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Assessment of the Awareness of Dental Professionals Regarding Identification and Basic Management of Dental Patients with Systemic/Parafunctional conditions in a Routine SPT appointment\ u2026 A Survey

Camille Padilla

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**ASSESSMENT OF THE AWARENESS OF DENTAL
PROFESSIONALS REGARDING IDENTIFICATION AND
BASIC MANAGEMENT OF DENTAL PATIENTS WITH
SYSTEMIC/PARAFUNCTIONAL CONDITIONS IN A ROUTINE
SPT APPOINTMENT: A SURVEY**

BY

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THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Master of Science

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**ASSESSMENT OF THE AWARENESS OF DENTAL PROFESSIONALS WITH
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ABSTRACT

This study examined what New Mexico dentists have reported regarding the knowledge and confidence levels of dental hygienists in providing patient education on oral/systemic periodontal risk factors. Further examined were New Mexico dentists' views are on structured SPT protocols that include dentist/dental hygienist patient education on major risk factors for oral/systemic disease, and referrals and consultation with primary physicians. Members of the New Mexico Dental Association (n=700) were asked to participate in a 20-question online survey. Survey questions focused primarily on the level of risk assessment for periodontal disease that New Mexico dentists report dental hygienists discussing with periodontal patients. It was predicted that New Mexico dentists do not believe that dental hygienists are lacking in knowledge or confidence when it comes to providing patient education on major risk factors for periodontal disease. Most of the New Mexico dentists who responded to this survey (76%) reported satisfaction with the knowledge of and patient education provided by a

dental hygienist on all four of the risk factors studied (diabetes, cardiovascular disease [CVD], cigarette smoking, and parafunctional habits). Results indicated that parafunctional habits (bruxism) and occlusal appliance fabrication appear to be increasingly common links to supporting periodontal maintenance. No significant relationships were found in chi-square tests performed on demographic data—such as age and area of practice (rural vs. urban)—as being related to their experience and views on dental hygienist knowledge and structure in SPT protocols. Overall, New Mexico dentists support increasing education on periodontal risk factors and structured SPT protocols would be beneficial for a dental hygienist. Survey results reveal that 33% of New Mexico dentists witness dental hygienists with a 4-year degree have increased knowledge and confidence in discussing risk factors with periodontal patients, while 27% response said dental hygienist graduates from 4-year and 2-year study programs had equal amounts of knowledge and confidence. Positively, results showed New Mexico dentists' satisfaction with their dental hygienists' patient education, and support a team approach between dentist and dental hygienist for periodontal patient assessment.

TABLE OF CONTENTS

LIST OF TABLES.....	viii
CHAPTER 1 INTRODUCTION.....	1
Statement of the Problem.....	2
Hypothesis.....	2
Significance of the Problem.....	3
Operational Definitions.....	6
CHAPTER 2 REVIEW OF THE LITERATURE.....	8
Introduction.....	8
Associations between Periodontal Diseases and Diabetes.....	10
Coronary Heart Cardiovascular Disease.....	12
Cigarette Smoking and Periodontal Disease.....	14
Parafunctional Habits and Occlusal Conditions/Diseases.....	16
Dental Hygienist: Job Description.....	19
Job Description and Professional Roles in the Dental Team.....	19
Dental Hygienists' Knowledge on Risk Assessment and Education for Periodontal Disease.....	20
Conclusion.....	21

CHAPTER 3 METHODS AND MATERIALS.....	23
Research Design.....	23
Procedure.....	23
Human Subjects Addressed.....	24
Materials: Survey Instrument.....	25
Timeline.....	25
Sample Defined.....	26
Data Collection and Statistical Analysis.....	26
CHAPTER 4 RESULTS, DISCUSSION AND CONCLUSION	28
Assumptions.....	28
Limitations.....	28
Results.....	29
Discussion.....	45
Conclusion.....	49
CHAPTER 5 JOURNAL OF DENTAL HYGIENE ARTICLE SUBMISSION	54
Abstract.....	54
Purpose.....	54
Methods.....	54
Results.....	54
Conclusion.....	55

APPENDIX A: UNM HUMAN RESEARCH REVIEW COMMITTEE STUDY	
PROTOCOL APPLICATION	71
APPENDIX B: HRPO APPROVAL LETTER (STUDY ID #14-291).....	77
APPENDIX C: SURVEY INSTRUMENT	78
APPENDIX D: UNM HRPO APPROVED CONSENT FORM.....	82
REFERENCES	83

LIST OF TABLES

Table 1. Frequencies for Area of Practice	29
Table 2. Frequencies for Age Category	29
Table 3. Frequencies for Gender	30
Table 4. Frequencies for Type of Practice	31
Table 5. Frequencies for the Question: “How satisfied are you with the knowledge and recommendations of a dental hygienist when discussing the inflammatory response and tissue damage caused by cigarette smoke?”	32
Table 6. Frequencies for the Question: “For your patients with diabetes, does the dental hygienist inquire with the patient about their HbA1c levels and discuss with the patient the relationship between diabetes and periodontal disease?”	33
Table 7. Frequencies for the Question: “Do your SPT appointments include discussion of increased gingival bleeding as a sign of inflammation that may be related to elevated blood glucose levels and systemic inflammation?”	33
Table 8. Frequencies for the Question: “Are you satisfied with the knowledge and recommendations a dental hygienist has when discussing a bruxism/clenching habit with patients?”	34
Table 9. Frequencies for the Question: “Are parafunctional habits/occlusal discrepancies/bruxism/clenching evaluated at SPT appointments?”	35
Table 10. Frequencies for the Question: “What percentage of patients in your office would you estimate having made some type of occlusal/TM joint appliance for?”	35
Table 11. Frequencies for the Question: “Would you estimate that within the last five years, your recommendations for occlusal appliances have increased?”	36
Table 12. Frequencies for the Question: “How often are health questionnaire/ medical history and blood pressures measured by a dental hygienist?”	37
Table 13. Frequencies for the Question: “Does your office refer patients to their primary physician to evaluate for inflammatory markers in the presence of periodontal disease or non-responsive periodontal disease?”	38

Table 14. Frequencies for the Question: “Select two topics/risk factors (other than plaque control) that you would most likely ask your dental hygienist to educate periodontal patients on.”	38
Table 15. Frequencies for the Question: “How would you rate the SPT protocol in your practice?”	40
Table 16. Frequencies for the Question: “Do you feel having a specific protocol with risk assessment for dental hygienists to address at each SPT appointment would be more understandable for a patient, and possibly increase patient motivation?”	40
Table 17. Frequencies for the Question: “Do you feel dental hygienists need more training on communication strategies for discussing oral/systemic links with patients?”	41
Table 18. Frequencies for the Question: “Do you think experience contributes to a dental hygienist’s knowledge on risk factors/predictors for periodontal disease?”	41
Table 19. Frequencies for the Question: “Have you experienced any significant difference in the amount of knowledge and confidence in a 4-year (Bachelor) degree vs. a 2-year (Associate) degree graduate dental hygienist?”	42
Table 20. Frequencies for the Question: “Who do you prefer to communicate mostly with patients on oral/systemic links to periodontal disease?”	43
Table 21. Chi-Square Data	44

CHAPTER 1

INTRODUCTION

Research has suggested a link between oral health and systemic health.¹ Previous and current studies aim to explore the education provided to students and health providers on subjects of oral/systemic health. Because oral health plays a large role in a patient's overall health, as well as immune/inflammatory responses, dental/dental hygiene curricula and continuing education prepares dental hygienists and dentists to clinically treat and educate patients on the causes and risk factors for periodontal disease.² Considering all the roles carried out by professionals in the dental field of practice, a dental hygienist has a ample opportunity to educate patients on the risk factors/indicators for periodontal disease. A dental hygienist is a licensed provider who specializes in preventive oral health, examines patients for signs of oral disease, and educates patients on ways to improve and maintain good oral health.² A license to practice dental hygiene in the U.S. is obtained through clinical and didactic education either through a associate's degree or a bachelor's degree program of study. Upon completion of this program of study, dental hygiene graduates must successfully pass national, and state dental board examinations for licensure.

A survey conducted on North Carolina dental hygienists reported that the conditions dental hygienists are likely to discuss with patients include tobacco use, pregnancy, and genetics.^{4,6,8} Furthermore, dentist's were noted to be more likely to assess for risks and discuss systemic health issues, as well as discuss parafunctional and/or occlusal trauma/disease with their patients.^{5,8}

Previous studies have been conducted exploring the perceptions of professional roles and identities in the dental team.¹⁰ These studies reveal that patients benefit most when the roles and expectations of dentist and dental hygienist are communicated and maximized to lend all of their individual expertise.¹⁰ There were no studies in the literature review that answered whether or not dentists view dental hygienists as effective educators on risk factors for periodontal disease.

Statement of the Problem

Do New Mexico dentists believe that improvements are needed in dental hygiene education to prepare a dental hygienist to provide patient education on risk assessment for periodontal disease?

Hypothesis

Members of the New Mexico Dental Association have observed that there is adequate knowledge and effective communication strategies from dental hygienists on patient risk assessment for periodontal diseases, including diabetes, cigarette smoking, cardiovascular disease, and parafunctional conditions. As oral/systemic diseases continue to correlate, additional curricula and continuing education for a dental hygienist on these risk factors is essential.

Significance of the Problem

Treatment and prevention of periodontal diseases are most successful with an accurate diagnosis, reduction or elimination of causative agents, and risk management of the individual patient.² Past research conducted has shown overall findings indicating that dental hygienists need more education about diabetes and its link to periodontal disease. Approximately 25-50% of North Carolina hygienists stated they had some knowledge, but that with the growing research in oral/systemic links, and additional factors affecting periodontal disease, an increase in dental hygiene curricula and continuing education on these topics would be beneficial.^{5,9} While treatment of periodontal disease may encompass a variety of procedures (surgical and non-surgical) designed to restore health to the periodontium, non-surgical therapy remains the primary defense of care. Non-surgical Periodontal Therapy (NSPT) is the removal of plaque and calculus by controlling the growth of harmful bacteria and treating conditions that encourage gum disease.¹ NSPT includes scaling and root planing, possibly adjunctive antibiotic therapy, and occlusal adjustments. Dental biofilms are the number one and most recognized causative agent in periodontal disease.² Studies suggest that the goal of NSPT is to control microbial periodontal infection by removing biofilm, calculus, and toxins from periodontal-involved root surfaces, thus helping to establish a periodontium free of disease.⁶ Dental hygienists are clinically educated on the fundamentals of NSPT and must successfully perform a number of patient cases of NSPT while in their clinical training. NSPT alone does present with limitations, such as long-term

maintenance of deep periodontal pockets.⁶ This presents the area where patient assessment and patient education on periodontal risk factors completes periodontal therapy, and increases the incidence of healing and maintenance of the periodontium. Past research indicated lower levels of knowledge in some topics of systemic disease risk factors for periodontal diseases such as diabetes, and suggests the need for formal training for dental hygienists in addressing expanded risk factors and indicators for periodontal diseases.^{5,8,12} According to 2013 data from the U.S. Government Accountability Office (GAO), approximately 40-50% of the U.S. population visits a dental office at least once a year.⁵ Because the dental hygienist may treat the patient multiple times in a year, particularly through Supportive Periodontal Therapy, the dental hygienist can play a primary role in performing risk assessment for oral disease.⁵

Post NSPT, supportive periodontal maintenance (SPT) is imperative for long-term success of periodontal treatment.¹ Supportive Periodontal Therapy is defined as the continuous diagnostic monitoring of the patient in order to intercept with adequate therapy and optimize the therapeutic intervention tailored to the patient's needs.¹ Studies support the idea that most patients who have regular compliance with SPT visits are less likely to experience tooth loss.^{2,3,5} SPT appointments are most effective when they are focused and comprehensive.^{2,5} The main objectives of SPT are to: 1) prevent or minimize the recurrence and progression of periodontal disease in patients who have been previously treated for gingival diseases; 2) prevent or reduce the incidence of tooth loss by monitoring the dentition and any prosthetic replacement of the

natural teeth; and 3) increase the probability of locating and treating other diseases or conditions found within the oral cavity.^{2,3,4}

In addition to the clinical skills in periodontal maintenance aimed at plaque and biofilm control, SPT has a patient assessment and patient education component on the systemic and parafunctional risk factors associated with periodontal diseases as well. Dental parafunction is described as habitual exercise, or uses of the mouth, tongue, and jaw. Oral parafunctional habits may include bruxism (tooth-clenching or grinding), tongue thrusting, and mouth breathing.¹⁵ Detection of teeth affected by parafunctional habits may also be referred to as “occlusal disease.” Bruxism/occlusal disease can accelerate bone loss and pocket formation depending on the presence of local irritants and inflammation.^{15,16} The amount of pressure created through bruxism can inflame the periodontal ligament of a tooth and subsequently cause mobility and irritation.¹⁶ In an effort to prevent periodontal trauma from parafunctional habits, “occlusal therapies,” which include fabrication of occlusal mouthguards (bite-guards) and/or occlusal (bite) adjustments, are often a component in SPT.¹⁵ These therapies aim to reduce the amount of damage to an affected tooth or teeth by reducing the amount of pressure created from heavy tooth-to-tooth contact, and in some cases, create awareness so that a patient may somewhat retrain themselves to stop bruxing.^{15,16}

Due to the amount of research that associates periodontal diseases and systemic disease, it is imperative that dental patients receive adequate education and treatment on both systemic and parafunctional conditions which possibly

affect their oral health. Diabetes type 1 and type 2, cardiovascular disease (CVD), and cigarette smoking are among the highest risk factors for periodontal disease and non-responsive periodontal treatment.^{2,7} All three of these risk factors share the inflammatory and vascular abnormalities of periodontal disease, and thus it is important that dental hygienists familiarize themselves with the oral/systemic health links.⁷ A decrease in host response, such as the impairment of defense cells like neutrophils, is seen in both diabetic persons as well as cigarette smokers. With impaired host response, destruction of bacteria associated with periodontal diseases is altered.³ Similarities are seen in individuals with cardiovascular disease, in which impairment of host response lends to entry of toxins into the bloodstream, and an increase in inflammatory markers such as alveolar macrophages, which alter the function of immune cells.^{11,13} The increase of white blood cells and other defense cells can lead to arterial thickening and risk of cardio/thrombotic events.¹³ More research appears to be needed describing which risk factors need education—and have a higher incidence or prevalence—and evaluations and assessments on how effective dental hygiene is for patient risk factor assessment and a dental hygienist's role in interprofessional care.

