A Pilot Study: An Evaluation of Periodontal Assessment Procedures

Among Indiana Dental Hygienists

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*Abstract*

Using a descriptive correlational design, this study surveyed periodontal assessment procedures currently performed by Indiana dental hygienists in general dentistry practices to reveal if deficiencies in assessment exist. Members (n=354) of the Indiana Dental Hygienists’ Association (IDHA) were invited to participate in the survey. A twenty-two multiple choice question survey, using Likert scales for responses, was open to participants for three weeks. Descriptive and non-parametric inferential statistics analyzed questions related to demographics and assessment procedures practiced. In addition, an evaluation of the awareness of periodontal assessment procedures recommended by the American Academy of Periodontology (AAP) was examined. Of the 354 Indiana dental hygienists surveyed, a 31.9% response rate was achieved. Participants were asked to identify the recommended AAP periodontal assessment procedures they perform. The majority of respondents indicated either frequently or always performing the listed assessment procedures. Additionally, significant relationships were found between demographic factors and participants’ awareness and performance of recommended AAP assessment procedures. While information gathered from this study is valuable to the body of literature regarding periodontal disease assessment, continued research with larger survey studies should be conducted to obtain a more accurate national representation of what is being practiced by dental hygienists.

*Keywords*: periodontal diseases, periodontal pocket, risk assessment, dental hygienists, periodontal index

**INTRODUCTION**

Dental hygienists and dentists have an ethical, moral, and legal obligation to accurately assess and diagnose patients’ periodontal health. To meet these professional responsibilities, the dental team should thoroughly assess patients’ periodontal health by reviewing the medical history, obtaining periodontal probe measurements, calculating clinical attachment loss, recording bleeding on probing (BOP) sites, evaluating radiographic bone loss, assessing tooth mobility, inspecting plaque and calculus deposits, and determining patients’ risk factors.1, 2  The American Academy of Periodontology (AAP) recognizes dental hygienists play a vital role in the assessment and treatment of periodontal disease.1  Dental hygienists are “often responsible for several important elements of comprehensive periodontal therapy, including: evaluating the patient’s periodontal health; providing nonsurgical periodontal treatment; and offering guidance on follow-up treatment, as well as self-care and maintenance.”1  The AAP recommends performing a yearly periodontal evaluation on every adult patient. In addition to the significant role dental hygienists have in periodontal assessments, the entire dental team including general dentists and periodontists have responsibility for annual evaluation.1,3  Despite the responsibility of the dental team in assessing patients’ periodontal health, public records indicate periodontal disease is still prevalent in the United States.1,4,5

According to the National Health and Nutrition Health Examination Survey (NHANES) conducted in the United States between 2009 and 2010, the prevalence of periodontitis, including mild, moderate, and severe case types, was estimated at 47.2% for those 30 years and older.4,5 Previous estimates from the NAHNES III and NHANES 1999-2004, which used partial-mouth recording, indicated disease prevalence as 26% and 17%, respectively.4,5 The Centers for Disease Control and Prevention (CDC) is currently working with key partner organizations including the AAP and the American Dental Association (ADA) to improve and sustain surveillance of periodontal disease in the adult U.S. population.6  As the incidence of periodontitis rises, dental professionals should implement appropriate assessment and diagnostic protocols to determine proper patient treatment. Research is necessary to measure the periodontal assessment procedures and diagnostic protocols practiced in general dentistry. Since a large portion of the population is affected by periodontal disease, dental professionals should adhere to the AAP recommendations.

As the prevalence of periodontal disease rises, the AAP strongly encourages early screening, evaluation and diagnosis to improve the health of patients. To support the concern of the AAP, the CDC acknowledges periodontal disease as one of the biggest threats to dental health.6  The increase in periodontal disease prevalence validates the need for dental professionals to practice appropriate assessment and diagnostic protocols when treating patients.

