to during the same session.
- One of the women added to the discussion of barriers to care the fact that many people who became HIV+ did not seek dental care prior to becoming HIV-infected because they had a general fear of dentists. She said that while before she became HIV+, going to the dentist only for cleanings seemed sufficient, "*HIV causes oral problems.*" She has learned to get over her fear of dentists to seek the dental care she now needs.

Participants had no response to the question about the extent to which the cost of dental insurance acted as a barrier to HIV+ Broward County residents. When asked specifically why they were silent, they agreed with the participant who said that they had no information about this. Except for the one individual who spoke about Medicare, their only dental related financial information was connected to what "*Ryan White*" covered.

Related to this issue, when asked about the extent to which out-of-pocket payments for dental care acted as a barrier to care, this same individual told the group that when he leaves his Broward House program and returns to a situation where his dental care would be covered only by Medicare, due to the high cost of his medication (\$3,000 per month) he will be unable to pay the 20% out-of-pocket costs that will be required for dental care. Other participants asked this individual for more details, saying that they did not have much information about this.

In response to the question about how access to HIV dental care in Broward County can be improved, participants made several suggestions:

- Increase public awareness about what services are available. Educate the public. Begin HIV/AIDS outreach dental programs to get in touch with people by using fliers and mail. Send more brochures with dental information (e.g., go to the dentist if you develop thrush or white patches in your mouth.) "*Put people's minds at ease*" who might be afraid to go to dentist. Some people are afraid to find out if they are HIV+. They should be educated not to feel stigmatized. HIV/AIDS is just "*something in the world; we have to deal with it.*" One man volunteered to be part of the outreach program - in gratitude for the help he has received.
- Reach out to clinics to inform them how to better help HIV+ clients concerning needed dental services.
- Given the large HIV+ population in Broward County, build more dental clinics. Fund clinics to open more hours (even 24 hours), since people are most likely to suffer with toothaches late at night.
- Lobby legislators to provide support for funding for dental care. This might "*open doors.*"
- Establish a network between agencies that would "*kick in*" for an individual upon HIV+ diagnosis.
- Establish a "*dental card*" with identification, like a medical card for HIV+ clients who are already "*in the computer,*" to bring to clinics and private practitioners. This card would make it easier to get dental care in a variety of places.

In response to the perceptions of HIV+ Broward County residents about the quality of dental care they receive, the most positive participants felt that those who were connected

with some treatment service got “100% good” dental care. Others indicated that the care they got was pretty good. They all agreed with a statement made by one individual who said that what care they received was good, and that it would “*be great to have more.*” Individuals again brought up the idea that things were not quite as positive for those who were not connected to a place like Broward House.

In response to the final question concerning ways to improve the quality of HIV dental care in Broward County, participants responded that in addition to all the suggestions that they had already given, they recommended that “*Ryan White*” should be expanded to pay for private practitioners, especially those who had specialized practices such as periodontists and orthodontists.

Agencies	Private Practices
Broward House	Cleveland Clinic Florida
Care Resource/Community AIDS Resource	Florida Lighthouse Office of Infectious Disease
Community AIDS Resource	Friedberg Medical Group, Inc.
Community Healthcare /CenterOne	ID Associates of Broward
House of Hope and Stepping Stones, Inc.	Dr. Karen Williams
Legal Aid Service of Broward County, Inc.	HIV Dental Clinics
Minority Development and Empowerment, Inc.	Children's Diagnostic and Treatment Center Dental Clinic
Mount Olive Development Corporation	Northwest Health Center Dental Clinic
NBHD Comprehensive Care Center	Nova Southeastern University
NBHD Specialty Care Center	Paul Hughes Health Center Dental Clinic
North Broward Hospital District	South Regional Health Center Dental Clinic
Northwest Health Center	Other
Paul Hughes Health Center	Broward County HIV Health Planning Council
Poverello Center, Inc.	Case Management Network
Prima Food Corporation	
South Broward Hospital District	
Trinity Ministries Social Services, Inc.	

B. HIV Dental Survey

POI adapted the oral health interview instruments used in HCSUS for fielding in Broward County. POI reviewed the three sets of HCSUS oral health instruments and adapted them to address perceptions of Broward County HIV+ residents regarding barriers to access and retention in HIV oral health care. This approach resulted in validated, national benchmark data to compare Broward County responses.

POI implemented the web-based dental survey of Broward County HIV+ residents. The web-based survey was activated on the POI website (www.positiveoutcomes.net) in early February 2006. Promotional flyers and post cards announcing the survey were distributed to the agencies listed in Table 10. POI implemented an aggressive information campaign in February 2006 to ensure that Broward County HIV+ residents were aware of and completed the survey:

- Approximately 120 posters and 1,400 individual postcards were distributed at the agencies listed in Table 10. Examples of the flyer and postcard are in the technical addendum.
- A paper version of the survey was designed and distributed to case management agencies. Paper versions of the survey also were distributed at BCHD HIV dental clinics and by faculty of the Nova Southeastern University College of Dental Medicine at their clinic waiting room.
- Additionally, Case Management Network members were contacted several times by email about the survey. An announcement regarding the survey was made at the Network meeting

and at a briefing to the Planning Council Assessment Committee. HIV case managers volunteered to assist their clients to complete the survey.

- Planning Council and committee members were notified by email about the survey and encouraged to disseminate information about the survey to Broward County HIV+ residents.
- Flyers were distributed at several HIV consumer forums.
- A Planning Council member volunteered to distribute paper copies of the survey and collect completed surveys at Broward House residential facilities.
- The Internet survey was active until the end of March to gather as many surveys as possible.

1. Characteristics of Survey Respondents

A total of 67 individuals completed a survey via the POI website, a paper version of the survey distributed by agencies identified in Table 10, or by telephone interview with a POI staff person. Respondents are an average of 45 years of age, with ages ranging from 16 to 64. More than three-quarters (81%) of respondents are males and 19% are females. Among the 62 respondents that reported their race and/or ethnicity, 55% reported that they were white or Caucasian, 31% reported that they were Black or African-American, and 15% were Hispanic or Latino. Among the 61 respondents providing information about educational level, a small percentage had less than a high school diploma (5%), 51% had a high school diploma, 20% had an associate degree from a two-year college, 16% had a baccalaureate degree from a four-year college, and 8% had a graduate or professional degree.

Information regarding current sexual orientation was gathered. Slightly more than one-tenth of the respondents (10%) did not report information about their sexual orientation. Among males reporting their orientation, 74% report being gay, 14% are straight or heterosexual, 6% are bisexual, 2% are celibate or asexual; 2% are unsure, questioning, or in transition; and 2% report other sexual orientation. Among females reporting their orientation, 10% report being gay and 90% are straight or heterosexual.