Operational Definitions

1. Periodontal Diseases: A group of diseases that affect the tissues that support and anchor the teeth.

2. Supportive Periodontal Therapy (SPT): Started after completion of active periodontal therapy, and continues at varying intervals for the life of the dentition. The phase of periodontal therapy during which periodontal disease and conditions are monitored and etiologic factors are reduced or eliminated.
3. Non-Surgical Periodontal Therapy (NSPT): An integral part of periodontal treatment that has been defined as plaque removal, plaque control, supragingival and subgingival scaling, root surface debridement, and the adjunctive use of chemical agents.
4. Dental Occlusion: The relationship between the maxillary (upper) and mandibular (lower) teeth when they approach each other, as occurs during chewing or at rest.
5. Cardiovascular Diseases: A group of disorders of the heart and blood vessels that include coronary heart disease, disease of the blood vessels supplying the heart muscle, and disease of the blood vessels supplying the brain.
6. Inflammation: A localized physical condition in which part of the body becomes reddened, swollen, hot, and often painful, especially as a reaction to injury or infection.
7. Parafunctional Habits: A habitual exercise of a body part in a way that is other than the most common use of that body part; used by dental and maxillofacial specialists to refer to parafunctional uses of the mouth, tongue, and jaw.

CHAPTER 2

REVIEW OF THE LITERATURE

Introduction

The maintenance of periodontal disease includes assessing and educating patients on areas that cause, or may predispose a patient to periodontal disease. Review of the literature showed diabetes, cardiovascular disease, smoking, and parafunctional/occlusal disease to be among the most common risk factors for periodontally-involved patients.³ Along with clinical skills of scaling and root debridement, a major role of a dental hygienist's job description includes assessments of oral health, review of health questionnaires, counseling patients on food/nutrition/oral/systemic disease links and their impact on oral health, as well as identifying possible risk factors/indicators for periodontal disease.¹⁸

Past research indicates that while the majority of dental hygienists reported that they are somewhat confident in discussing and educating patients on oral/systemic relations, the results of these studies show that more education regarding systemic risk factors for periodontal disease is needed for dental hygienists.^{9,17} In particular, a study published by the *Journal of Dental Education* in 2012, conducted by Kathryn Bell et al., documented a survey conducted on North Carolina dental hygienists concerning practice behaviors regarding, and barriers to providing, oral/systemic health information. This study revealed that dental hygienists were found to be comfortable discussing systemic health issues with their patients—including referring patients to a medical doctor—but that the

dental hygienists were much less likely to take an active role (e.g., performing fingerstick to assess blood glucose levels). Barriers to implementing oral/systemic counseling cited by the dental hygienists participating in the survey included: patient objections to additional fees, concerns over legal risks, and lack of time. The survey questions focused on systemic health conditions (diabetes, cardiovascular disease, and respiratory disease) as they relate to periodontal disease. Results suggested that the three most frequently identified risk factors for periodontal disease were poor oral hygiene, smoking, and oral bacteria. More than 90 percent of the survey participants correctly identified diet, genetics, smoking, obesity, and high blood pressure as risk factors for periodontal disease. In addition, 77% agreed that they thoroughly assess patient risk for systemic disease as it relates to their oral condition. Most (94%) had thorough knowledge regarding some areas of systemic health. The results stated that the number one risk factor they would like more education on is diabetes.

Education and basic knowledge/facts about the link between periodontal disease and parafunctional/occlusal disease appears to be needed for a dental hygienist as well. There were no significant studies that indicated a dental hygienist included patient education on occlusal disease as a common risk factor for periodontal disease; however, some earlier studies suggest there are associations between trauma from occlusion and periodontal disease. A review article by M.E. Gher indicates that occlusal forces can cause changes in the alveolar bone and periodontal connective tissue.²¹ These changes can affect tooth mobility and probing depths. Statistically greater gains in clinical periodontal

attachment level have been reported with occlusal adjustments; however, tooth mobility results from a variety of factors. Therefore, occlusion is not defended as a cofactor in progression of inflammatory disease.¹⁵ Other study results suggest that the purpose of occlusal guards and occlusal adjustments is to eliminate trauma from occlusion to periodontal ligament, and stabilize mobile teeth.¹⁵

A section of research was also reviewed to identify the level of existing education and knowledge dental hygienists felt they received in their dental hygiene education curricula on interprofessional care.^{5,9,17} The study on North Carolina dental hygienists from Kathryn Bell et al., 2012, revealed that dental hygienists are not sure of their role in interprofessional care. Dental hygienists in this study reported that they would be more willing to collaborate with other medical professions if they had a better understanding of what was expected of them, and what other medical professionals knew about oral disease.^{5,9} More research appears to be needed describing which risk factors have a higher incidence or prevalence and would require more patient education from the dental hygienist. Diabetes was the number one risk factor that dental hygienists reported wanting more education.

Associations between Periodontal Diseases and Diabetes

A significant group of patients with periodontal disease present with other inflammatory conditions such as diabetes.^{9,10,11} It is accepted that periodontal disease is increasingly prevalent and more severe in persons with type 1 and type 2 diabetes than in non-diabetic persons.⁹ Periodontal disease is accepted

as one of the diabetic complications by its high prevalence and severity in diabetic patients.¹⁰ The methods by which hyperglycemia induces periodontal destruction have not yet been shown. The biological relation is based on diabetes-related features, such as inflammatory response abnormalities, vascular abnormalities, and the patterns of bone destruction and repair.^{9,10} A reduction in host response and the body's defense mechanisms associated with diabetes increases susceptibility to periodontal disease, and prevents bacterial destruction.¹⁰ Additionally, there is a bi-directional relationship between periodontal disease and diabetes.^{10,11} Inflammation and an uncontrolled state of one of these conditions can increase the chances of the other one being uncontrolled.¹⁰

Since 1960, over 60 studies have been conducted examining the relationship between oral infection and glycemic control among diabetic patients.^{3,8,9} However, according to a study conducted by Lopes et al., most (79%) certified diabetes educators (CDEs) have not received formal oral health education.^{8,9} There are few ways in which dental hygienists can help educate these patients through SPT appointments. Dental hygienists—having a very small and basic knowledge to inquire with a patient about their most recent HbA1c level or blood glucose level—can gain insight as to why periodontal disease in some patients may not be responding or may be worsening post non-surgical periodontal therapy (NSPT).¹⁰ HbA1c is defined as glycosylated hemoglobin. It develops when hemoglobin, a protein with red blood cells that carries O₂ throughout the body, joins with glucose in the blood, becoming

glycated.^{10,11} Red blood cells in the human body survive for 8-12 weeks, so measuring glycated hemoglobin or A1c can be used to reflect average blood glucose levels over time, providing a useful longer-term gauge of blood glucose control.¹⁰ Blood glucose levels differ from HbA1c because they are the concentration of glucose in your blood at a single point in time.^{10,11} Several studies have shown significantly decreased levels in HbA1c following NSPT and regular SPT/maintenance appointments.^{3,5,10}

Through communicating and inquiring with both diabetic patients and non-diabetic patients about these test numbers, periodontal disease and overall health may be better maintained.^{9,10} In patients who have no known diagnosis of diabetes, but who may exhibit excess tissue inflammation and bleeding post NSPT, education on medical/diabetic tests may bring to light a very important contributor to systemic inflammation.^{5,9}

Coronary Heart Cardiovascular Disease

Some data are lacking in the causality between periodontal disease and cardiovascular disease (CVD) risk; however, associations exist between the two.^{11,12} Periodontal disease involves inflammatory activities which induce the production of proinflammatory cytokines and the destruction of the epithelium. This allows the entry of toxins into the bloodstream, which may contribute to atherogenesis and thromboembolic events.^{11,13} According to a study conducted by Rastogi, periodontal treatment performed through meticulous scaling and root planing that included oral hygiene instruction resulted in a significant decrease in

BOP and PD.¹² Periodontal treatment also lowered the serum inflammatory markers, C-reactive proteins, and white blood cell counts in patients with coronary artery disease.^{6,11,12} A further study published by the *European Journal of Preventive Cardiology* aimed to assess indicators of periodontal disease and associations with CVD risk factors.¹³ This study concluded that less tooth loss was associated with lower levels of glucose, low-density lipoprotein (LDL) cholesterol, and systolic blood pressure.¹³ Studies have also linked chronic dental infections such as periodontal disease to myocardial infarction (MI), especially in patients with a history of AMI (Acute Myocardial Infarction).¹³

C-reactive protein (CRP) is a substance produced by the liver that increases in the presence of inflammation in the body. Elevated CRP levels identified during blood tests are considered non-specific “markers” for disease.¹¹ Awareness and basic educational background on research studies focusing on the correlation between CVD and periodontal disease will prepare the dental hygienist to educate patients and encourage routine medical check-ups.³ Correlating information may include studies in which periodontal therapy (non-surgical) reduced cardiovascular markers. Common markers of CVD include arterial stiffness, systolic and diastolic blood pressure, and plasma levels of C-reactive protein, fibrinogen, and interleukin-6. Periodontal therapy has been shown to greatly reduce levels of each of these, lowering cardiovascular risk.^{12,13,14}

Cigarette Smoking and Periodontal Disease

Cigarette smoking has long been suspected to be associated with periodontal disease. Over the last two decades, experimental evidence has indicated that cigarette smoking is probably a true risk factor for periodontal disease.^{16,17}

Studies indicate that past smokers have lower levels of risk for periodontitis compared to current smokers, and this is considered to be the strongest available evidence that smoking cessation will result in improved periodontal health. In addition, studies indicate that smoking cessation counseling should be a part of comprehensive periodontal therapy and prevention.¹⁷

Periodontal therapies such as scaling and root planing, oral hygiene instruction, adjunctive anti-microbial therapy, access flap surgery, and different reconstructive procedures such as guided tissue regeneration and bone grafting have all been associated with notable improvements in periodontal outcomes. However, in comparison to the results obtained in non-smokers on those same parameters, the outcomes were significantly reduced in smokers.^{17,18} Results of studies indicate that the observed *P.gingivalis*, *Actinobacillus actinomycetemcomitans* (*A.a*), and *Bacteroides forsyntus* elimination from the dentition of smokers was less than half that observed in non-smokers.¹⁸

Evidence suggests that many of the adverse systemic consequences of chronic smoking might be due to its effects on and suppression of the immune-inflammatory system.^{17,18} Exposure to cigarette smoke increases the number of alveolar macrophages, the body's first line of cellular defense against pollutants and microbial agents, which produce proinflammatory mediators, thus increasing

inflammation and tissue damage. Many related adverse effects of exposure to cigarettes might result from the ability of cigarette smoke to interfere with the immune-inflammatory system.^{18,19} The activation of resident cells and the recruitment of inflammatory cells (caused by smoking) leads to release of proinflammatory markers which alter the function of immune cells. Furthermore, smoking has been shown to impair revascularization during soft and hard tissue wound healing, which is critical for periodontal procedures.¹⁹

Most studies show that although effects of smoking on inflammatory markers may persist for many years, the majority of the adverse health effects of smoking are reversible.^{17,18,19} If periodontal disease has been shown to have increased healing and stability through less clinical attachment loss, and decreased probing depths even in previous smokers who have quit, it is essential that dental hygienists include smoking cessation and counseling as part of SPT.¹⁹ Educating patients on the “whys” of smoking as a risk factor for periodontal disease—including the role of inflammation and its adverse effects on healing post scaling and root planing, as well as the reversibility of the gingival inflammation and repair of periodontal tissue upon smoking cessation—may be motivational for periodontal patients who are cigarette smokers. Past studies show that many dentists claim to advise most of their patients on tobacco cessation, but few provide cessation counseling.¹⁹

Parafunctional Habits and Occlusal Conditions/Diseases

In addition to assessing and treating the bacterial component of periodontal disease, a critical component of SPT involves assessing the occlusal functions and habits of a patient.¹⁵ Dental occlusion is defined as the manner in which top and bottom teeth come into contact with one another, whether at rest or while chewing.¹⁶ Malocclusion is defined as teeth that are misaligned and do not fit together properly.¹⁶ The role of trauma from occlusion and pathogenesis of periodontal disease is not fully understood, but a few conclusions can be made from available evidence. Past studies have suggested the following facts:

- 1) trauma from occlusion does not initiate or aggravate marginal gingivitis or initiate periodontal pockets;
- 2) it can cause increased tooth mobility;
- 3) active trauma tends to accelerate bone loss and pocket formation depending on the presence of local irritants and inflammation;
- 4) trauma may be continued by bruxism (clenching or grinding); and
- 5) it plays a role in the pathogenesis of early to moderate periodontal disease.^{14,15}

Occlusal function/parafunction should be addressed at each SPT appointment. Detection and correction of occlusal trauma at generalized or localized sites may contribute to more complete periodontal health for the patient.¹⁵ The first principle in SPT, in which etiologic factors include occlusal trauma/parafunction, is still to eliminate and control plaque, and then address the occlusal factors. An exception to this is only if the patient is experiencing

discomfort related to occlusion, in which delay of treatment may have a negative effect on later treatment.¹⁵ A few specific modalities have been studied and are applicable as part of SPT/periodontal treatment, including: 1) orthodontic treatment, 2) temporary splinting, 3) bite plane/occlusal guards, 4) occlusal adjustment, 5) restorative dentistry, and 6) splinting (long term).¹⁴

Some adults may consider orthodontic treatment a longer-term commitment. It should not be considered a routine preventive procedure in periodontics.¹³ Examples of some cases in which orthodontic treatment may enhance healing and increase optimal results of periodontal therapy include: cases where an anterior crossbite with an unstable jiggling in occlusion exist; cases where uprighting tipped teeth may reduce periodontal pocket depth and aid in plaque control; and cases involving an extensive open bite with contacts only on the last molars. All of these situations have been associated with periodontal problems.^{14,15}

Patients with orthodontic crowding or malocclusion should be educated on the possible benefits of orthodontics to optimize periodontal healing, health, and stability.^{14,16} Bite or occlusal guards are an adjunct to SPT therapy. The purpose is to eliminate trauma from occlusion, bruxism, TM joint or muscle pain, as well as to stabilize mobile teeth.¹⁵ The occlusal appliance decreases the occlusal load for single teeth.¹⁶ If periodontal patients present with flattened occlusal surfaces of posterior teeth, or deformations or abfractions that occur to teeth and bone, occlusal parafunction/disease should be discussed. The unique wear and loss of tooth surface seen with abfraction has been a controversy among dental

professionals for years.¹⁶ A probable explanation that has been passed on to patients is toothbrush abrasion.¹⁶ This a large area of change in education in which dental professionals have discovered other scientific reasons to support tooth enamel abrasion and shedding.¹⁶

Periodontal trauma from occlusion can be assessed clinically and radiographically.¹⁵ Occlusal trauma often will present in localized, specific sites which should be eliminated to have a healthy masticatory system.¹⁶ A study by Deschner et al. states that periodontal disease is an inflammatory disease.²² Periodontal regeneration remains an often unpredictable challenge due to a number of unknown factors. EMD-enamel matrix derivative (brand name Emdogain™) is a protein used in periodontal therapy for the purpose of improving periodontal attachment. This study showed that in the presence of an inflammatory environment and biomechanical forces, beneficial effects of EMD decreased significantly. Occlusal loading of EMD-treated teeth immediately following surgery should be minimized for optimal results.²⁰ Furthermore, patients who wore some type of occlusal guard in the presence of periodontal lesions and occlusal trauma had statistically greater gains in clinical periodontal attachment level.²⁰ Occlusal adjustment procedures should be based on a definite diagnosis of a traumatic lesion through radiographs, inflammation, and tooth mobility.¹⁶ If occlusal forces can be optimized for the remaining teeth, the better the functional result of the periodontal treatment, and less chance for increased mobility.^{15,16}

Dental Hygienist: Job Description

As defined by the ADA (American Dental Association), some of the services provided by a dental hygienist include: screening procedures, assessments of oral health, review of health questionnaire, oral cancer screening, removing calculus and plaque from teeth, counseling patients about food nutrition, oral/systemic disease links and their impact on oral health, and teaching patients about strategies to maintain oral health, i.e., tooth brushing, flossing, and identifying possible risk factors/indicators for periodontal disease.¹⁸ The definition of services provided by a dental hygienist is not limited to clinical therapies such as calculus removal; therefore, patient education and counseling on oral/systemic health/periodontal risk factors can have a large impact on patients' post healing results and periodontal maintenance.