**LITERATURE REVIEW**

A literature review confirmed the use of surveillance studies to assess the level of disease, and to study the level of periodontal assessment and diagnostic protocols practiced in dentistry. The examination of specific periodontal diagnostic procedures included use of periodontal assessment protocol, radiographs, and frequency of patient referrals to periodontists for specialty care.

**Periodontal Disease Surveillance**

Surveillance studies are fundamental to the study of periodontal disease and the reporting of prevalence. Generally, oral health surveys for large population samples utilize fixed probing sites on a randomly chosen maxillary quadrant and one mandibular quadrant rather than full-mouth probing. Some of the earliest periodontal surveys collected data by visually assessing periodontal status in the 1960-1962 Health Examination Survey and the 1971-1974 National Health and Nutrition Examination Survey (NHANES). Subsequent surveys, National Institute of Dental and Craniofacial Research (NIDCR) Survey of Employed Adults and Seniors 1985-1986, NHANES III 1988-1994, and NHANES 1999-2004 used various partial-mouth periodontal examination protocols (PMPE).4  PMPEs used in NHANES surveys have evolved from using two randomly selected quadrant measurements assessing probing depth and attachment loss at two sites per tooth to assessing three sites per tooth in NHANES 2001-2004.4 The benefits of PMPEs are time efficiency and surveying national populations. However, when PMPEs were used to determine disease prevalence, there was an underestimation of periodontal disease diagnosis due to not providing a complete evaluation of the patient’s periodontal status.4,5,7,8

As a result of previous estimates of periodontal disease prevalence using the PMPEs, the 2009-2010 NHANES instituted the full-mouth periodontal examination (FMPE). The 2009-10 study was the first national surveillance sample used to gather periodontal disease data using six sites per tooth for all teeth, excluding third molars. The purpose of the full-mouth study was to provide the most accurate data regarding prevalence, extent, and severity of periodontal disease in the United States adult population. The results of the 2009-10 study determined the prevalence of periodontitis (including mild, moderate, and severe case types) for adults 30 years and older was 47.2%, representing 64.7 million in the United States.4,5 Since implementing the full-mouth system, results provide the most accurate representation of the periodontal status in this country. Previous estimates from the NAHNES III and NHANES 1999-2004, which used partial-mouth recording, indicated disease prevalence as 26% and 17%, respectively.4,5 The inclusion of full-mouth protocols in the 2009-2010 NHANES revealed 47.2% prevalence of periodontitis which suggests there is a national epidemic of periodontal disease.4,5

**American Academy of Periodontology**

The AAP maintains the importance of performing a yearly comprehensive periodontal assessment.1,3  Clem states this yearly comprehensive periodontal evaluation should be performed on every patient and include the following:

* “extraoral and intraoral evaluation
* thorough occlusal evaluation
* assessment of the presence, degree, and distribution of plaque, calculus, and gingival inflammation
* probing of six sites per tooth
* assessment and documentation of recession and attachment loss around teeth
* radiographic evaluation of bone loss and identification of vertical defects and furcation involvements
* assessment of patient-associated risk factors such as age, smoking, and other chronic systemic conditions associated with development or progression of periodontal diseases or systemic inflammatory burden”.1

This comprehensive periodontal evaluation provides the necessary diagnostic tools to thoroughly evaluate the periodontal status of adult patients so proper treatment can be determined and implemented. As part of the AAPs recommendations for the comprehensive periodontal assessment, it was necessary to also review literature regarding the use of radiographs among general dentists.