One-third (33%) of respondents had always lived in Broward County. Among respondents that moved to Broward County, 71% had changed their city or state of residence since they first learned that they were HIV+. Among respondents that moved to Broward County, 55% resided in another Florida county before moving to Broward County and 45% resided elsewhere. Among respondents residing outside of Florida, only one respondent reported moving to the U.S. from another country.

All but three of the 67 respondents reported their employment status. Less than one-third (30%) of respondents were employed full or part-time. One respondent (2%) had a job but was on sick leave. Another respondent (2%) had a job but was not working for other reasons. Over one-half of respondents (52%) report being disabled and not working, 6% are unemployed and looking for work, and 3% are retired and not working. Two respondents (3%) reported an employment status that did not fit other categories.

Survey respondents are enrolled in an array of income assistance programs. About one-half (53%) of respondents are enrolled in the Social Security Disability Income (SSDI) Program, 13% in the Supplemental Security Income (SSI) Program, and 5% in the Temporary Assistance to Needy Families (TANF) Program.

The survey assessed sources of health insurance coverage. About one-half (48%) are enrolled in Medicaid, 48% are enrolled in Medicare, and 3% report receiving services at a Veterans Administration (VA) Medical Center or other VA facility. Among Medicaid enrollees, 41% are enrolled in Florida Medicaid Project AIDS Care (PAC) Waiver Program.

Respondents provide information about HIV and diagnostic testing. Over one-third (37%) of the respondents report receiving their first HIV+ test in the 1980s, 48% in the 1990s, and 15% since 2000. Almost all (98%) respondents report having their blood tested for a “T-cell lymphocyte, helper cell, or CD4 count,” with one respondent indicating that they had not received a test and four respondents skipping this item. The average (mean) CD4 or T-cell count was 421. Over one-half (53%) of respondents have been diagnosed with AIDS.

The responses of the nationally representative HCSUS participants were compared to those of Broward County survey respondents. Special analyses of HCSUS data were conducted by federal staff to allow this comparison.⁸³ Differences between HCSUS and Broward County responses were evaluated using Chi-square statistical tests, with statistical significance set at $p < 0.05$, or the odds of a statistically significant chance of an association between categorical variables being less than 5%.

2. Self-Examination and Oral Care

Broward County respondents report examining their mouths, tongues, teeth, and gums for problems related to HIV infection less frequently than HCSUS respondents (see Table 11). Broward County respondents report that since first learning of their HIV diagnosis, 17% never examine their mouth, tongue, teeth, or gums for problems related to HIV infection. In comparison, 11% of the HCSUS respondents reported never examining their mouth, tongue, teeth, or gums for problems related to HIV infection. Over one-quarter (28%) of Broward County respondents report examining their mouths every few months, compared to 8% of HCSUS respondents. In contrast, 31% of Broward County respondents report doing daily self-exam, compared to 44% of HCSUS respondents. These findings are particularly concerning as the HCSUS respondents were surveyed in the late 1990s, when less was understood about the importance of self-exam to identify early the signs of HIV-related oral manifestations or conditions. Opportunities for education Broward County HIV+ residents about the importance of self-exam should be taken by medical and dental providers to improve the rate of self-exam.

Table 11. Since you first learned of your HIV diagnosis, how often do you examine your mouth, tongue, teeth, or gums for problems related to HIV infection?

	Broward %	HCSUS %	Difference %
Daily	30.8%	44.0%	-13.2%
At least twice a week	9.2%	16.1%	-6.9%
Once a week	4.6%	11.3%	-6.7%
At least 2 times a month	10.8%	9.8%	1.0%
Every few months	27.7%	7.6%	20.1%
Never	16.9%	11.2%	5.7%

Significant Chi-square at $p \leq 0.05$

Opportunities for improvement of self-management were also found in the frequency in which Broward County residents flossed their teeth (Table 12). About one-quarter (24%) of Broward County respondents never flossed their teeth, while 14% flossed less than once a week, 8% once a week, 20% at least twice a week, and 35% daily. There was no statistically significant difference in the frequency of flossing between HCSUS and Broward County respondents.

Table 12. How often do you use dental floss on your teeth?

	Broward %	HCSUS %	Difference %
Daily	34.8%	26.3%	8.5%
At least twice a week	19.7%	17.6%	2.1%
Once a week	7.6%	8.5%	-0.9%
Less than once a week	13.6%	11.6%	2.0%
Never	24.2%	36.0%	-11.8%

3. Condition of Respondents' Mouth, Tongues, Teeth, and Gums

Among Broward County respondents, 15% report having pain or discomfort with their mouth, tongue, teeth, or gums all or most of the time and 25% some of the time in the last four weeks. In contrast, 13% report using medication all or most of the time to relieve pain or discomfort with their mouth, tongue, teeth, or gums, while 27% report using medication some of the time. Compared to HCSUS respondents, Broward County respondents are significantly more likely to report having pain or discomfort with their mouths, tongues, teeth, or gums.

Broward County respondents also are more likely than the HCSUS cohort to report using medication to relieve oral pain or discomfort (see Tables 13 and 14). While 76% of HCSUS respondents reported never using medication to relieve pain for the discomfort of their mouth, tongue, teeth, or gums, only 38% of Broward County respondents reported never using pain medication. Among Broward County respondents, 50% report using medication a little or some of the time and 13% report using medication most or all of the time.

Table 13. In the last 4 weeks, how much of the time did you have pain or discomfort with your mouth, tongue, teeth, or gums?

	Broward %	HCSUS %	Difference %
All of the time	3.0%	2.3%	0.7%
Most of the time	11.9%	6.7%	5.2%
Some of the time	25.4%	14.1%	11.3%
A little of the time	20.9%	19.9%	1.0%
None of the time	38.8%	57.1%	-18.3%

Significant Chi-square at $p \leq 0.05$

Table 14. In the last 4 weeks, how much of the time did you use medication to relieve pain for discomfort with your mouth, tongue, teeth, or gums?

	Broward %	HCSUS %	Difference %
All of the time	5.0%	3.1%	1.9%
Most of the time	7.5%	3.8%	3.7%
Some of the time	27.5%	8.4%	19.1%
A little of the time	22.5%	9.1%	13.4%
None of the time	37.5%	75.6%	-38.1%

Significant Chi-square at $p \leq 0.05$

Missing permanent teeth were common among Broward County respondents (Table 15). Only 15% of Broward County respondents report having no missing teeth. We cannot compare this response to HCSUS data, as they did not ask if no teeth were missing. All teeth are missing among 3% of the Broward County respondents, 14% have 12 to 27 missing teeth, 14% have 7 to 12 missing teeth, 27% have 3 to 6 missing teeth, and 27% have one or two missing teeth. No statistically significant difference in the number of missing teeth was found between Broward County and HCSUS respondents.