Job Description and Professional Roles in the Dental Team

Studies have been conducted that explore the perceptions of professional roles and identities in the dental team.¹⁷ If dental team members are clear of each profession's roles, then they are more likely to refer the patient to the dentist or dental hygienist.¹⁷ Good communication skills between dentist and dental hygienist about their roles and expectations will be much more valuable to patients. A good working relationship between dentist and dental hygienist is essential in practicing this comprehensive approach to periodontal patient care. This is a relationship of trust and mutual respect. When both parties understand

that the dental hygienist can share a lot of patient education and soft tissue expertise, both the patient and the practice will benefit.¹⁷

A variety of skills are required in successful management of periodontal disease, including clinical, communication, education, and motivation of patients. Time and education are required to treat the condition properly. A dental hygienist can spend the time to educate patients on risk factors/indicators and their roles in helping manage periodontal disease.

Dental Hygienists' Knowledge on Risk Assessment and Education for Periodontal Disease

Associations between periodontal and systemic health have been well established; however, there is little evidence pertaining to dental hygienist knowledge of the oral/systemic link. A previous study/survey of practicing North Carolina dental hygienists generally reflected thorough knowledge regarding some areas of systemic health, and a smaller percentage (between 24-50%) were able to correctly identify the risk factors for oral/systemic diseases.¹⁷ No significant studies were found that identified a dental hygienist's knowledge or education on the benefits of occlusal therapy for parafunctional habits and periodontal disease. As more is understood about the association between oral disease and systemic conditions, it seems that those in the dental profession need to refresh and increase their knowledge on these correlations.

While the majority of dental hygienists reported that they are somewhat confident in discussing and educating patients on these oral/systemic relations

and conditions, the results from this study indicate that more education regarding systemic diseases is desired for dental hygienists.¹⁷ The results of this study and other future studies could have an impact on dental education through the content included in the dental hygiene program curricula, and in continuing education on the oral/systemic link and risk factors related to periodontal disease, and this aspect of their patient's mouth.

Conclusion

In addition to plaque control and oral hygiene instruction, there are systemic and parafunctional relations to prevention and stabilization of periodontal diseases. An increasing correlation between oral and systemic health has become a larger part of the dental hygiene professional's education. A dental hygienist can play a vital part in providing and educating the public on additional and compounding risk factors, indicators, and predictors for periodontal disease. With as much as 70% of the population visiting a dentist at least once per year—and even more frequently with periodontal patients—a dental hygienist has a solid opportunity to educate patients. Good communication between dentists and dental hygienists about the roles and expectations of one another can maximize their expertise and prove very valuable to patients. With basic knowledge of the research studies, as well as text curricula on the links between systemic/parafunctional problems and periodontal health, a dental hygienist can be equipped with the proper questions and conversation to offer adjunctive therapies and resolutions to improving oral and overall health. In educating dental hygiene students and

practicing dental hygienists through continuing education, both knowledge and communication skills can be strengthened. There are many aspects of this topic that need further investigation in order to evaluate how dental hygienists are educated on comprehensive periodontal/systemic health and whether or not they are viewed by a dentist as being competent to communicate and, in some cases, apply adjunctive therapies to a periodontal appointment.

CHAPTER 3

METHODS AND MATERIALS

Research Design

The scope of this descriptive study is to survey a group of New Mexico dentists to research their attitudes on their experience with dental hygienists training on incorporating a multi-factorial approach to SPT. Goals will be to identify:

a) dentists who will report that their dental hygienists are doing adequate or above adequate work; b) dentists who will report asking that dental hygienists increase their education, knowledge, and communication skills on risk assessment for periodontal disease; or c) dentists who prefer to discuss these issues with their patient, while the hygienist's duties focus only on clinical therapies. The information gained from this study will aid dental practices/settings in utilizing a dental hygienist to formulate periodontal protocols involving risk assessment. The results of this study could inform dental hygienists on which risk assessment topics are most relevant to focus their continuing education on, and inform dental hygiene educators to incorporate into their curricula presentations and lectures on areas of periodontal risk assessment education that may need enhancement.

Procedure:

A recruitment letter explaining the survey was first sent to all NMDA members. A second e-mail was sent following the recruitment letter containing informed consent and a link to the survey. The e-mail containing the survey link was sent

out on November 3, 2014. A descriptive approach for this research design was conducted through a survey using the Psych Data survey software. The survey inquired about the experiences of New Mexico dentists regarding the abilities of dental hygienists to educate patients on risk factors for periodontal disease. All of the questions were in multiple-choice format, covering four of the major risk factors for periodontal disease: 1) diabetes, 2) cardiovascular disease, 3) cigarette smoking, and 4) parafunctional habits like bruxism.^{4,6,10} Also included were questions inquiring as to how dentists view dental hygienist knowledge and communication skills with patients on these topics during SPT, whether the degree level of a dental hygienist affects knowledge on periodontal disease risk factors, and additional demographic questions.

Human Subjects Addressed

This research/survey was determined “exempt” and was approved by the University of New Mexico School of Medicine’s Human Research Protection Office HRPO #14-291, not subject to continuing review (**APPENDIX B**). The survey link and the approved and stamped consent documents from HRRC (**APPENDIX D**) were e-mailed to all New Mexico Dental Association (NMDA) members via NMDA. An invitation to participate was sent to each member, and it was also advertised on the NMDA’s Facebook page. By clicking on the link, the participants were consenting to take the survey. Survey questions were strictly anonymous. The electronic survey was designed to hide the IP addresses of the participant’s computer or mobile device from the primary investigator, adding

privacy. Once completed, the participant was advised to close their browser window to remove the survey from their browser. Participants were also allowed to exit and discontinue with the survey at any point they chose.

Materials: Survey Instrument

The survey instrument was a 20-question electronic survey designed to measure descriptive statistics on New Mexico dentists' attitudes and experiences regarding the ability of dental hygienists to educate patients on risk factors of periodontal disease (**APPENDIX C**). Using an electronic survey presents the researcher with many benefits, including reduced cost and time, quick response, and the ability to survey a large population.¹⁸ The main disadvantages are limited sampling (i.e., respondents must have computer access) and low response rate from "survey saturation" due to constant e-mails soliciting questionnaires and surveys.¹⁸

Timeline

The research was approved by the University of New Mexico's Health Science Center Human Research Protection Office (HRPO) on October 22, 2014 (**APPENDIX B**). The survey was e-mailed to the target population on November 3, 2014, and the survey was available for an 18-day period ending on November 20, 2014. At completion of the survey, the data were processed and analyzed with aid and statistical counseling from a University of New Mexico statistical counseling group.

Sample Defined

The sample includes all New Mexico dentists who, as of November 3, 2014, are current members of the New Mexico Dental Association. This sample includes approximately 700 New Mexico dentists.

Data Collection and Statistical Analysis

The online survey data were collected through the Psych Data survey software in the form of a spreadsheet, which were then transferred into a statistical program R. Response rate for this survey was about 5%, 37/700.

Descriptive data collected included demographic information on age, gender, place of practice (rural vs. urban), and type of practice (general vs. specialty). Additional data were collected regarding adequacy of SPT protocols; level of satisfaction on dental hygienist knowledge and recommendations pertaining to the risk factors of diabetes, cardiovascular disease, and smoking; satisfaction with dental hygienist knowledge and evaluation of parafunctional (bruxism) habits; current percentages of periodontal patients wearing some type of occlusal appliance; what is communicated to patients in terms of increased bleeding or blood pressures; and finally, which risk factors dentists feel need most recognition. Frequency distribution plots were created through R for each of the 20 survey questions to present an overview of the data.

Inferential data was used to determine if any relationships existed between variables. Chi-square tests were run on any relationships/associations between:

- 1) dentist area of practice and their attitudes on whether dental hygienists need increased education on risk factor communication strategies;
- 2) dentist age category and their preference on how patient communication is conducted, and
- 3) dentist area of practice and their attitude on the importance of a specific periodontal protocol to increase patient understanding and motivation.

CHAPTER 4

RESULTS, DISCUSSION AND CONCLUSION

Assumptions

1. Dentists observe that dental hygienists do or do not always contribute knowledge on extended relations to periodontal disease.
2. Dentists will take the time to accurately answer each question.
3. Dentists interviewed examine SPT patients regularly every 3-4 months and more than once per year.

Limitations

1. Dentists may not be in agreement with the dental hygienist discussing topics such as “occlusal therapies.”
2. A small study group, sample size, will result in only reflecting the views of some dentists practicing in New Mexico, and only members of the New Mexico Dental Association.
3. A survey consisting of only 20 basic questions regarding dental hygienists’ periodontal risk assessment protocols may not capture all the information needed to develop a conclusion.
4. The online survey format may result in a lower response rate.

Results

From the demographic categories, the largest group response came from the 45-55 age category, $20/37=(54\%)$. Most of the respondents were male dentists, $28/37=(76\%)$. Area of practice (rural vs. urban) showed most response came from urban, $23/37=(62\%)$, while the majority of responding dentists, $31/37=(84\%)$, practice in a general dentistry office. **(Tables 1,2,3,4).**