**Radiographs in Periodontal Assessment**

Among the literature reviewed, researchers reported a high percentage of dentists utilizing radiographs as part of their periodontal assessment. In a study conducted by Tugnait, Clerehuh, & Hirschmann, there was no consensus among dentists surveyed regarding the choice of radiographic views to diagnose periodontal disease. The majority of dentists utilized some type of radiographs in conjunction with a basic periodontal evaluation.10 There has been support regarding the importance of using radiographs for periodontal assessment.10,11,12  However, the information gained from the radiographic or clinical examination differs significantly and cannot replace one another.11

**Under diagnosis**

Current literature regarding the surveillance of periodontal disease shows a nation that has been underdiagnosed. With nearly fifty percent of the adult U.S. population affected by this disease, research regarding assessment and diagnosis is relevant, pertinent, and necessary. Unfortunately, the literature regarding periodontal disease assessment, including the specific use of periodontal diagnostic procedures, radiographs, and the frequency of patient referrals to periodontists for specialty care is limited. The majority of studies discuss periodontal assessments practiced in other countries with few studies conducted in the United States.

A review of six studies assessed periodontal referral patterns, periodontal status at time of referral, and the quality of periodontal management.13,14,15,16,17,18 This literature indicated a lack of timely diagnosis and treatment of periodontal disease but provided insight regarding the adequacy of periodontal assessment protocols within general dentistry practices.13,14,15,16,17,18 Two additional studies conducted by Linden, Linden, Stevenson, & Burke revealed that dentists did not employ the necessary periodontal procedures on new patients resulting in under diagnosis of periodontitis.13, 14  Based on the analysis of the data obtained by Dockter, Williams, Bray & Cobb, the care received by patients within general dentistry practices was not altered based on the severity of disease. The authors expressed “that dentistry is failing to address issues of timely diagnosis, appropriate treatment, and/or timely referral for treatment.”14 This indicates the care received was less than standard, even for healthy patients. Research published in 2011 by Ghiabi & Weerasinghe investigated periodontal assessment and diagnostic protocols practiced by general dentists in Nova Scotia, Canada. There was a lack of periodontal probing or assessment leading to an underestimation as well as under diagnosis of periodontal disease. The authors emphasized the importance of continued research in this area with larger survey samples to validate their current findings. Additionally, the authors suggested future research of periodontal assessment techniques should evaluate the teaching methods presented to dentists and dental hygienists in educational settings.16

The purpose of this study was to survey Indiana dental hygienists’ awareness and utilization of the periodontal assessment procedures recommended by the AAP. The study also examined the relationships between the recommended AAP periodontal assessment procedures being routinely utilized in dental practices and education levels, experience, and employment status of practicing dental hygienists in Indiana.

**METHODS AND MATERIALS**

This study employed a quantitative approach using a cross-sectional survey design to examine the use of AAP periodontal assessment procedures practiced by dental hygienists in Indiana. A twenty-two item multiple choice survey was adapted from a previously validated survey instrument design, with permission from Dr. Edmond Ghiabi.15 The survey questions were revised with assistance from dental hygiene educators.

The survey instrument and an information letter explaining the purpose of the study were emailed to a convenience sample of 354 Indiana dental hygienists who are members of the American Dental Hygienists’ Association (ADHA). Electronic addresses were obtained with permission from the administrative board of the Indiana Dental Hygienists’ Association (IDHA). All participants were informed their participation was voluntary and anonymous with no other incentives intended other than contributing to dental hygiene literature. The study was approved by the Institutional Review Board (IRB) of University of Texas Health Science Center, San Antonio (HSC20130189E).

The survey was made available by anonymous link using Qualtrics™, an online survey website engine, which provides an anonymous Uniform Resource Locator (URL).

The survey instrument URL and information letter explaining the purpose of the survey were emailed to the participants. Three additional reminder emails were sent to participants. The survey remained open and available for three weeks. The data collected were coded and analyzed using descriptive and inferential statistics to show correlations among the variables.

**RESULTS**

One hundred thirteen (113) surveys were returned resulting in a 31.9% response rate. Participants’ demographic information is summarized in Table 1. The majority of respondents were full-time permanent employees who have been practicing dental hygiene for 1-9 years, primarily in one office. Education level of associate degree hygienists was reported at 37.5%, baccalaureate at 46.4%, master at 15.2%, and doctorate at .9%.