Table 15. How many of your 28 permanent teeth are you missing?

	Broward %	HCSUS %	Difference %
1 or 2	27.1%	37.6%	-10.5%
3 – 6	27.1%	37.4%	-10.3%
7 – 12	13.6%	11.3%	2.3%
More than 12, but not all	13.6%	9.3%	4.3%
All	3.4%	4.5%	-1.1%
None	15.3%	NA	

Asked how many untreated decayed teeth or cavities they have, Broward County respondents were statistically significantly more likely than HCSUS respondents to report treated teeth (see Table 16). While 42% of Broward County respondents report having no untreated decayed teeth or cavities, 58% of HCSUS respondents reported having no untreated decayed teeth or cavities. Among Broward County respondents, 25% had one or more untreated teeth, 30% had three to five untreated teeth, and 3% had six or more untreated teeth. In contrast, 21% of HCSUS respondents had one or more untreated teeth, 11% had three or more untreated teeth, and 7% had six or more untreated teeth.

Table 16. How many decayed teeth or cavities do you have that have not been treated? Do not include teeth that have been filled, capped, or crowned.

	Broward %	HCSUS %	Difference %
None	42.1%	58.7%	-16.6%
1 or 2	24.6%	21.5%	3.1%
3 to 5	29.8%	11.4%	18.4%
6 or more	3.5%	6.9%	-3.4%
Does not apply, all teeth are dentures	0.0%	1.5%	-1.5%

Significant Chi-square at $p \leq 0.05$

Broward County respondents are statistically significantly more likely than HCSUS respondents to report changes in their oral health condition since their HIV infection (see Table 17). One-third (35%) of Broward County respondents report that their oral health condition had stayed the same since their HIV infection, compared to 52% of HCSUS respondents. Nearly one-half (47%) of Broward County respondents report that their oral health was somewhat worse or much worse since their HIV infection, compared to 23% of HCSUS respondents whose oral health condition had deteriorated. About one-fifth (17%) of Broward County respondents reported improvements to their oral health since their HIV infection, compared to 13% of HCSUS respondents.

Broward County respondents reported several conditions associated with their gums. Healthy gums that do not bleed were reported by 40% of Broward County respondents compared to 52% of HCSUS respondents, a difference that is statistically significant ($p < 0.05$). Almost one-half (45%) of respondents report that their gums bleed occasionally when they brush their teeth, 9% report that their teeth are loose, 5% report having painful gums, and 2% report having swollen, red, and bleeding gums.

Table 17. Since you have been infected with HIV, has your oral health condition:

	Broward %	HCSUS %	Difference %
Become much better	10.3%	5.3%	5.0%
Become somewhat better	6.9%	8.2%	-1.3%
Stayed the same	34.5%	52.1%	-17.6%
Become somewhat worse	24.1%	15.2%	8.9%
Become much worse	22.4%	7.7%	14.7%
Sometimes better and sometimes worse	1.7%	11.6%	-9.9%

Significant Chi-square at $p \leq 0.05$

4. Access to Dental Care and Related Use of Dental Services

All respondents in the Broward County and HCSUS surveys had received dental care. Respondents were asked if they had a dentist's office or clinic that they usually went to for dental care before they found out that they were HIV+. Slightly less (38%) of Broward County respondents had a usual source of dental care before becoming aware of their HIV infection than HCSUS respondents (46%). This difference; however, was not statistically significantly different. While Broward County respondents were slightly less likely than HCSUS respondents

to not have a usual source of dental care before becoming aware of their HIV infection, they were more likely to report that they currently have a usual source of dental care than HCSUS respondents (74% versus 62%).

Respondents were asked the reasons why they do not have a usual source of dental care. Broward County respondents differed statistically significantly from HCSUS respondents in the reasons they reported for not having a usual source of dental care (see Table 18). Only 4% of Broward County respondents indicated that they do not need a usual source of dental care, compared to 28% of HCSUS respondents. Two-thirds (67%) of Broward County respondents report that they cannot afford dental care, compared to just 40% of HCSUS respondents who reported that they cannot afford dental care. One-quarter (25%) of Broward County respondents report that they cannot find an HIV friendly dentist, compared to 11% of the nationally representative group.

Table 18. Why you do not have a usual source of dental care?

	Broward %	HCSUS %	Difference %
I do not need a usual source of dental care *	4.2%	28.4%	-24.2%
I cannot afford dental care *	66.7%	39.8%	26.9%
I cannot find an HIV friendly dentist *	25.0%	11.5%	13.5%
I do not know where to find dental care	12.5%	9.9%	2.6%
I do not have transportation to get to a dentist	0.0%	3.7%	-3.7%
I cannot find a dentist that speaks my language	0.0%	0.7%	-0.7%
Fear of dentists or dental care	12.5%	14.3%	-1.8%
Worry about my privacy being protected	4.2%	5.8%	-1.6%
Some other reason	4.2%	16.1%	-11.9%

* Significant Chi-square at $p \leq 0.05$

Over one-half of Broward County respondents reports having their last dental visit within the last year, with 40% having a dental visit less than six months before they completed the survey and 22% having a visit between six and twelve months before the survey (Table 19). Among other respondents, 12% had their last dental visit more than one year before the survey but less than two years before, 19% had a visit between three and five years, and 7% had a visit more than five years before the survey. These findings did not differ significantly from HCSUS responses.

Table 19. How long has it been since your last visit for dental care?

	Broward %	HCSUS %	Difference %
Less than 6 months	39.7%	40.5%	-0.8%
6 months to 1 year	22.4%	21.3%	1.1%
More than 1 year and up to 2 years	12.1%	16.3%	-4.2%
More than 2 years and up to 5 years	19.0%	12.8%	6.2%
More than 5 years	6.9%	8.6%	-1.7%
Never	NA	0.5%	

Broward County respondents were asked the reason for their most recent dental visit. About one-third (31%) of respondents had a dental visit because something was wrong, 27% thought it was time for a dental exam or cleaning, 16% because the visit was part of a series or course of treatment, 14% because their dentist had reminded them that it was time for an exam or cleaning, and 8% because of some other reason (Table 20). Only 4% of respondents reported that they went to their most recent dental visit because their doctor had suggested it. As described earlier, several sets of dental guidelines recommend that HIV+ patients be referred routinely to dental care to identify and treat any oral conditions and to closely monitor changes in the oral cavity related to HIV oral manifestations or conditions.