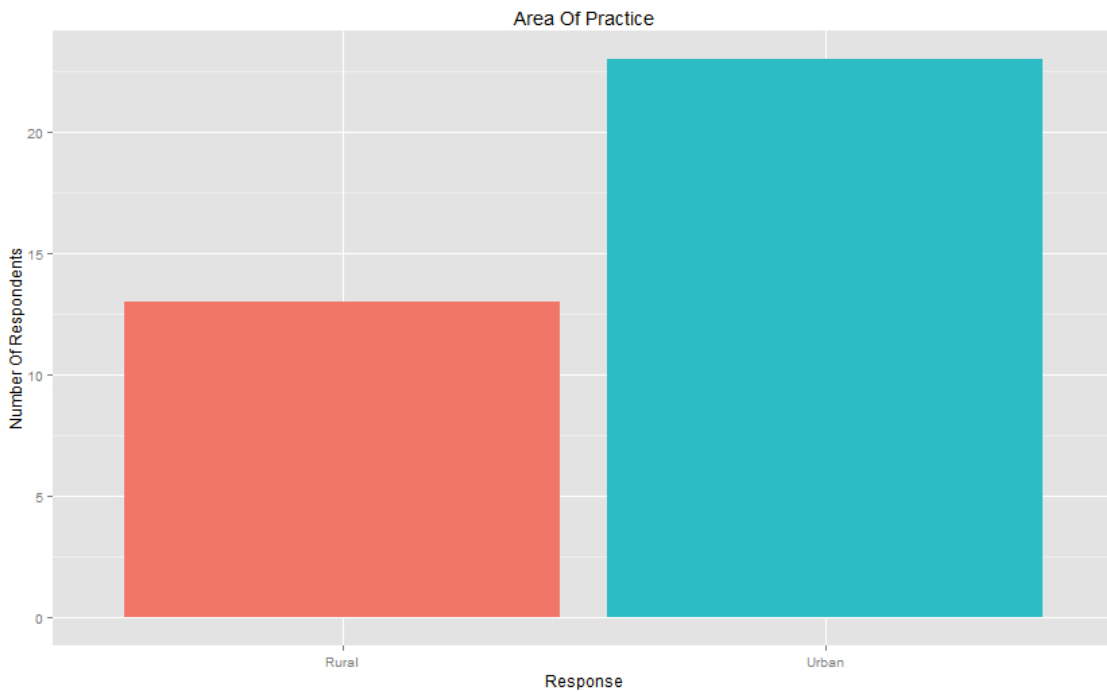


Table 1. Frequencies for Area of Practice

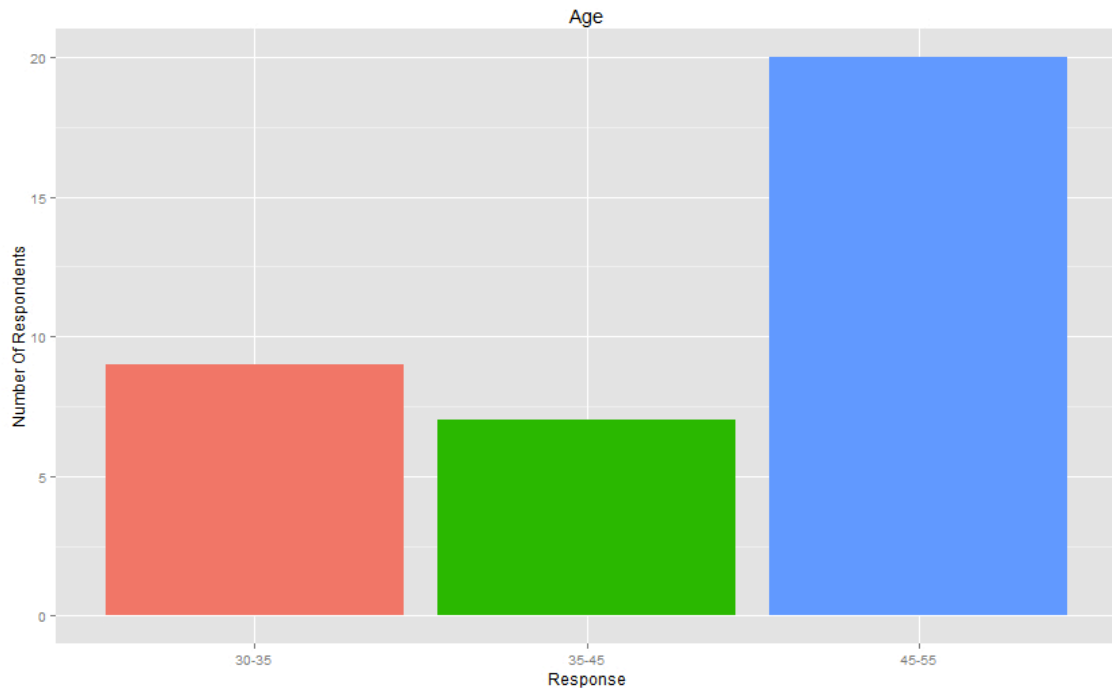


Table 2. Frequencies for Age Category

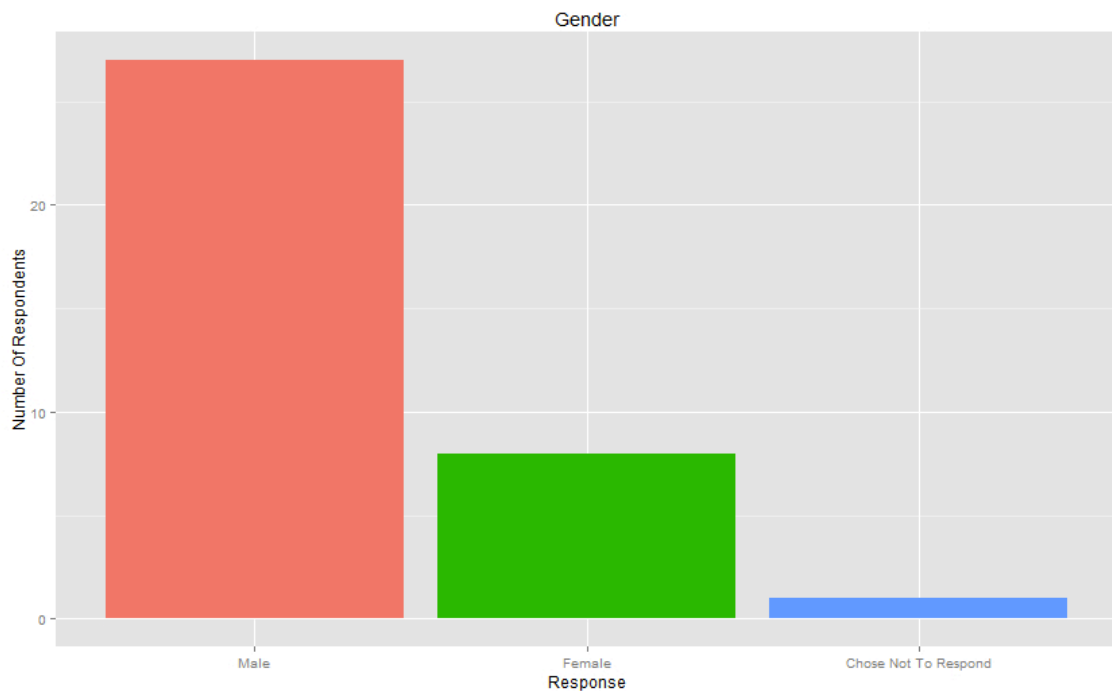


Table 3. Frequencies for Gender

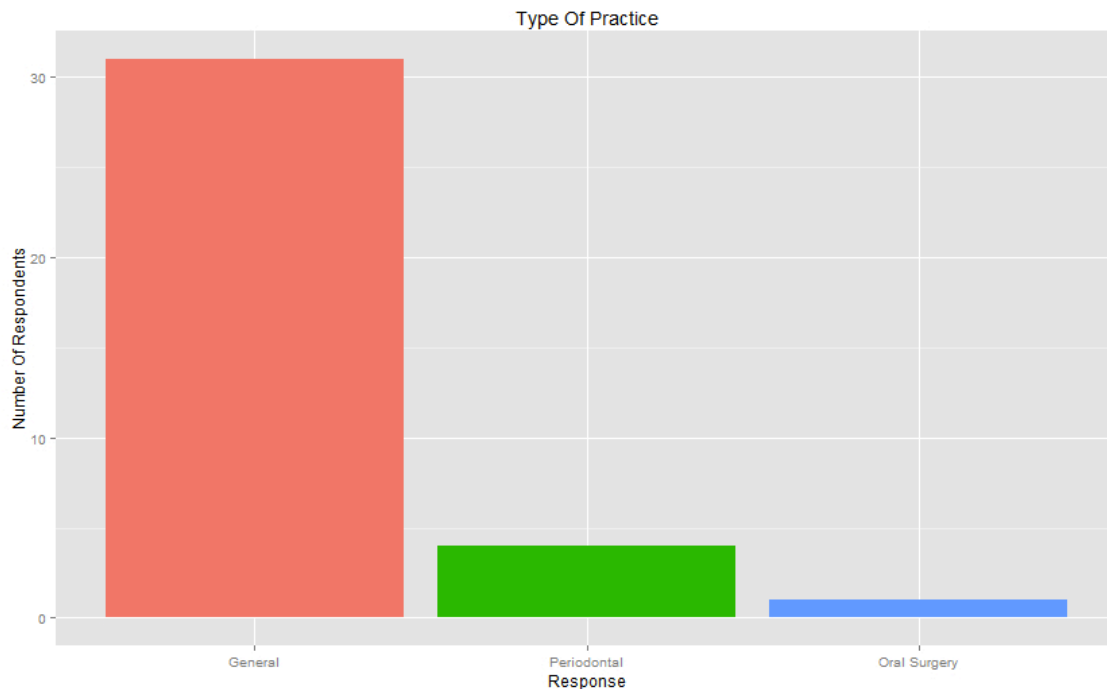


Table 4. Frequencies for Type of Practice

The overall results showed that most New Mexico dentist respondents were satisfied with the knowledge and recommendations of dental hygienists for discussing oral/systemic inflammation and cigarette smoke damage. Specifically, $26/37=(70\%)$ were satisfied, $8/37=(22\%)$ were somewhat satisfied, $2/37=(5\%)$ were not satisfied, and one respondent reported that the hygienist does not address this issue. **(Table 5)**

In reporting discussions with patients about the relationship between periodontal disease and diabetes, $16/37=(37\%)$ reported witnessing a dental hygienist inquiring about a periodontal patient's HbA1c levels and providing oral/systemic periodontal education, $7/37=(19\%)$ said hygienists do not inquire about HbA1c levels, $9/37=(24\%)$ said sometimes they do, and $5/37=(14\%)$ did not know. **(Table 6)**

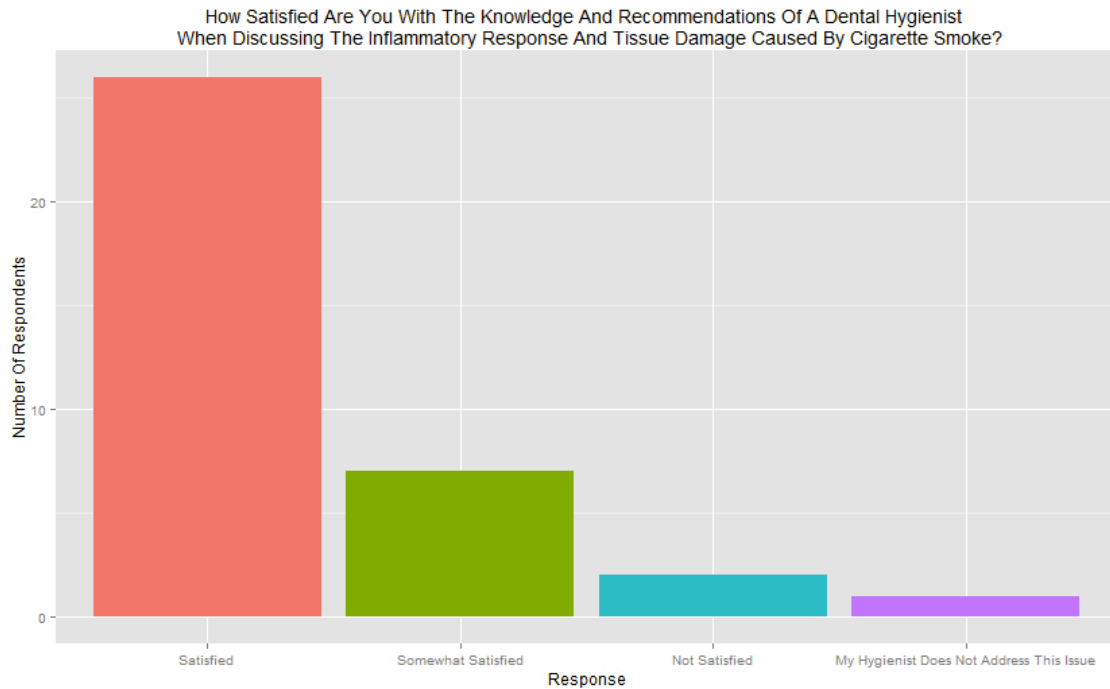


Table 5. Frequencies for the Question: “How satisfied are you with the knowledge and recommendations of a dental hygienist when discussing the inflammatory response and tissue damage caused by cigarette smoke?”

17/37=(46%) said that their SPT appointments included discussions of increased gingival bleeding as a sign of inflammation that may be related to elevated blood glucose levels and systemic inflammation, 12/37=(30%) said there was no discussion, 6/37=(16%) said sometimes there was, and 2 people did not answer this question. **(Table 7)**

In response to the risk factor of bruxism/parafunction, most New Mexico dentists, 16/37=(43%), said they were satisfied with the knowledge and recommendations a dental hygienist has when discussing bruxism/clenching habits with patients, 13/37=(35%) said they were somewhat satisfied, 6/37=(16%) said they were not satisfied, and 2/37=(6%) said the hygienist does not address this issue. **(Table 8)**

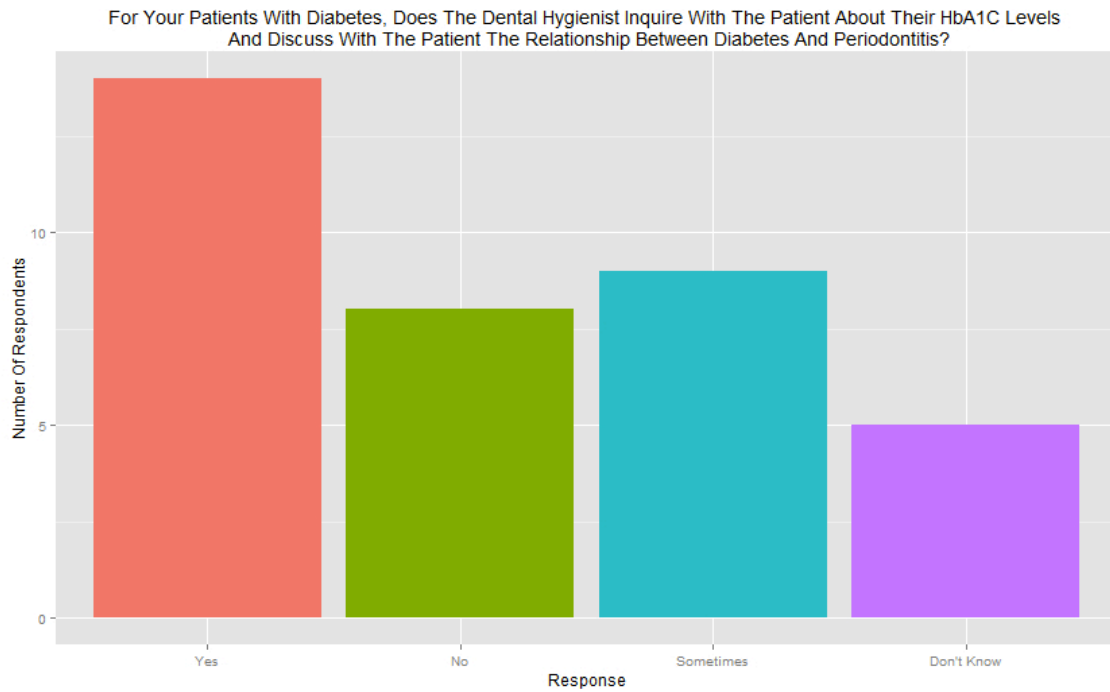


Table 6. Frequencies for the Question: “For your patients with diabetes, does the dental hygienist inquire with the patient about their HbA1c levels and discuss with the patient the relationship between diabetes and periodontal disease?”

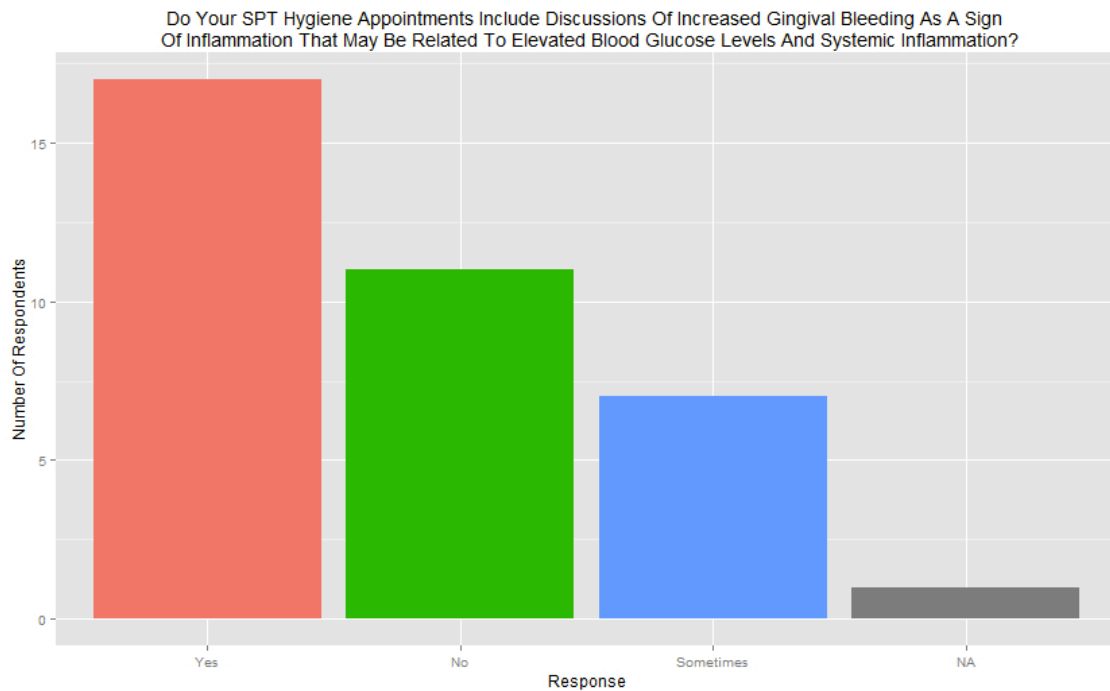


Table 7. Frequencies for the Question: “Do your SPT appointments include discussion of increased gingival bleeding as a sign of inflammation that may be related to elevated blood glucose levels and systemic inflammation?”