Participants were asked to note the periodontal assessment procedures they perform for adult recall patients. Procedures included:

* take radiographs
* perform periodontal probing
* evaluate and record clinical attachment loss
* evaluate recession
* perform extraoral and intraoral evaluations
* perform a thorough occlusal evaluation
* assess the presence, degree, and distribution of plaque and calculus
* assess gingival inflammation and,
* probe six sites per tooth

Frequencies are summarized in Graph 1.

Participants were also asked how often they assessed patient-associated risk factors for periodontal disease. These included: patient’s age, smoking habits, and other chronic systemic conditions associated with periodontal disease (Table 2). The majority of respondents either frequently or always assessed the following: patient’s age- 74.1%, smoking habits- 88.9%, and other chronic systemic conditions associated with periodontal disease--85.2%.

When participants responded to the following, “I am aware of the parameters of the comprehensive periodontal assessment as recommended by the AAP”, 78.5% either agreed or strongly agreed 15.9 % neither agreed or disagreed, and 5.6 % either strongly disagreed or disagreed. Participants were also asked if they performed the periodontal assessment procedures recommended by the AAP—64.1% either agreed or strongly agreed, 25.2% neither agreed nor disagreed, and 10.7% either strongly disagreed or disagreed (Graph 2).

After analyzing participants’ responses to the surveys, relationships between years of practice, employment status, education and demographics and the procedures performed were considered. Using SPSS software, Pearson’s correlations were run to determine if relationships existed between these variables.

Table 3 summarizes the relationships between demographic variables and periodontal assessment procedures performed by participants. The most significant correlations existed between employment status and performing periodontal probing. Of other significance were the relationships between the number of hours worked per week and performing periodontal probing and extraoral and intraoral evaluations. Other strong correlations existed between the number of hours worked per week and performing thorough occlusal evaluations and probing six sites per tooth. There was a strong correlation with levels of education and evaluating and recording attachment loss and recession.

Correlations were also found between demographic factors and assessing patient- associated risk factors of periodontal disease. One significant relationship was between length of time participants have been practicing dental hygiene and their assessment of patients’ smoking habits; hygienists who have practiced longer were more likely to assess patients’ smoking habits. There were no other significant correlations found among other demographics and the remaining risk factors.

Several significant correlations (at the 0.01 level, 2-tailed), were found between demographics and participants’ awareness and use of AAP assessment parameters. Most notably, employment status, number of hours worked per week, and level of education showed the strongest relationships with participants’ performing the AAP assessment procedures. Hygienists who were employed full-time and worked more hours per week were more likely to perform periodontal probing. Those hygienists who worked more hours per week more likely to perform extraoral and intraoral evaluations, perform thorough occlusal evalutions, and probe six sites per tooth. Additionally, as the education levels of the hygienists increased, so did the likelihood of evaluating and recording clinical attachment loss and recession. Relationships are summarized in Table 4.

**DISCUSSION**

The NHANES 2009-2011 reported 47.2% of the adult U.S. population are affected with periodontal disease, representing 64.7 million people.4,5  While the respondents appeared most often either frequently or always perform the periodontal assessment procedures recommended by the AAP, there is still a percentage who are never, rarely, or only occasionally performing these procedures, leaving a large number of patients who are still not receiving the standard of care necessary to assess, diagnose, and treat this destructive disease (Graph 1).

In addition to performing the periodontal assessment procedures, the AAP recommends dental professionals also assess patient-associated risk factors such as patients’ age, smoking habits, and other chronic systemic conditions associated with periodontal disease. Results show most hygienists are either frequently or always assessing these risk factors. However, 25.9% admit to either never, rarely, or only occasionally assessing patients’ age as a risk factor. Eleven percent never, rarely, or occasionally assess patients’ smoking habits and 14.8% either never, rarely, or occasionally assess other chronic systemic conditions affecting periodontal disease. In a state where almost 30% of the adult population smokes, not assessing this risk factor could have significant ramifications in terms of periodontal disease assessment and diagnosis.19

Moreover, there are 21.5% of hygienists who either strongly disagree, disagree, or neither agree or disagree to being aware of the periodontal assessment parameters recommended by the AAP. Almost 36% either strongly disagreed, disagreed, or neither agreed or disagreed to performing the periodontal assessment procedures recommended by the AAP. If this statistic was nationally applied, millions of adults are undiagnosed and have untreated periodontal disease creating significant oral and systemic health risks. This should be of great concern to dental professionals.