Table 20. Which answers comes closest to the reason for your most recent dental visit?

	Broward %	HCSUS %	Difference %
Something was wrong	30.6%	31.8%	-1.2%
I thought it was time for an examination or cleaning	26.5%	31.0%	-4.5%
The dentist reminded me it was time for an examination or cleaning	14.3%	16.7%	-2.4%
My doctor suggested that I see a dentist	4.1%	NA	NA
It was part of a series or course of treatment	16.3%	16.3%	0.0%
Some other reason	8.2%	4.3%	3.9%

5. Source of Dental Care

HIV+ Broward County respondents were significantly more likely to receive dental care from public clinics and dental clinics run by AIDS programs than were HCSUS respondents, as shown in Table 21. The largest proportion (43%) of Broward County respondents receive oral health care from dental clinics run by AIDS programs, compared to just 14% of HCSUS respondents. Over one-quarter (29%) of Broward County respondents compared to 19% of HCSUS respondents receive dental care from public clinics. Over one-half (59%) of HCSUS respondents usually received their dental care from a dentist's office or private clinic compared to 20% of Broward County respondents, a two-fold significant difference.

Table 21. Which of these places best describes the place you usually go for dental care?

	Broward %	HCSUS %	Difference %
A dentist's office or private clinic	20.0%	59.3%	-39.3%
A VA clinic	0.0%	0.1%	-0.1%
A public clinic	28.6%	19.4%	9.2%
Some other clinic	8.6%	2.9%	5.7%
A dental clinic run by an AIDS program	42.9%	14.4%	28.5%
A dental school clinic	0.0%	2.7%	-2.7%
Some other place	0.0%	1.1%	-1.1%

Significant Chi-square at $p \leq 0.05$

Broward County and HCSUS respondents were significantly different in the ways that they found out about the offices or clinics where they usually receive dental care (see Table 22). Only 4% of Broward County respondents report receiving dental care from the same offices or clinics that they had been going to before their HIV infection, compared to 17% of HCSUS respondents. One-third (33%) of Broward County respondents found out about their source of dental care through an AIDS programs, compared to 18% of HCSUS respondents. Less than one-tenth (6%) of Broward County respondents found out about their dentist's offices or clinics from friends, relatives, neighbors, or coworkers, compared to 23% of HCSUS respondents. While 10% of Broward County residents found out about their dentist's office or dental clinic from their physician, 16% of HCSUS respondents reported that their physician had told them about the dentist's office or clinic. Once again, physicians do not appear to be a source of referral to get dental care.

Table 22. How did you find out about this dentist's office or dental clinic?

	Broward %	HCSUS %	Difference %
You had been going there before your HIV infection *	3.9%	17.3%	-13.4%
From another HIV+ patient	7.8%	4.1%	3.7%
From an AIDS program *	33.3%	18.3%	15.0%
From a friend, relative, neighbor, or fellow worker *	5.9%	22.6%	-16.7%
From a physician (medical doctor)	9.8%	16.1%	-6.3%
From another health professional	9.8%	8.1%	1.7%
From another dentist	0.0%	2.8%	-2.8%
From an advertisement: TV, radio, newspaper, sign outside	2.0%	7.2%	-5.2%
Some other way	11.8%	11.6%	0.2%

* Significant Chi-square at $p \leq 0.05$

6. Satisfaction With Dental Care

HCSUS respondents were significantly more likely than Broward County respondents to be satisfied with the dental care that they received from the place they usually go for dental care. About three-quarters (75%) of Broward County respondents report being satisfied, compared to 89% of HCSUS respondents (Table 23). Lack of certainty about their satisfaction with the dental care received by Broward County respondents prompted a further analysis of satisfaction among respondent receiving dental care within the last twelve months. Among the 41 Broward County respondents that received dental care within the last twelve months, 63% reported their satisfaction with their usual source of dental care. Most respondents (81%) report being satisfied with the dental care they received.

Table 23. I am satisfied with the dental care I receive at the place I usually go for dental care.

	Broward %	HCSUS %	Difference %
I strongly agree	41.7%	48.2%	-6.5%
I agree	33.3%	41.2%	-7.9%
I disagree	5.6%	5.9%	-0.3%
I strongly disagree	5.6%	3.2%	2.4%
I am not sure	13.9%	1.5%	12.4%

Significant Chi-square at $p \leq 0.05$

Broward County respondents were significantly more likely than HCSUS respondents to report that their dentists check carefully their mouths, teeth, and gums during exams (see Table 24). Most Broward County respondents (87%) agreed or strongly agreed that their dentist carefully checked them. In contrast, only 10% of HCSUS respondents report that they were carefully checked. In contrast, 87% of HCSUS disagreed or strongly disagreed that their dentist carefully checked their mouth, teeth, or gums, compared to 8% of Broward County respondents.

Table 24. When my dentist examines me, he or she is careful to check my mouth, teeth, and gums.

	Broward %	HCSUS %	Difference %
I strongly agree	34.4%	3.5%	30.9%
I agree	53.1%	6.3%	46.8%
I disagree	6.3%	46.5%	-40.2%
I strongly disagree	1.6%	40.8%	-39.2%
I am not sure	4.7%	2.9%	1.8%

Significant Chi-square at $p \leq 0.05$

Broward County and HCSUS respondents differed significantly extent to which they agreed, disagreed, or were unsure about whether their dentists discuss their treatment with their medical doctors (see Table 25). Broward County respondents were almost twice as likely (33%) as

HCSUS respondents (17%) to be unsure if their dentists discuss their treatment with their medical doctors. About one-quarter (25%) of HCSUS respondents and 19% of Broward County respondents agree that their dentists discuss their treatment with their doctors. In contrast, 58% of HCSUS respondents and 48% of Broward County respondents disagree that their dentists discuss their treatment with their doctors.

Table 25. My dentist discusses my treatment with my medical doctor.

	Broward %	HCSUS %	Difference %
I strongly agree	3.2%	6.6%	-3.4%
I agree	15.9%	18.3%	-2.4%
I disagree	27.0%	39.4%	-12.4%
I strongly disagree	20.6%	18.4%	-2.2%
I am not sure	33.3%	17.3%	16.0%

Significant Chi-square at $p \leq 0.05$

Broward County respondents were more than four times as likely to agree that their dentist treats them with dignity and respect than HCSUS respondents, a highly statistically significant difference. Table 26 shows that 87% of Broward County respondents versus 8% of HCSUS respondents agreed or strongly agreed that their dentists treat them with dignity and respect. In contrast, 90% of HCSUS respondents and only 8% of Broward County respondents reported that they disagreed or strongly disagreed that their dentist treats them with dignity and respect.