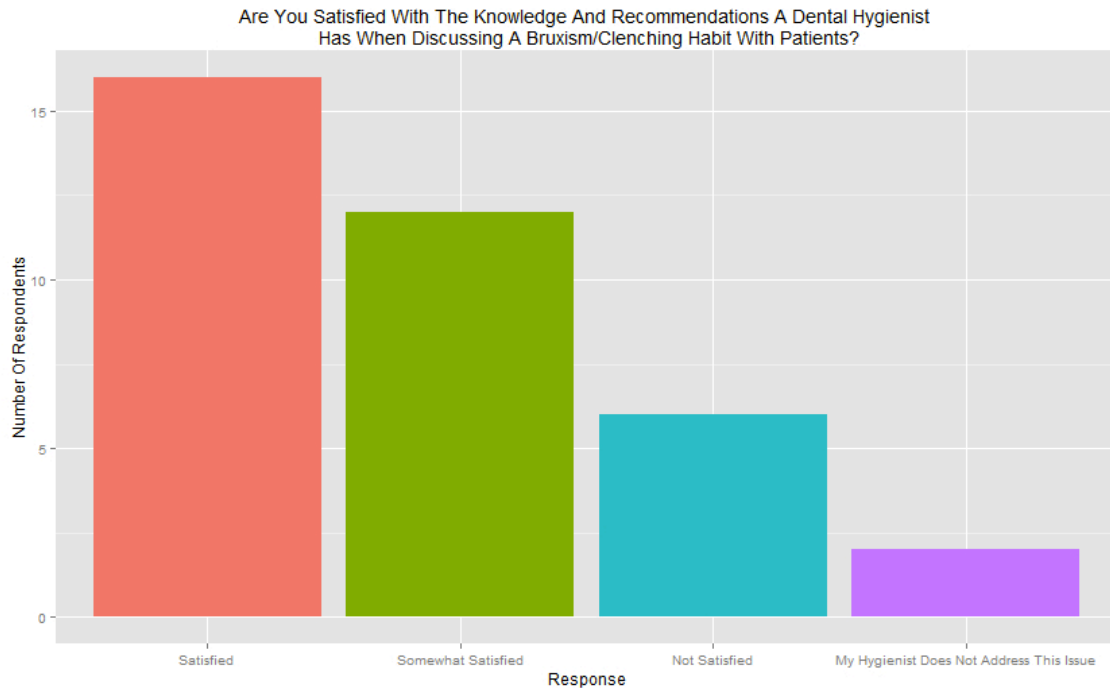


Table 8. Frequencies for the Question: “Are you satisfied with the knowledge and recommendations a dental hygienist has when discussing a bruxism/clenching habit with patients?”

The majority of respondents stated that parafunction is evaluated and discussed during patients’ SPT appointments: 20/37=(54%) said yes, often, 1/37=(2%) said no, never, 10/37=(27%) said sometimes, 4/37=(8%) said only if it is a chief complaint, and 2 people did not answer this question. **(Table 9)**

With regards to the frequency with which New Mexico dentists make some type of occlusal appliance for their patients, 25/37=(68%) said they have made 0-25% of their patients such an appliance, 6/37=(16%) have made 25-50% of patients an occlusal appliance, 3/37=(8%) have made 50-75% of patients an appliance, and 3/37=(8%) did not answer. **(Table 10)** Lastly, 26/37=(70%) estimated that within the last five years, their recommendations for an occlusal appliance has increased. **(Table 11)**

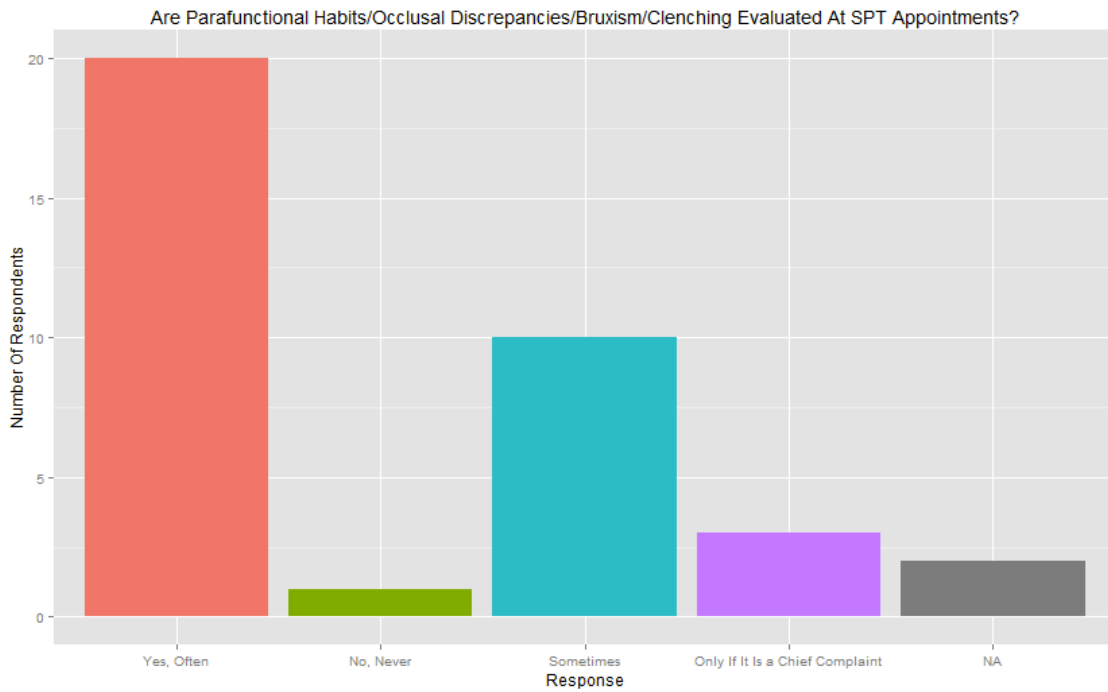


Table 9. Frequencies for the Question: “Are parafunctional habits/occlusal discrepancies/bruxism/clenching evaluated at SPT appointments?”

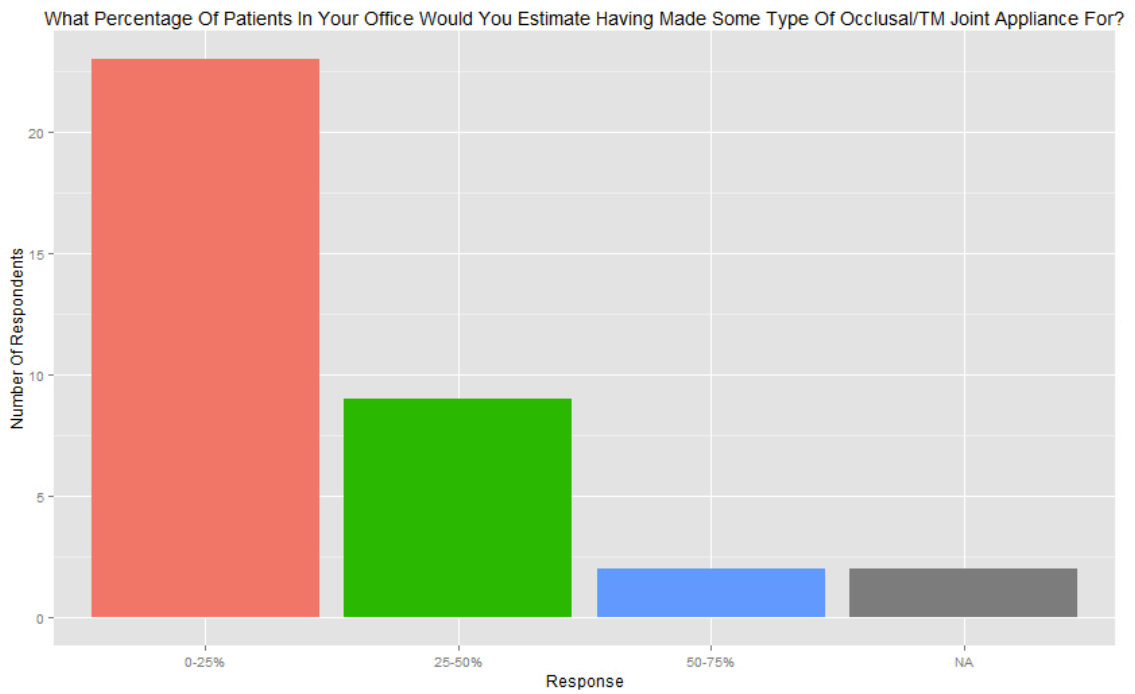


Table 10. Frequencies for the Question: “What percentage of patients in your office would you estimate having made some type of occlusal/TM joint appliance for?”

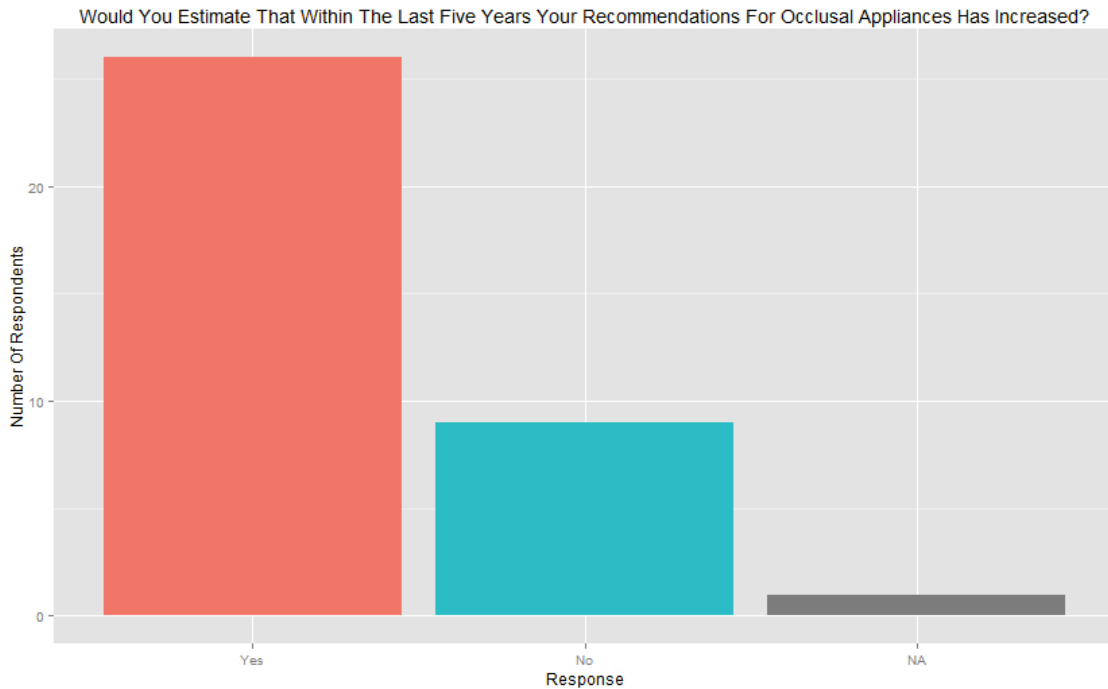


Table 11. Frequencies for the Question: “Would you estimate that within the last five years, your recommendations for occlusal appliances have increased?”

As a whole, the results support that New Mexico dentists experience dental hygienists as providing adequate or above adequate patient education on four of the most common risk factors for periodontal disease.

A few questions were asked with regard to the overall medical history and health of the patient. In response to the question, “How often are health questionnaire/medical history and blood pressures measured by a dental hygienist?”, 15/37=(41%) said at every SPT appointment, 10/37=(27%) said every 6 months, 8/37=(22%) said annually, 2 people said never, and 2 people did not answer this question. An equal number of respondents, 13/27=(35%), said they do refer patients to a primary physician to evaluate for inflammatory markers in the presence of periodontal disease or non-responsive periodontal disease,

13/27=(35%) said they do not refer, 8/37=(22%) said they sometimes refer, and 3/37=(8%) did not answer this question. **(Tables 12 and 13)**

The top two responses from New Mexico dentists regarding which risk factors/indicators they would like to see most patient education on had equal numbers of responses, including #1=diabetes and periodontal disease, and #2=cigarette smoking and parafunction and periodontal disease. **(Table 14)**

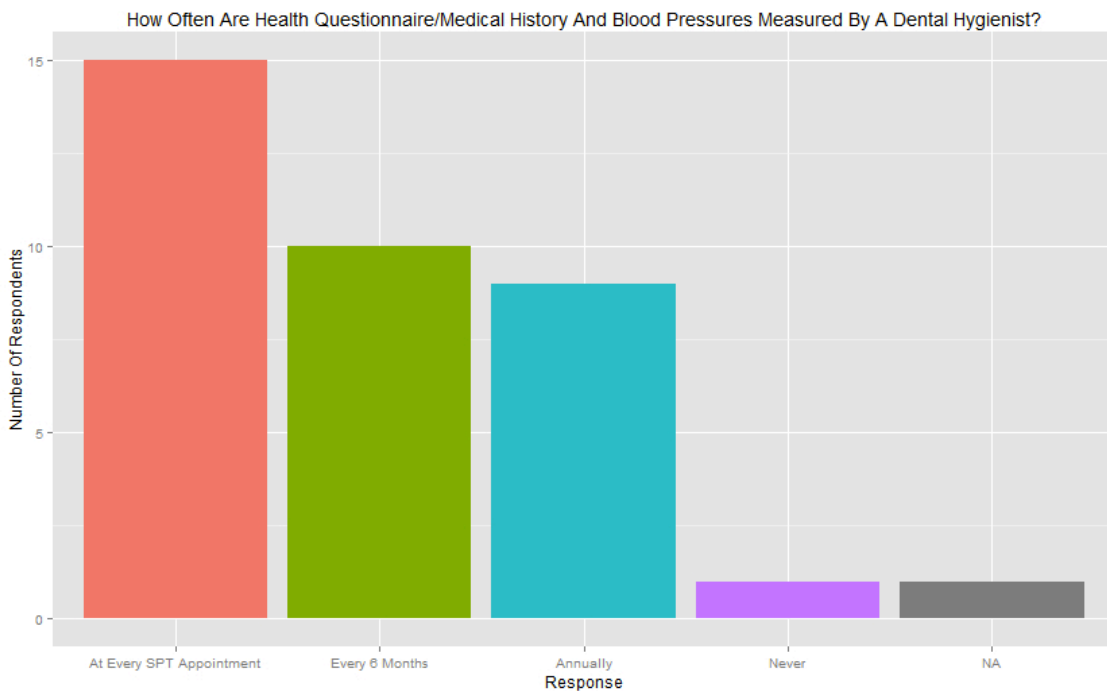


Table 12. Frequencies for the Question: “How often are health questionnaire/medical history and blood pressures measured by a dental hygienist?”