Upon analyzing the statistics, strong correlations were discovered between demographic factors and periodontal procedures performed. Respondents’ employment status showed a negative correlation with performing periodontal probing. This implies that dental hygienists who were either full- or part-time temporary employees were less likely to perform periodontal probing than those who were either full- or part-time permanent employees. This may indicate hygienists who are permanent employees are more vested in their patients’ health than those who are temporary employees or “subs”. Ultimately, in Indiana, a dentist is responsible for the policies, procedures, and routines of his or her practice.20 Therefore, having temporary employees who do not comply with this standard of care could pose a risk for the dentist and dental practice.

Other strong correlations exist between the number of hours hygienists work per week and performing periodontal probing, extraoral and intraoral evaluations, a thorough occlusal evaluation, and probing six sites per tooth. The more hours hygienists work per week increases the incidence of performing the procedures recommended by the AAP. Again, these results suggest hygienists who work more hours are more committed to the periodontal health of their patients. When reviewing the respondents’ education, hygienists with higher levels of education were more likely to evaluate and record clinical attachment loss and recession.

In addition to finding frequencies of participants’ awareness and performance of the recommended AAP procedures, relationships were found between these and demographic variables. Most significantly, employment status (full-or part-time), number of hours worked per week, and education levels had the strongest relationships with participants’ performing the AAP’s periodontal assessment procedures. Once more, these statistics may indicate hygienists who are full-time, permanent employees, with more education, may be more concerned with their patients’ periodontal health.

Despite the useful findings of this study, it is necessary to note potential limitations. The participants were all members of the IDHA, which only represents 354 of an estimated 4,900 hygienists in Indiana, 7% of licensed hygienists. While the information gained from this study is helpful, it may not be an accurate representation of the practices of all hygienists in Indiana. An additional study that includes all Indiana dental hygienists may produce more significant results. A second limitation is that all questions were only allowed a Likert scale response with no write-in answers. Some of the answers given may have been misleading since there were limited choices for each question. A third limitation is self-selection bias. Dental hygienists invited to participate were given an informational letter explaining the purpose of the study--to assess periodontal assessment procedures performed. If potential participants did not perform these procedures, they may have elected not to participate in the survey.21  Despite the limitations stated, the information gathered establishes a baseline of current practices and procedures regarding periodontal disease assessment among Indiana dental hygienists.

**CONCLUSIONS**

This study showed 78.5% of hygienists are aware of the recommended AAP periodontal assessment procedures, and 64.1% incorporate the AAP procedures into routine care. While the percentages of hygienists who are aware of and who are performing the recommended AAP procedures is good, room for improvement exists. However, in order for the CDC and other organizations such as the AAP and ADA to improve and sustain surveillance of periodontal disease, larger survey studies should be conducted to obtain a more accurate representation of what is being practiced by dental hygienists nationally.

The results of this study also revealed relationships between employment status, number of hours worked per week, education levels and many of the periodontal assessment procedures performed by Indiana dental hygienists. Although further research is necessary to validate this information, these results give insight to what factors may influence hygienists to perform the recommended AAP assessment procedures necessary to accurately assess and diagnose periodontal disease.