Table 26. My dentist treats me with dignity and respect.

	Broward %	HCSUS %	Difference %
I strongly agree	42.9%	4.0%	38.9%
I agree	44.4%	4.4%	40.0%
I disagree	6.3%	36.5%	-30.2%
I strongly disagree	1.6%	53.9%	-52.3%
I am not sure	4.8%	1.2%	3.6%

Significant Chi-square at $p \leq 0.05$

There were no statistically significant differences ($p < 0.05$) between Broward County respondents and HCSUS respondents in the proportions that agreed, disagreed, or were unsure of whether they can trust their dentists to respect their privacy regarding HIV status (see Table 27). Most (81%) Broward County and HCSUS (84%) respondents trust their dentist to protect their privacy regarding HIV status. It is concerning; however, that 13% of Broward County residents report that they are not sure that their dentist protects their privacy regarding their HIV status.

Table 27. I can trust my dentist to protect my privacy regarding my HIV status.

	Broward %	HCSUS %	Difference %
I strongly agree	46.0%	43.1%	2.9%
I agree	34.9%	40.8%	-5.9%
I disagree	3.2%	6.3%	-3.1%
I strongly disagree	3.2%	2.0%	1.2%
I am not sure	12.7%	7.9%	4.8%

Significant Chi-square at $p \leq 0.05$

7. Unmet Need for Dental Care

Broward County respondents were about three times more likely to report unmet need for dental care in the twelve months before the survey than the HCSUS respondents. While 61% of Broward County respondents report there were times in the twelve months before the survey that they needed but did not receive dental care, 19% of HCSUS respondents reported unmet dental needs.

Respondents reporting that they had unmet dental needs were asked to identify the reasons that they did not get dental care. Significant differences ($p < 0.05$) were identified between Broward County respondents and the nationally representative group for two reasons for not getting needed dental care (see Table 28). HCSUS respondents were about twice as likely (47%) than Broward County respondents (26%) to report that they did not get dental care when they needed it during the previous 12 months because they could not afford dental care. About one-tenth (8%) of Broward County respondents report that they did not get treatment they needed due to worry about their privacy being protected, compared less than one percent (0.9%) of HCSUS respondents.

Table 28. Which of the following statements describes the most important reason that you did not get the dental care you needed?

	Broward %	HCSUS %	Difference %
I did not think it was important enough	7.9%	9.0%	-1.1%
I could not afford dental care *	26.3%	46.7%	-20.4%
I could not find an HIV friendly dentist	2.6%	5.9%	-3.3%
I did not know where to find dental care	0.0%	5.3%	-5.3%
I did not have transportation to get to a dentist	0.0%	1.1%	-1.1%
I am afraid of dentists or dental care	5.3%	9.7%	-4.4%
I worry about my privacy being protected *	7.9%	0.9%	7.0%
I could not get an appointment anywhere	7.9%	5.4%	2.5%
I did not feel well enough to go to a dentist	0.0%	1.4%	-1.4%
I was afraid of finding out something was wrong	0.0%	1.8%	-1.8%
I am afraid of dental pain	0.0%	NA	
Some other reason	10.5%	12.7%	-2.2%

* Significant Chi-square at $p \leq 0.05$

8. Dental Insurance

HCSUS respondents were about three-times more likely (60%) to have health insurance that pays for dental services than Broward County respondents (23%), a significant difference. It should be noted, 8% of Broward County respondents were unsure if their insurance plan pays for dental services.

Among respondents who report that they do not have dental insurance, 6% of Broward County respondents report that they were denied dental insurance because of their HIV status, compared to 2% of HCSUS respondents- a significant difference (see Table 29). Not having a job was reported by 40% of Broward County and 35% of HCSUS respondents to be a reason that they do not have dental insurance. That dental insurance was too expensive was reported as a reason by 19% of Broward County and 25% of HCSUS respondents. About one-tenth (8%) of Broward County and 16% of HCSUS respondents reported that dental insurance was not offered by their employer.

Table 29. Which one of these reasons best explains why you do not have dental insurance?

	Broward %	HCSUS %	Difference %
Don't have a job	40.4%	34.6%	5.8%
Dental insurance not offered where I work	7.7%	15.6%	-7.9%
Dental insurance is too expensive	19.2%	25.2%	-6.0%
I was denied dental insurance because of my HIV status *	5.8%	1.8%	4.0%
Some other reason	23.1%	17.4%	5.7%

* Significant Chi-square at $p \leq 0.05$

Broward County respondents were significantly more likely (60%) to receive dental care paid for by the CARE Act than HCSUS respondents (0%). In contrast, HCSUS respondents were significantly more likely to rely on private and public insurance than Broward County respondents (see Table 30). While only 2% of Broward County respondents had dental benefits through private insurance, 37% of HCSUS respondents had private insurance that covered dental benefits. About one-fifth (19%) of Broward County respondents had dental benefits through Medicaid, compared to 49% of HCSUS respondents.

Table 30. What kind of dental benefits do you have?

	Broward %	HCSUS %	Difference %
Private insurance *	1.9%	36.8%	-34.9%
Medicaid *	19.2%	48.9%	-29.7%
VA, County, State, or Federal Program	11.5%	10.0%	1.5%
Some other insurance	1.9%	4.3%	-2.4%
My dental care is paid for by the CARE Act	59.6%	NA	
Don't know	15.4%	NA	

* Significant Chi-square at $p \leq 0.05$

Nearly one-third (31%) of Broward County respondents spent \$1,000 or more on dental care in the twelve months prior to the survey, compared to none of the HCSUS respondents (see Table 31), a significant difference.

Table 31. Pick the category that comes closest to the amount you spent on dental care in the past 12 months.

	Broward %	HCSUS %	Difference %
Less than \$100	23.1%	23.1%	0.0%
\$100-\$199	15.4%	28.1%	-12.7%
\$200-\$999	30.8%	47.8%	-17.0%
\$1,000-\$2,499	15.4%	0.0%	15.4%
\$2,500 or more	15.4%	0.0%	15.4%

Significant Chi-square at $p \leq 0.05$

Among insured Broward County respondents, 43% report that they have not notified their dentist that they have health insurance. Reasons for not disclosing this information include an inability to pay a co-payment and because the patient does not what their health insurance plan to know that they have HIV.