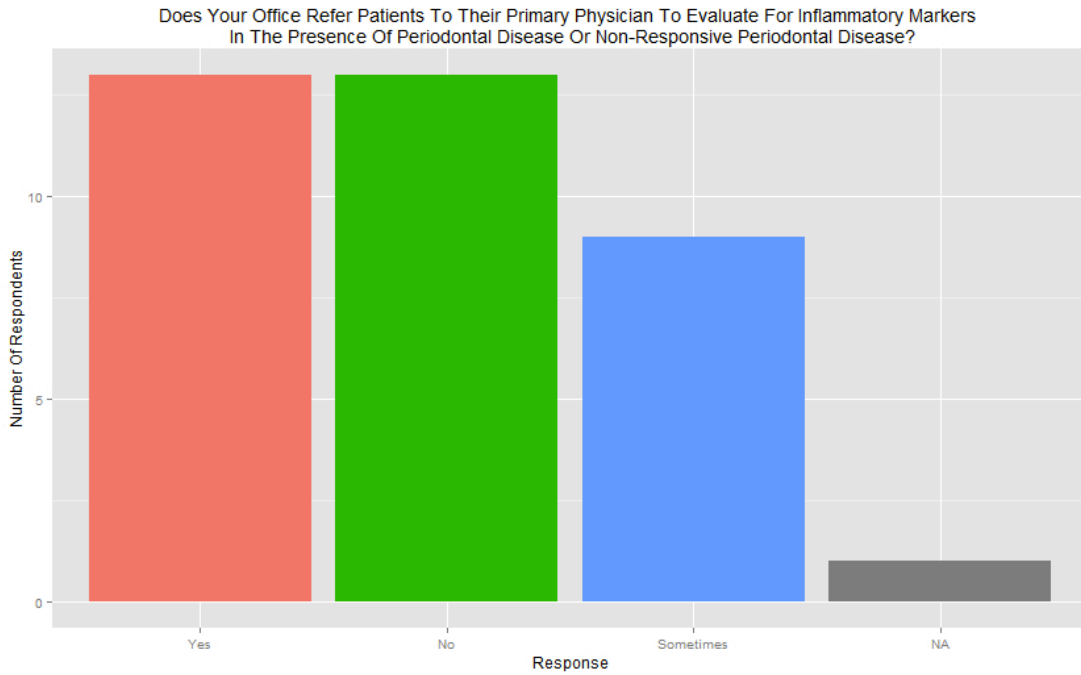


Table 13. Frequencies for the Question: "Does your office refer patients to their primary physician to evaluate for inflammatory markers in the presence of periodontal disease or non-responsive periodontal disease?"

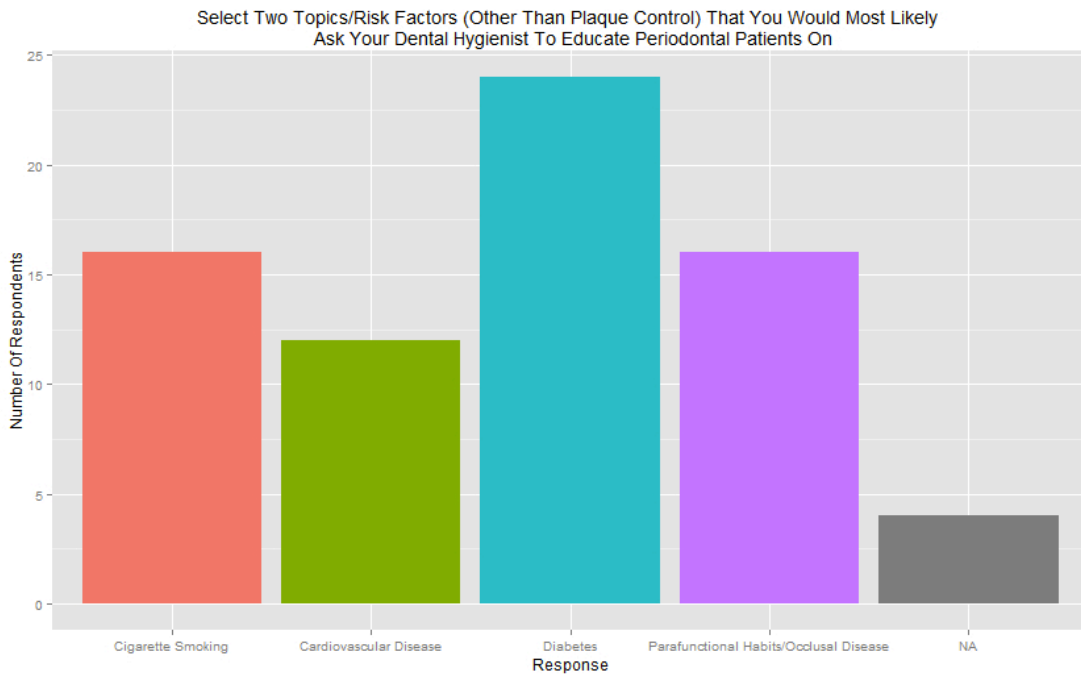


Table 14. Frequencies for the Question: "Select two topics/risk factors (other than plaque control) that you would most likely ask your dental hygienist to educate periodontal patients on."

In an attempt to understand how New Mexico dentists rate the overall knowledge and effective communication of dental hygienists with patients on periodontal risk factors, results showed that the majority of New Mexico dentists, 33/37=(89%), rate their SPT protocol as being adequate, and 4/37=(11%) as needing improvement. Most dentists surveyed either strongly agreed, 10/37=(27%), or agreed, 17/37=(46%), that having a specific protocol with risk assessment for a dental hygienist to implement into SPT appointments would increase understanding and motivation for the patient. Conversely, 7/37=(19%) disagreed, and 3/37=(8%) had no answer. **(Tables 15 and 16)**

Nearly half of respondents, 18/37=(49%), reported that they experience dental hygienists as needing increased education on communication strategies for discussing oral/systemic links with patients, 16/37=(43%) reported dental hygienists do not need increased education on oral/systemic link communication strategies, and 3/37=(8%) did not answer this question. **(Table 17)**

The overwhelming majority of respondents, 30/37=(81%), recognized that the amount of experience a dental hygienist has contributes to knowledge on risk factors/predictors for periodontal disease, 5/37=(14%) responded that they do not believe amount of experience contributes to knowledge of periodontal risk factors, and 2/37=(5%) did not answer this question. **(Table 18)**

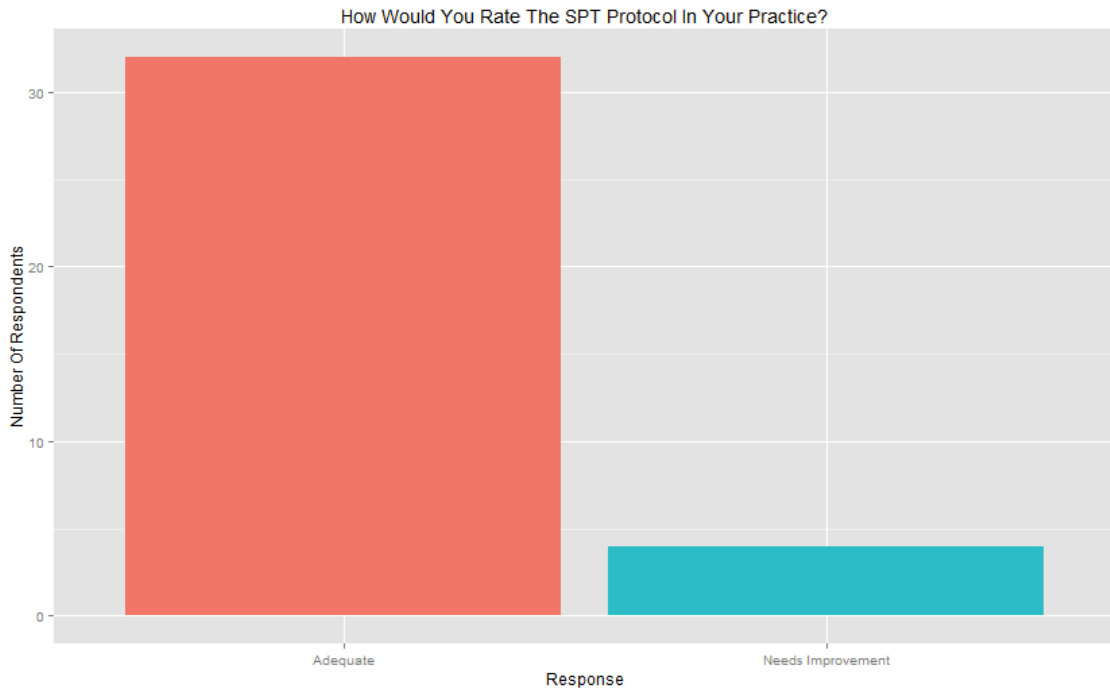


Table 15. Frequencies for the Question: “How would you rate the SPT protocol in your practice?”

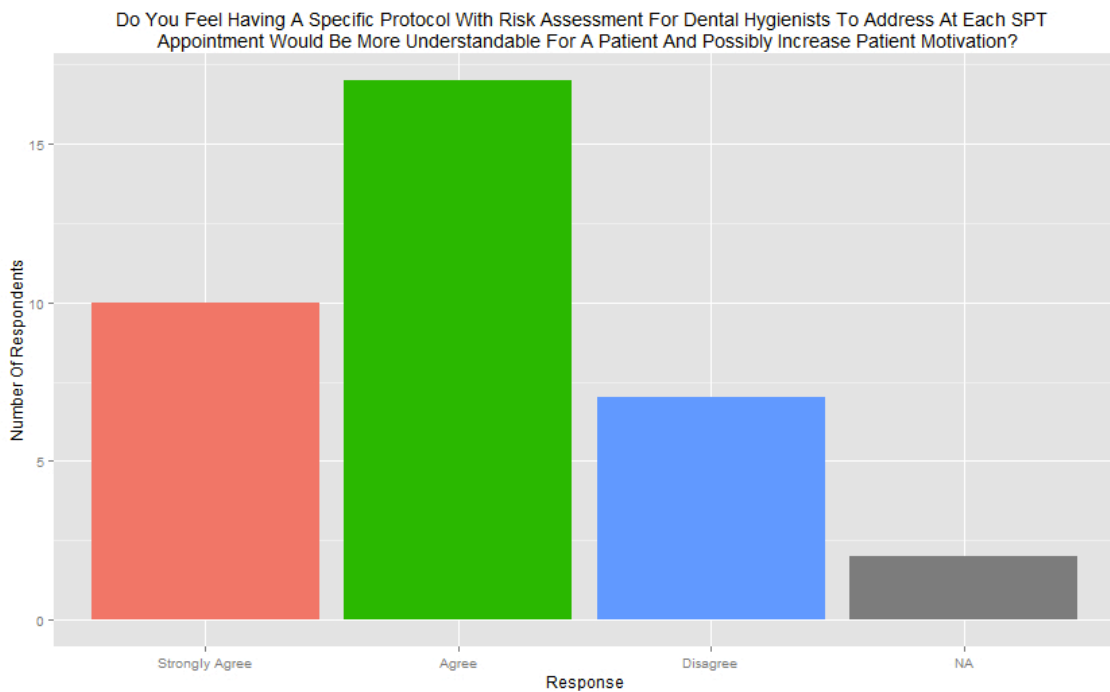


Table 16. Frequencies for the Question: “Do you feel having a specific protocol with risk assessment for dental hygienists to address at each SPT appointment would be more understandable for a patient, and possibly increase patient motivation?”

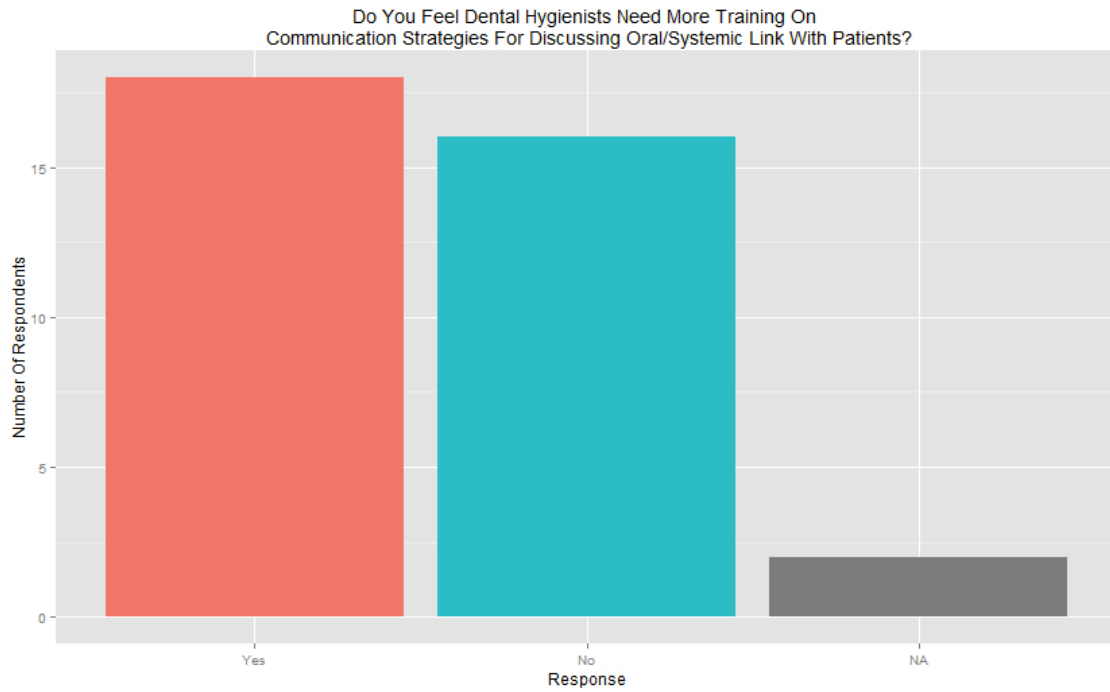


Table 17. Frequencies for the Question: “Do you feel dental hygienists need more training on communication strategies for discussing oral/systemic links with patients?”