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**Table 1**

**Participant Demographics (N=113)**

|  |  |  |
| --- | --- | --- |
| Demographic Features | Participants | Percent |
| Years practicing dental hygiene  (n=113) | 1-9 Years | 43.4 |
| 10-19 years | 14.2 |
| 20-29 years | 12.4 |
| 30+ years | 30.1 |
| Number of offices employed  (n=113) | 0 (Retired or unemployed) | 6.2 |
| 1 | 65.5 |
| 2 | 20.4 |
| 3 | 1.8 |
| 4+ | 6.2 |
| Employment status, primary office  (n=107) | Full time, permanent | 57.9 |
| Part time, permanent | 33.6 |
| Full time, temporary | .9 |
| Part time, temporary | 7.1 |
| Hours employed in primary office  (n=107) | >10 hours | 12.1 |
| 10-20 hours | 20.6 |
| 21-30 hours | 17.8 |
| 30+ hours | 49.5 |
| Highest degree level completed  (n=112) | Associate’s | 37.5 |
| Bachelor’s | 46.4 |
| Master’s | 15.2 |
| Doctoral | .9 |

**Graph 1**

**Frequency table of periodontal assessment procedures performed on adult recall patients**

Survey Question: In regard to your adult recall patients, how often do you perform the following procedures?

**Table 2**

**Frequency table of assessment of patient-associated risk factors**

Survey Question: In regard to patient-associated risk factors of periodontal disease, how frequently do you assess the following risk factors?

|  |  |  |
| --- | --- | --- |
| Answer Options | Never/Rarely/  Occasionally | Frequently/Always |
| Patient’s Age | 25.9% | 74.1% |
| Patient’s smoking habits | 11.1% | 88.9% |
| Other chronic systemic conditions associated with periodontal disease | 14.8% | 85.2% |

**Graph 2**

**Frequency table of participant responses regarding AAP assessment parameters**

**Table 3**

**Relationships between demographics and periodontal assessment procedures performed**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | Perform perio probing | Evaluate and record clinical attachment loss | Evaluate recession | Perform extraoral and intraoral evualations | Perform a thorough occlusal evaluation | Probe six sites per tooth |  |  |  |
| What is your employment status in your primary office? | Pearson Correlation | -.298†† | -.124 | -.032 | -.134 | -.166 | -.102 |  |  |  |
| Sig. (2-tailed) | .002 | .208 | .744 | .177 | .093 | .311 |  |  |  |
| N | 105 | 104 | 104 | 103 | 103 | 101 |  |  |  |
| How many hours a week do you work in your primary office? | Pearson Correlation | .364†† | .163 | .091 | .271†† | .201† | .239† |  |  |  |
| Sig. (2-tailed) | .000 | .097 | .354 | .005 | .041 | .016 |  |  |  |
| N | 106 | 105 | 105 | 104 | 104 | 102 |  |  |  |
| What is your highest degree level of education completed? | Pearson Correlation | .005 | .229† | .221† | .097 | .080 | .062 |  |  |  |
| Sig. (2-tailed) | .960 | .016 | .020 | .317 | .411 | .525 |  |  |  |
| N | 111 | 110 | 110 | 109 | 109 | 107 |  |  |  |

†Correlation is significant at the 0.05 level (2-tailed)

††Correlation is significant at the 0.01 level (2-tailed)

**Table 4**

**Relationships between demographics and respondents awareness and use of AAP assessment parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | What is your employment status in your primary office? | How many hours a week do you work in your primary office? | What is your highest degree level of education completed? |
| I am aware of the parameters of the comprehensive periodontal assessment as defined by the American... | Pearson Correlation | -.111 | .140 | .361†† |
| Sig. (2-tailed) | .270 | .160 | .000 |
| N | 101 | 102 | 107 |
| I perform the periodontal assessment procedures, as defined by the American Academy of Periodontolog... | Pearson Correlation | -.336†† | .370†† | .294†† |
| Sig. (2-tailed) | .001 | .000 | .003 |
| N | 98 | 99 | 103 |

†Correlation is significant at the 0.05 level (2-tailed).

††Correlation is significant at the 0.01 level (2-tailed).