9. Attitudes About Dental Care

Broward County respondents were asked to provide their assessment of how HIV+ individuals view various aspects of dental care. Their responses were compared to HCSUS respondents:

- Broward County respondents significantly disagree with HCSUS respondents in their perceptions about the extent to which dentists can effectively treat HIV-related oral health conditions. About three-quarters (73%) of Broward County versus 17% of HCSUS respondents agree that dentists can effectively treat HIV-related oral conditions (see Table 32).
- Broward County respondents reported significantly more confidence in dentists' knowledge of treatment of oral conditions related to HIV infection than HCSUS respondents (see Table 33). About two-thirds (63%) of Broward County respondents versus 54% of HCSUS respondents agreed that dentists are knowledgeable about how to treat oral conditions related to HIV infection.

- Broward County respondents (53%) were slightly more likely than HCSUS respondents (51%) to agree that HIV+ people can get an appointment to see a dentist when they want it (see Table 34).
- Broward County respondents were significantly less likely than HCSUS respondents to agree that HIV+ people can afford the cost of dental care (see Table 35). Most (81%) Broward County respondents versus 76% of HCSUS respondents disagreed that HIV+ individuals can afford the cost of dental care.

Table 32. Dentists can effectively treat oral conditions related to HIV infection.

	Broward %	HCSUS %	Difference %
I strongly agree	21.9%	2.8%	19.1%
I agree	51.6%	14.4%	37.2%
I disagree	14.1%	50.3%	-36.2%
I strongly disagree	1.6%	15.7%	-14.1%
I am not sure	10.9%	16.7%	-5.8%

Significant Chi-square at $p \leq 0.05$

Table 33. Dentists in general are knowledgeable about how to treat oral conditions related to HIV infection.

	Broward %	HCSUS %	Difference %
I strongly agree	18.8%	12.4%	6.4%
I agree	43.8%	43.4%	0.4%
I disagree	12.5%	21.9%	-9.4%
I strongly disagree	14.1%	5.0%	9.1%
I am not sure	10.9%	17.4%	-6.5%

Significant Chi-square at $p \leq 0.05$

Table 34. Most HIV+ can get an appointment to see a dentist when they want it.

	Broward %	HCSUS %	Difference %
I strongly agree	25.0%	12.5%	12.5%
I agree	28.1%	38.1%	-10.0%
I disagree	20.3%	23.7%	-3.4%
I strongly disagree	12.5%	12.3%	0.2%
I am not sure	14.1%	13.4%	0.7%

Significant Chi-square at $p \leq 0.05$

Table 35. People with HIV infection can afford the cost of dental care.

	Broward %	HCSUS %	Difference %
I strongly agree	6.3%	2.7%	3.6%
I agree	1.6%	12.1%	-10.5%
I disagree	26.6%	39.3%	-12.7%
I strongly disagree	54.7%	36.9%	17.8%
I am not sure	10.9%	9.1%	1.8%

Significant Chi-square at $p \leq 0.05$

X. GLOSSARY OF DENTAL TERMS

Adapted from the American Dental Association (ADA) Website:
<http://www.ada.org/public/resources/glossary.asp>

Abrasion Tooth wear caused by forces other than chewing such as holding objects between the teeth or improper brushing.

Abutment A tooth (or implant) that supports a dental prosthesis.

Alveolar bone The part of the jaw that surrounds the roots of the teeth.

Alveolar process The curving part of the jaw into which the teeth are rooted.

Alveolus The socket in the alveolar bone into which the tooth's root fits.

Amalgam An alloy used in direct dental restorations.

Analgesia Loss of pain sensations without loss of consciousness.

Ankylosis A condition where two hard tissues are fused together. When this happens to a tooth and the alveolar bone, the tooth partially erupts.

Anesthesia

- **General Anesthesia:** A controlled state of unconsciousness, accompanied by a partial or complete loss of protective reflexes, including loss of ability to independently maintain airway and respond purposefully to physical stimulation or verbal command, produced by a pharmacologic or non-pharmacologic method or combination thereof;
- **Intravenous Sedation/Analgesia:** A medically controlled state of depressed consciousness while maintaining the patient's airway, protective reflexes and the ability to respond to stimulation or verbal commands. It includes intravenous administration of sedative and/or analgesic agent(s) and appropriate monitoring.
- **Local Anesthesia:** The loss of pain sensation over a specific area of the anatomy without loss of consciousness.
- **Non-Intravenous Conscious Sedation:** A medically controlled state of depressed consciousness while maintaining the patient's airway, protective reflexes and the ability to respond to stimulation or verbal commands. It includes administration of sedative and/or analgesic agent(s) by a route other than IV; (PO, PR, Intranasal, IM) and appropriate monitoring.
- **Regional Anesthesia:** A term used for local anesthesia.

Apicoectomy Removal of the tip of a tooth root.

Benign The mild character of an illness or the non-malignant character of a neoplasm.

Bicuspid A premolar tooth; a tooth with two cusps.

Bilateral Occurring on, or pertaining to, both right and left sides.

Biopsy Process of removing tissue for histologic evaluation.

Bitewing radiographs X-rays used to reveal the crowns of several upper and lower teeth as they bite down.

Bleaching A cosmetic dental procedure that whitens the teeth using a bleaching solution.

Bonding A composite resin applied to a tooth to change its shape and/or color. Bonding also refers to how a filling, orthodontic appliance or some fixed partial dentures are attached to teeth.

Bridge See Fixed Partial Denture and/or Removable Partial Denture.

Bruxism Constant grinding or clenching of teeth during the day or while asleep.

Calculus Hard deposit of mineralized material adhering to crowns and/or roots of teeth.

Canal A relatively narrow tubular passage or channel.

- **Root Canal:** Space inside the root portion of a tooth containing pulp tissue.

Cariogenic Promotes tooth decay.

Caries Commonly used term for tooth decay.

Cavity Decay in tooth caused by caries; also referred to as carious lesion.

Clenching The clamping and pressing of the jaws and teeth together in centric occlusion, frequently associated with psychological stress or physical effort.

Composite A dental restorative material made up of disparate or separate parts (e.g. resin and quartz particles).

Conscious Sedation A state in which patients are awake and can breathe and swallow on their own but are less aware of what is taking place.

Crown

- **Anatomical Crown:** That portion of tooth normally covered by, and including, enamel;
- **Abutment Crown:** Artificial crown serving for the retention or support of a dental prosthesis;
- **Artificial Crown:** Restoration covering or replacing the major part, or the whole of the clinical crown of a tooth;
- **Clinical Crown:** That portion of a tooth not covered by supporting tissues.
- **Crown Lengthening:** A surgical procedure exposing more tooth for restorative purposes by apically positioning the gingival margin and/or removing supporting bone.