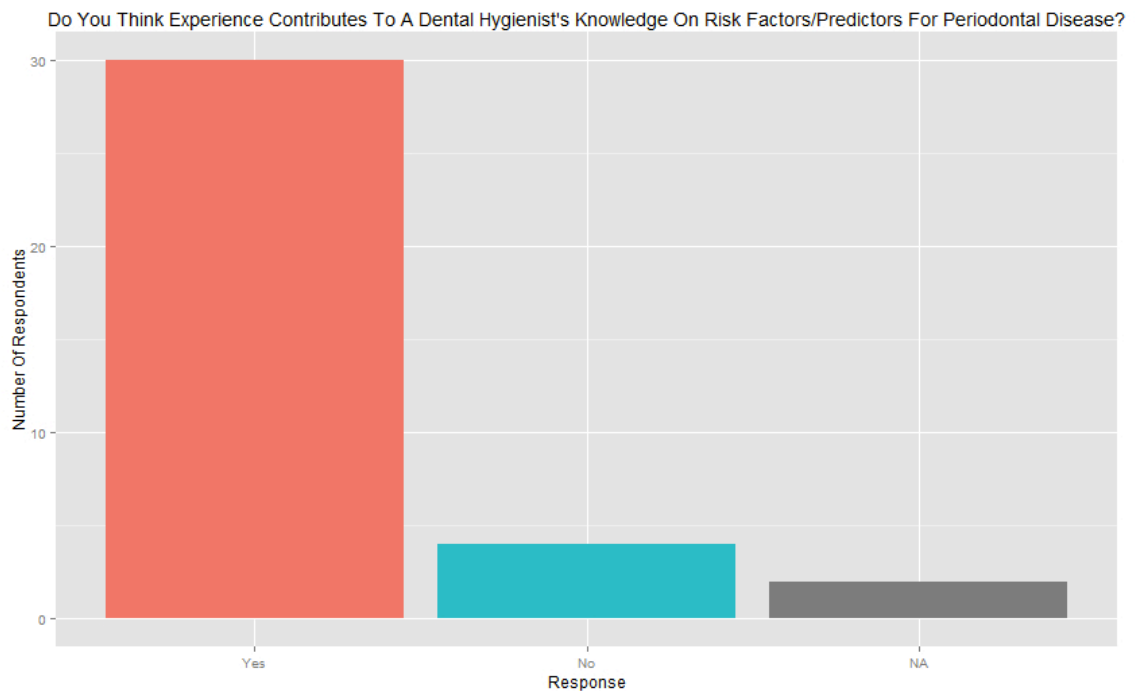


Table 18. Frequencies for the Question: “Do you think experience contributes to a dental hygienist’s knowledge on risk factors/predictors for periodontal disease?”

In reference to the type of degree a dental hygienist holds (4-year vs. 2-year), 12/37=(33%) of New Mexico dentists responded that dental hygienists who earned a 4-year Bachelor degree had increased knowledge and confidence, 10/37=(27%) said that both graduates have equal amounts of knowledge and confidence, 2/37=(5%) reported that 2-year Associate degree hygienists had increased confidence and knowledge, and 13/37=(35%) did not answer this question. **(Table 19)**

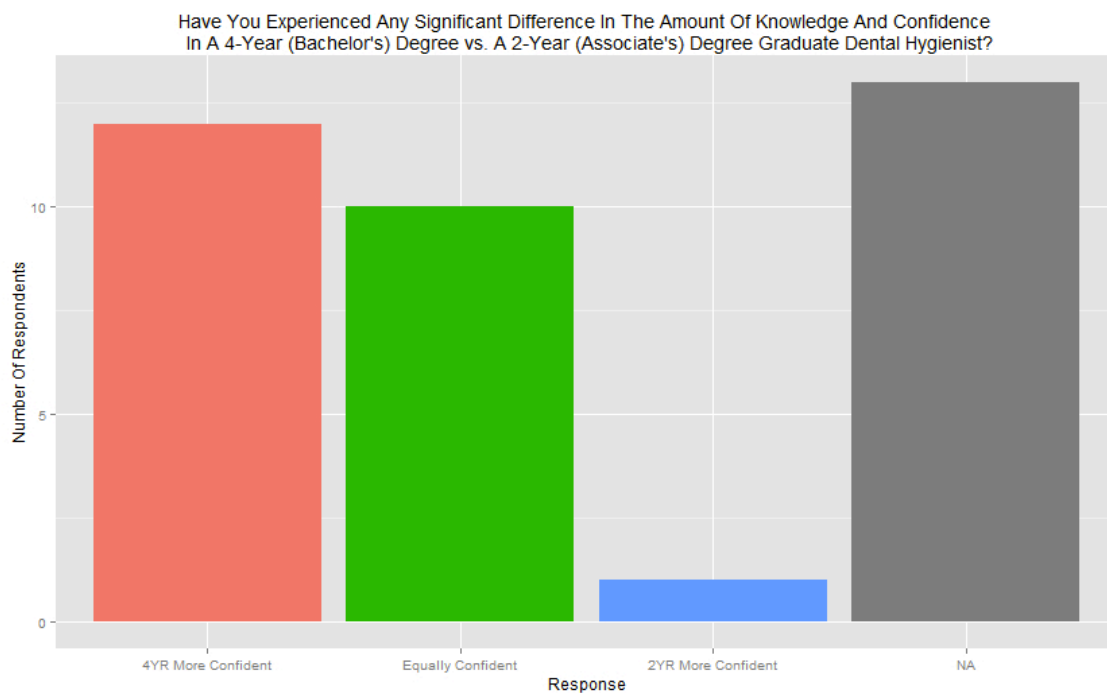


Table 19. Frequencies for the Question: “Have you experienced any significant difference in the amount of knowledge and confidence in a 4-year (Bachelor) degree vs. a 2-year (Associate) degree graduate dental hygienist?”

The results showed that most New Mexico dentists, 28/37=(76%), prefer a team approach in which both dentist and dental hygienist educate and communicate with the patient on oral/systemic links and disease, 7/37=(19%) responded that they prefer only the dentist to educate the patient on

oral/systemic links and disease, and 2/37=(5%) responded that they prefer only the dental hygienist to educate the patient on oral/systemic links and disease.

(Table 20)

A Chi-square statistical test was run to determine if any relationship existed between dentist area of practice and attitude on whether dental hygienists need increased education on knowledge and communication strategies for risk assessment for periodontal disease. $X^2= 0.1907, df=1, p\text{-value}=0.6623$, assumed significance level was $p < 0.1$, so we conclude no relationship. To determine if a relationship existed between dentist age category and preference on who communicates most with the patients on risk assessment/factors for periodontal disease, results were $X^2=4.6357, df=4,$

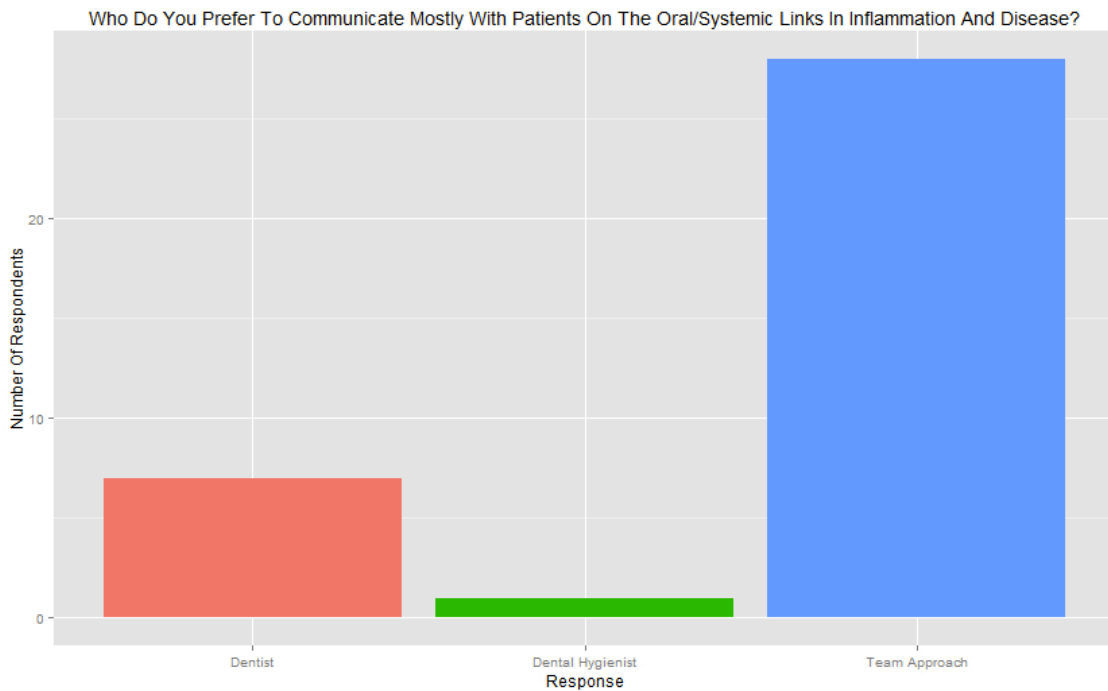


Table 20. Frequencies for the Question: “Who do you prefer to communicate mostly with patients on oral/systemic links to periodontal disease?”

p-value=0.3268, assumed significance level was $p < 0.1$, so we conclude no relationship. (Table 21)

Chi-Square 1 Data	> chisq1\$observed data[, 21]		
	data[, 8]	YES	NO
	Rural	8	5
	Urban	10	11
	> chisq1\$expected data[, 21]		
	data[, 8]	YES	NO
	Rural	6.882353	6.117647
	Urban	11.117647	9.882353

Chi-Square 2 Data	> chisq2\$observed data[, 13]			
	data[, 6]	DENTIST	DENTAL HYGIENIST	TEAM APPROACH
	30-35	1	0	8
	35-45	0	0	7
	45-55	6	1	13
	> chisq2\$expected data[, 13]			
	data[, 6]	DENTIST	DENTAL HYGIENIST	TEAM APPROACH
	30-35	1.750000	0.250000	7.000000
	35-45	1.361111	0.194444	5.444444
	45-55	3.888889	0.555556	15.555556

Chi-Square 3 Data	> chisq3\$observed data[, 26]			
	data[, 8]	STRONGLY AGREE	AGREE	DISAGREE
	Rural	3	5	5
	Urban	7	12	2
	> chisq3\$expected data[, 26]			
	data[, 8]	STRONGLY AGREE	AGREE	DISAGREE
	Rural	3.823529	6.5	2.676471
	Urban	6.176471	10.5	4.323529

Table 21. Chi-Square Data

The final test of Chi-square analysis was run to statistically test if a relationship existed between dentist area of practice and attitude of whether or not having a specific/detailed protocol for SPT and risk factor assessment would increase patient understanding and motivation. $X^2=4.1134, df=2, p\text{-value}=0.1279$, assumed significance level was $p < 0.1$, so we conclude no relationship.

Discussion

A review of the results from this study represents an overall satisfaction in the experiences of New Mexico dentists who responded to this survey, with regard to the knowledge of dental hygienists on four of the most common risk factors for periodontal disease.

The review of the literature supported the importance of dental hygienists including basic education for patients on the link between periodontal disease and diabetes, and inquiring regularly on the number of their patients' current HbA1c.¹⁰ The majority of respondents indicated that they do see dental hygienists including patient education on diabetes/periodontal disease regularly in SPT appointments. Dentists reported that most of their SPT appointments include discussions on a possible relation between increased bleeding/inflammation and elevated blood glucose levels. New Mexico dentist responses also revealed a high satisfaction rate and overall good performance on dental hygienist experience and knowledge on patient education for the links between CVD and cigarette smoking with increased oral inflammation/periodontal disease. Discussions of CVD and elevated blood

pressure were shown in the review of the literature to be crucial elements to address due to the link between inflammatory activities and destruction of epithelium.¹¹ New Mexico dentists reported approximately 35% of their hygienists will refer a patient to their primary physician for elevated blood pressure. Most New Mexico dentists report their dental hygienist reviews medical history and blood pressure either every SPT appointment (3-4 months) or every 6 months. In circumstances where elevated blood pressure was noted, responses were split equally, with 35% of dentists reporting that they do refer patients to their primary physician, 35% saying they do not refer, and 22% referring “sometimes.” This possibly would benefit from further discussion and study as the trend towards communication between health fields increases. Reasoning for the non-referring group could be investigated more closely to identify which factors would increase confidence and prompt the decision to make referrals and discuss overall health.

The effects of cigarette smoking on inflammation response and tissue damage, as well as smoking cessation, are reported as being discussed regularly at SPT appointments. The importance of educating patients on smoking cessation is strongly supported through previous research showing that the exposure to cigarette smoke increases the body’s cellular defense, which increases inflammation and tissue damage.^{18,19}

The literature review found no significant studies that indicated parafunction/bruxism links with periodontal disease to be a large topic of education for the dental hygienist. However, 43% of New Mexico dentists reported they were satisfied with the knowledge and recommendations a dental

hygienist has when educating patients on bruxism and clenching habits and their relation to periodontal disease. Previous research articles indicated mostly that the role of trauma from occlusion and pathogenesis of periodontal disease is not fully understood.¹⁴ However, increased tooth mobility and accelerated bone loss have been studied and proven to link parafunction and periodontal disease together.^{14,15} This study supported the trend of patient education in that 54% of New Mexico dentists said occlusion and parafunction is discussed at every SPT appointment. Furthermore, 70% of New Mexico dentists estimated that within the last five years, their recommendations for an occlusal appliance have increased. It appears that periodontal trauma from occlusion plays a role in the overall healing and maintenance of patients with periodontal disease. Results from this study show that some SPT protocols do not involve treatment of parafunction habits. Perhaps this is an area needing more research and practitioner education.

From New Mexico dentists' perception and experience, diabetes, cigarette smoking, and parafunction were the top risk factors indicated as the most crucial topics for patient education. New Mexico dentists reported that dental hygiene patient education on these risk factors is mostly satisfactory, with just a small margin needed for expanded or just continued education. New Mexico dentist responses supported the ideas in the literature review that having a structured and specific SPT protocol may increase patient understanding and motivation for being an active participant in their overall health and periodontal healing. The majority of New Mexico dentists are on board with an SPT protocol, and 89% of

them rate their current protocol as adequate. The American Dental Association includes assessment of oral health, overall health, counseling patients on proper food nutrition, and identifying possible risk factors for periodontal disease as part of the services provided by a dental hygienist,¹⁸ so it would be logical to include these in a structured/checklist SPT appointment.