Cusp The pointed portion of the tooth.

Cyst Pathological cavity, usually lined with epithelium, containing fluid or soft matter.

Debridement Removing foreign matter or dead tissue.

Decay The lay term for carious lesions in a tooth; decomposition of tooth structure.

Dental Prophylaxis Scaling and polishing procedure performed to remove coronal plaque, calculus, and stains.

Dental Prosthesis An artificial device that replaces one or more missing teeth.

Dental Specialist A dentist who has received postgraduate training in one of the recognized dental specialties (DDS, DMD)

Dentin That part of the tooth that is beneath enamel and cementum.

Dentition The teeth in the dental arch.

- **Permanent Dentition** Refers to the permanent teeth in the dental arch.
- **Deciduous Dentition** Refers to the deciduous or primary teeth in the dental arch.

Denture An artificial substitute for natural teeth and adjacent tissues.

Denture Base The part of the denture that holds the artificial teeth and fits over the gums.

Direct Restoration A restoration fabricated inside the mouth.

Dry Mouth (See Xerostomia)

Dry Socket Localized inflammation of the tooth socket following extraction due to infection or loss of blood clot; osteitis.

Dysphagia Oral pain and difficulty in swallowing.

Edentulous Toothless.

Enamel Hard calcified tissue covering dentin of the crown of tooth.

Endodontist A dental specialist who limits his/her practice to treating disease and injuries of the pulp and associated periradicular conditions.

Erosion Wearing down of tooth structure, caused by chemicals (acids).

Evaluation

- **Periodic Oral Evaluation:** An evaluation performed on a patient of record to determine any changes in the patient's dental and medical health status since a previous comprehensive or periodic evaluation. This may require interpretation of information acquired through additional diagnostic procedures. Report additional diagnostic procedures separately.
- **Limited Oral Evaluation:** Problem focused: an evaluation limited to a specific oral health problem. This may require interpretation of information acquired through additional diagnostic procedures. Definitive procedures may be required on the same date as the evaluation. Typically, patients receiving this type of evaluation have been referred for a specific problem and/or present with dental emergencies, trauma, acute infection, etc.
- **Comprehensive Oral Evaluation:** Typically used by a general dentist and/or a specialist when evaluating a patient comprehensively. It is a thorough evaluation and recording of the extraoral and intraoral hard and soft tissues. It may require interpretation of information acquired through additional

diagnostic procedures. This would include the evaluation and recording of the patient's dental and medical history and a general health assessment. It may typically include the evaluation and recording of dental caries, missing or unerupted teeth, restorations, occlusal relationships, periodontal conditions (including periodontal charting), hard and soft tissue anomalies, etc.

- **Comprehensive Periodontal Evaluation:** Typically includes evaluation of periodontal conditions, probing and charting, evaluation and recording of the patient's dental and medical history and general health assessment. It may include the evaluation and recording of dental caries, missing or unerupted teeth, restorations, occlusal relationships and oral cancer screening.
- **Detailed And Extensive Oral Evaluation—Problem-Focused, By Report:** A detailed and extensive problem-focused evaluation entails extensive diagnostic and cognitive modalities based on the findings of a comprehensive oral evaluation. Integration of more extensive diagnostic modalities to develop a treatment plan for a specific problem is required. The condition requiring this type of evaluation should be described and documented. Examples of conditions requiring this type of evaluation may include dentofacial anomalies, complicated perio-prosthetic conditions, complex temporomandibular dysfunction, facial pain of unknown origin, severe systemic diseases requiring multi-disciplinary consultation, etc.
- **Re-Evaluation—Limited, Problem Focused (established patient; not post-operative visit):** This includes assessing the status of a previously existing condition. Examples of conditions requiring this type of evaluation may include: A traumatic injury where no treatment was rendered but the patient needs follow-up monitoring; Evaluation for undiagnosed continuing pain: A soft tissue lesion requiring follow-up evaluation.

Excision Surgical removal of bone or tissue.

Extraction The process or act of removing a tooth or tooth parts.

Filling A lay term used for the restoring of lost tooth structure by using materials such as metal, alloy, plastic or porcelain.

Fixed Appliances Orthodontic devices, commonly known as braces, that are bonded to the teeth to produce different tooth movements to help reposition teeth for orthodontic therapy.

Fixed Partial Denture A fixed partial denture is a prosthetic replacement of one or more missing teeth cemented or attached to the abutment teeth or implant abutments adjacent to the space.

Fracture The breaking of a part, especially of a bony structure; breaking of a tooth.

Full-Mouth X-Rays A combination of 14 or more periapical and 4 bitewing films of the back teeth. This series of x-rays reveals all the teeth (their crowns and roots) and the alveolar bone around them.

General Anesthesia A deep level of sedation in which patients lose consciousness, feel no pain, and have no memory of what is taking place around them.

Gingiva Soft tissues overlying the crowns of unerupted teeth and encircling the necks of those that have erupted.

Gingival Hyperplasia An overgrowth of gingival tissues.

Gingivitis Inflammation of gingival tissue without loss of connective tissue.

Gingivectomy The excision or removal of gingiva.

Gingivoplasty Surgical procedure to reshape gingiva.

Graft A piece of tissue or alloplastic material placed in contact with tissue to repair a defect or supplement a deficiency.

Imaging, Diagnostic This would include, but is not limited to, CAT scans, MRIs, photographs, radiographs, etc.

Immediate Denture Prosthesis constructed for placement immediately after removal of remaining natural teeth.

Impacted Tooth An unerupted or partially erupted tooth that is positioned against another tooth, bone, or soft tissue so that complete eruption is unlikely.

Implant Material inserted or grafted into tissue.

- **Dental Implant** A device specially designed to be placed surgically within or on the mandibular or maxillary bone as a means of providing for dental replacement; endosteal (endosseous); eposteal (subperiosteal); transosteal (transosseous).

Implantation, Tooth Placement of an artificial or natural tooth into an alveolus.

Inlay An indirect intracoronal restoration; a dental restoration made outside of the oral cavity to correspond to the form of the prepared cavity, which is then luted into the tooth.

Interproximal Between the teeth.

Intraoral Inside the mouth.

Intravenous Sedation Medications used intravenously (through the bloodstream) to produce varying levels of sedation.

Jaw A common name for either the maxilla or the mandible.

Labial Pertaining to or around the lip.

Lesion An injury or wound; area of diseased tissue.

Lingual Pertaining to or around the tongue; surface of the tooth directed toward the tongue; opposite of facial.

Maintenance, Periodontal Therapy for preserving the state of health of the periodontium.

Malignant Having the properties of dysplasia, invasion, and metastasis.

Malocclusion Improper alignment of biting or chewing surfaces of upper and lower teeth.

Maxilla The upper jaw.

Molar Teeth posterior to the premolars (bicuspid) on either side of the jaw; grinding teeth, having large crowns and broad chewing surfaces.

Mucous Membrane Lining of the oral cavity as well as other canals and cavities of the body; also called "mucosa."

Occlusal Pertaining to the biting surfaces of the premolar and molar teeth or contacting surfaces of opposing teeth or opposing occlusion rims.

Occlusion Any contact between biting or chewing surfaces of maxillary (upper) and mandibular (lower) teeth.

Onlay An indirect restoration made outside the oral cavity that overlays a cusp or cusps of the tooth, which is then luted to the tooth.

Oral Pertaining to the mouth.

Oral And Maxillofacial Surgeon A dental specialist whose practice is limited to the diagnosis, surgical and adjunctive treatment of diseases, injuries, deformities, defects and esthetic aspects of the oral and maxillofacial regions.

Oral Mucosa The pink-red tissues that line the mouth.

Orthodontist A dental specialist whose practice is limited to the interception and treatment of malocclusion of the teeth and their surrounding structures.

Palate The hard and soft tissues forming the roof of the mouth that separates the oral and nasal cavities.

Palliative Action that relieves pain but is not curative.

Partial Denture Usually refers to a prosthetic device that replaces missing teeth.

Parotid Glands Major salivary glands located in front of and below the ears.

Patient An individual who has established a professional relationship with a dentist for the delivery of dental health care. For matters relating to communication of information and consent, this term includes the patient's parent, caretaker, guardian, or other individual as appropriate under state law and the circumstances of the case.

Pediatric Dentist A dental specialist whose practice is limited to treatment of children from birth through adolescence; formerly known as a pedodontist.

Pellicle A thin nonbacterial film from saliva that covers the teeth.

Periapical X-Ray An x-ray that shows several entire teeth (crowns and roots) and includes a small amount of the periapical bone (surrounding the root tips).

Periodontal Pertaining to the supporting and surrounding tissues of the teeth.

Periodontal Abscess An infection in the gum pocket that can destroy hard and soft tissues.

Periodontal Disease Inflammatory process of the gingival tissues and/or periodontal membrane of the teeth, resulting in an abnormally deep gingival sulcus, possibly producing periodontal pockets and loss of supporting alveolar bone.

Periodontal Pocket Pathologically deepened gingival sulcus; a feature of periodontal disease.

Periodontist A dental specialist whose practice is limited to the treatment of diseases of the supporting and surrounding tissues of the teeth.

Periodontitis Inflammation and loss of the connective tissue of the supporting or surrounding structure of teeth with loss of attachment.

Plaque A soft sticky substance that accumulates on teeth composed largely of bacteria and bacterial derivatives.

Post An elongated projection fitted and cemented within the prepared root canal, serving to strengthen and retain restorative material and/or a crown restoration.

Posterior Refers to teeth and tissues towards the back of the mouth (distal to the canines): maxillary and mandibular premolars and molars.

Premedication The use of medications prior to dental procedures.

Prophylaxis Scaling and polishing procedure performed to remove coronal plaque, calculus and stains.

Prosthesis Artificial replacement of any part of the body.

Prosthodontist A dental specialist whose practice is limited to the restoration of the natural teeth and/or the replacement of missing teeth with artificial substitutes.

Pulp Connective tissue that contains blood vessels and nerve tissue which occupies the pulp cavity of a tooth.

Pulp Cavity The space within a tooth which contains the pulp.

Pulpectomy Complete removal of vital and non vital pulp tissue from the root canal space.

Pulpotomy Surgical removal of a portion of the pulp with the aim of maintaining the vitality of the remaining portion by means of an adequate dressing; pulp amputation.

Radiograph An image produced by projecting radiation, as x-rays, on photographic film. Commonly called x-ray.

Ranula A cyst that can develop under the tongue on the floor of the mouth.

Rebase To replace the denture base.

Reline To resurface the side of the denture that is in contact with the soft tissues of the mouth to make it fit more securely.

Removable Appliance Removable orthodontic appliances used to effect simple tipping movements of one tooth or several.

Removable Partial Denture A removable partial denture (removable bridge) is a prosthetic replacement of one or more missing teeth that can be removed by the patient.

Resorb To dissolve.

Root The anatomic portion of the tooth that is covered by cementum and is located in the alveolus (socket) where it is attached by the periodontal apparatus; radicular portion of tooth.

Root Canal The portion of the pulp cavity inside the root of a tooth; the chamber within the root of the tooth that contains the pulp.

Root Canal Therapy The treatment of disease and injuries of the pulp and associated periradicular conditions.

Root Caries Tooth decay that forms on the roots.

Root Planing A procedure designed to remove microbial flora, bacterial toxins, calculus, and diseased cementum or dentin on the root surfaces and in the pocket.

Scaling Removal of plaque, calculus, and stain from teeth.

Sealants Plastic resin placed on the biting surfaces of molars to prevent bacteria from attacking the enamel and causing caries.

Sjogren's Syndrome An autoimmune disorder (mostly affecting older women) that is characterized by partial or complete cessation of saliva and tears. It can be associated with rheumatic disease, such as rheumatic arthritis, lupus, or scleroderma.

Splint A device used to support, protect, or immobilize oral structures that have been loosened, replanted, fractured or traumatized. Also refers to devices used in the treatment of temporomandibular joint disorders.

Stomatitis Inflammation of the membranes in the mouth.

Sublingual Glands Major salivary glands located in the mucosa on the floor of the mouth.

Submandibular Glands Walnut-sized major salivary glands located beneath the tongue.

Suture Stitch used to repair incision or wound.

Temporary Removable Denture An interim prosthesis designed for use over limited period of time.

Torus A bony elevation or protuberance of bone.

Veneer In the construction of crowns or pontics, a layer of tooth-colored material, usually, but not limited to, composite, porcelain, ceramic or acrylic resin, attached to the surface by direct fusion, cementation, or mechanical retention; also refers to a restoration that is luted to the facial surface of a tooth.

Xerostomia Decreased salivary secretion that produces a dry and sometimes burning sensation of the oral mucosa and/or cervical caries.

X-Ray Radiograph.

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