It seems natural that New Mexico dentists observe more experienced dental hygienists as having an increased knowledge on risk factors and communication strategies with patients. This may be attributed to the fact that experience improves one's comfort and confidence of speaking openly on patient overall health and contributing risk factors to periodontal disease. One possible effective way to increase a student's confidence and communication skills on systemic/parafunctional issues may be accomplished by incorporating more case studies and role-playing exercises into clinical curricula. While the majority of New Mexico dentists felt risk factors/indicators were covered and discussed in a satisfactory manner during SPT appointments, 49% reported that they experience dental hygienists as needing increased education on communication strategies for patient education on oral/systemic links. This supports past research studies that have proven the growing correlation between oral and systemic health. With the information from this study, one could suggest the need and importance for more didactic instruction or clinical role-playing to strengthen the confidence of students in educating patients on periodontal risk factors. One could also conclude that results from this study support a need for more continuing education classes with instruction on oral/systemic health, effective

strategies for patient communication, and motivation techniques to help patients attain healing and overall improved health. Along with experience levels, New Mexico dentists further reported that they observe dental hygienists who possess a 4-year Bachelor degree had increased knowledge and confidence in patient education, as compared to dental hygienists with only a 2-year Associate degree.

Finally, the results identified that most New Mexico dentists (76% from a 5% response) prefer a team approach in which both dentist and dental hygienist educate and communicate with the patient on oral/systemic disease and correlations between the two. This result seems positive and supports previous findings in research studies that show good communication skills between dentist and dental hygienist about their roles and expectations will be much more valuable to patients. If dentist and dental hygienist are working together and the dentist (the front of the dental team) supports this, then a variety of skills can be used successfully in the management of periodontal disease.¹⁷

Conclusion

Treatment and maintenance of periodontal disease consists of clinical skills for bacterial biofilm removal as well as a patient assessment and patient education component to control for patient risk factors/indicators for periodontal disease. The intent of this study was to examine the attitudes and answers New Mexico dentists have regarding their experiences with dental hygienists' knowledge in risk assessment for periodontal disease, and patient education on oral/systemic links contributing to periodontal disease. The main goals were to discover which

risk factors/indicators were thought by New Mexico dentists to be the most crucial to address in helping to stabilize periodontal disease; to determine how effective New Mexico dentists believe dental hygienists are in discussing and educating patients on four of the main risk factors (diabetes, CVD, cigarette smoking, and parafunctional habits); to discover where the gaps may be in educating patients on certain risk factors; and to determine if New Mexico dentists observe SPT as more effective with structured protocols, and through a dentist/dental hygienist team approach for patient education.

Overall, the descriptive data summed up that New Mexico dentists believe their dental hygienists to be mostly satisfactory in discussing and educating periodontal patients on all four risk factors studied (diabetes, CVD, cigarette smoking, and parafunctional habits). These results can support the idea that, in general, dental hygiene curricula and education for covering periodontal risk factors is proving effective. Admittedly, the size of this study was small. A 5% survey response rate does not allow generalization to a population, and it is only representative of dentists in New Mexico. Further studies could be done involving and comparing different states and different areas of the country, as well as comparing dentists' experiences with dental hygienists possibly in different board regions.

It seems the three risk factors that New Mexico dentists agree on needing the most attention in periodontal patient education are diabetes, cigarette smoking, and parafunctional habits/malocclusion. This result differed somewhat from previous research, which stated that the conditions dental hygienists are

most likely to discuss as risk factors are tobacco use, pregnancy, and genetics.^{4,6} This study can provide the motivation for educational institutions to put forth more effort on educating dental hygiene students, as well as licensed dental hygienists, to properly and confidently interview and educate periodontal patients on controlling or even eliminating risk factors to aid in periodontal healing and overall health. Parafunctional habits, including the discussion of clenching/bruxism and fabrication of occlusal appliances, appear to be a growing topic of importance to control progression of localized periodontal sites. Generally, eliminating trauma from occlusion, temporomandibular joint or muscle pain, and decreasing occlusal load through use of an occlusal appliance will optimize periodontal healing, health, and stability of mobile teeth.¹⁵ In this study, 70% of the 5% response of New Mexico dentists reported that within the last five years, their recommendations for an occlusal appliance has increased. Perhaps because parafunction/bruxism is an increasing contributing factor to the stabilization of periodontal disease, increased dental hygiene education on occlusal appliances or bite stabilization could be useful. This may be an area where the dental hygienist can further aid the dentist and the patient, as it seems previously that occlusion discussions were left solely to the dentist.

New Mexico dentists reported that, in general, dental hygienists with more years of experience and more years of school (4-year. vs. 2-year degree) had increased knowledge on periodontal risk factor evaluation, and more confidence in patient communication and education. Again, given the limited, smaller sample size, this study cannot be generalized to an entire population; however, we may

say that perhaps additional education and confidence-building exercises for students upon graduation may ideally become a new focus of future dental hygiene programs. This may increase the effective communication and educational strategies of new graduates entering the profession.

Chi-square statistical tests were run to see if any correlations existed between New Mexico dentist responses and some of their demographic information. This particular study did not show any significant relationships on variables such as dentist area of practice (rural vs. urban) and attitudes on dental hygienist knowledge and effective communication strategies; dentist age category and preference on how patient education is provided, and who in the dental office communicates most with patients; or area of practice (rural vs. urban) and having structured and specific SPT protocols. Possibly, a larger study could be carried out further to include dentists from different states or regions, or evaluate dental hygienists from different schools to detect relationships or comparisons in attitudes and overall knowledge and confidence levels.

Conclusions can be made from the 5% response rate of this study that more than half of the total respondents of New Mexico dentists witness effective and satisfactory periodontal risk factor assessment, and that structured SPT protocols are carried out by a dental hygienist. Most dentists agree or strongly agree that continued education on periodontal risk factors, understanding of the oral/systemic links of disease, and patient education and communication strategies are always important to deliver superior and current oral health care. Half of the respondents said that they refer patients to a primary physician for

further examination if they suspect a connection between non-responsive periodontal disease and overall health. Perhaps through increased knowledge on current links between oral and systemic health, dental hygiene providers and dentists will gain increased confidence to discuss with patients their reasons for referring them to their primary physician. This may also increase confidence for dental hygienists to discuss a patient's overall care with other health professions.

Lastly, 76% of the 5% of the NMDA member dentists who responded to the survey stated that they prefer and support a team approach in which both the dentist and dental hygienist provide periodontal patient education on risk factors and how to best accomplish overall stability in periodontal and overall health. In accordance with the literature review, previous studies have shown that a team approach is the most effective way to educate a patient.¹⁷ This study concludes that New Mexico dentists' attitudes are that dental hygienists are overall effective in periodontal risk factors and patient education. Through continued oral/systemic link education and curricula, the dental hygiene profession can continue to reduce the incidence of inflammatory/oral/systemic disease through patient education and referral. This has the potential to benefit private/public dental practices, dentists, dental hygienists, and patients, as well as to elevate the status of dentistry and oral health providers as regarded by other health professionals.

CHAPTER 5

JOURNAL OF DENTAL HYGIENE ARTICLE SUBMISSION

NEW MEXICO DENTISTS' VIEWS ON HYGIENISTS AS EDUCATORS OF ORAL/SYSTEMIC DISEASE LINKS IN PERIODONTAL PATIENTS

ABSTRACT

Purpose: This study examined responses from New Mexico dentists regarding the knowledge and confidence levels of dental hygienists in providing patient education on oral/systemic periodontal risk factors. It further examined what New Mexico dentists' views are on structured SPT protocols that include dentist/dental hygienist patient education on major risk factors for oral/systemic disease, and referrals and consultation with primary physicians.

Methods: Members of the New Mexico Dental Association (n=700) were asked to participate in a 20-question online survey. Survey questions focused primarily on the level of risk assessment for periodontal disease that New Mexico dentists witness dental hygienists discussing with periodontal patients.

Results: It was predicted that New Mexico dentists do not believe that dental hygienists are lacking in knowledge or confidence when it comes to providing patient education on major risk factors for periodontal disease. Most of the New Mexico dentists who responded to this survey (76%) reported satisfaction with the knowledge and patient education provided by a dental hygienist on all four of the risk factors studied (diabetes, cardiovascular disease [CVD], cigarette smoking, and

parafunctional habits). Results indicated that parafunctional habits (bruxism) and occlusal appliance fabrication appear to be increasingly common links to supporting periodontal maintenance. No significant relationships were found in chi-square tests performed on demographic data—such as age and area of practice (rural vs. urban)—as being related to their experience and views on dental hygienists’ knowledge and structure in SPT protocols.

Conclusion: Overall, New Mexico dentists agree and support that increasing education on periodontal risk factors and structured SPT protocols would be beneficial for a dental hygienist. Positively, results showed New Mexico dentists’ satisfaction with their dental hygienists’ patient education, and support a team approach between dentist and dental hygienist for periodontal patient assessment.

INTRODUCTION

Research has suggested and acknowledged a link between oral and systemic health.¹ Previous and current studies aim to explore the education provided to students and health providers on subjects of oral/systemic health. Because oral health plays a large role in a patient’s overall health, dental/dental hygiene curricula strives to prepare dental professionals to clinically treat and educate patients on the causes and risk factors for periodontal disease.² Considering all the roles carried out by professionals in the field of dentistry, a dental hygienist has perhaps the best opportunity to educate patients on the risk factors/indicators for periodontal disease.

A survey conducted on North Carolina dental hygienists reported that the conditions dental hygienists are likely to discuss with patients include tobacco use, pregnancy, and genetics.^{4,6,8} Furthermore, it is found that dentists are more likely to

assess for risks and discuss systemic health issues, as well as discuss parafunctional and/or occlusal trauma/disease with their patients.^{5,8}

Significance of the Problem: Treatment and prevention of periodontal disease is most successful with an accurate diagnosis, reduction or elimination of causative agents, and risk management of the individual patient.² Past research conducted has shown overall findings indicating that dental hygienists need more education about diabetes and its link to periodontal disease. Approximately 25-50% of North Carolina hygienists stated that they had some knowledge of the subject, but that with the growing research in oral/systemic links and additional factors affecting periodontal disease, an increase in dental hygiene curricula and continuing education on these topics would be beneficial.^{5,9} This idea was reinforced by a different study, in which dental hygienists admitted desiring more education on oral/systemic links.²⁰

Past research shows overall lower levels of knowledge in some topics of systemic disease risk factors for periodontal diseases such as diabetes, and suggests the need for formal training for dental hygienists in addressing expanded risk factors and indicators for periodontal diseases.^{5,8,12} Because the dental hygienist may treat a patient multiple times in a year, particularly through Supportive Periodontal Therapy (SPT), the dental hygienist can play a primary role in performing risk assessment for oral disease.⁵

Due to the amount of research that associates periodontal diseases and systemic disease, it is imperative that dental patients receive adequate education and treatment on both systemic and parafunctional conditions which possibly affect their oral health. Diabetes type 1 and type 2, cardiovascular disease (CVD), and cigarette smoking are among the highest risk factors for periodontal disease and non-responsive periodontal treatment.^{2,7} All three of these risk factors share the inflammatory and vascular abnormalities of periodontal disease, and thus it is

important that dental hygienists familiarize themselves with the oral/systemic health links.⁷

Associations between Diabetes and Periodontal Disease: Periodontal disease is increasingly prevalent and more severe in persons with type 1 and type 2 diabetes than in non-diabetic persons, and is accepted as one of the diabetic complications by its high prevalence and severity in diabetic patients.^{9,10} Since 1960, over 60 studies have been conducted examining the relationship between oral infection and glycemic control among diabetic patients.^{3,8,9} However, according to a study conducted by Lopes et al., most (79%) certified diabetes educators (CDEs) have not received formal oral health education.^{8,9}

Associations between Cardiovascular Disease and Periodontal Disease: Some data are lacking in the causality between periodontal disease and cardiovascular disease (CVD) risk; however, associations exist between the two.^{11,12} Periodontal disease involves inflammatory activities which induce the production of proinflammatory cytokines and the destruction of the epithelium. This allows the entry of toxins into the bloodstream, which may contribute to atherogenesis and thromboembolic events.^{11,13} A further study published by the *European Journal of Preventive Cardiology* aimed to assess indicators of periodontal disease and associations with CVD risk factors.¹³ This study concluded that less tooth loss was associated with lower levels of glucose, low-density lipoprotein (LDL) cholesterol, and systolic blood pressure.¹³ Studies have also linked chronic dental infections such as periodontal disease to myocardial infarction (MI), especially in patients with a history of AMI (Acute Myocardial Infarction).¹³

Associations between Periodontal Disease and Cigarette Smoking: Over the last two decades, experimental evidence has indicated that cigarette smoking is probably a true risk factor for periodontal disease.^{16,17} Results of studies indicate that the observed *P.gingivalis*, *Actinobacillus actinomycetemcomitans* (A.a), and *Bacteroides forsyntus* elimination from the dentition of smokers was less than half that observed in non-smokers.¹⁸ Evidence suggests that many of the adverse systemic consequences of chronic smoking might be due to its effects and suppression on the immune-inflammatory system.^{17,18} Furthermore, smoking has been shown to impair revascularization during soft and hard tissue wound healing, which is critical for periodontal procedures.¹⁹

Parafunctional Habits and Occlusal Conditions/Diseases: The role of trauma from occlusion and pathogenesis of periodontal disease is not fully understood, but detection and correction of occlusal trauma at generalized or localized sites may contribute to more complete periodontal health for the patient.¹⁵ Occlusal trauma often will present in localized, specific sites which should be eliminated to have a healthy masticatory system.¹⁶ A study by Deschner et al. states that periodontal disease is actually an inflammatory disease.²² A review article by M.E. Gher indicates that occlusal forces can cause changes in the alveolar bone and periodontal connective tissue.²¹ These changes can affect tooth mobility and probing depths.

Statement of the Problem: Do New Mexico dentists observe that there are improvements needed in dental hygiene education to prepare a dental hygienist to provide patient education on risk assessment for periodontal disease?

This study will explore the experiences and attitudes of New Mexico dentists regarding the knowledge levels and communication strategies of dental hygienists in educating patients on risk factors (diabetes, cardiovascular disease, tobacco use, and

parafunctional habits) for periodontal disease. This study aims to gain information on the risk assessment topics most often addressed by dental hygienists—topics of risk assessment that may possibly need more education or attention—and how this could be essential to maximizing the past and continued healing for periodontal patients through more detailed periodontal risk assessment.

METHODS AND MATERIALS

Sample Defined: The sample included all of the approximately 700 New Mexico dentists who were current members of the New Mexico Dental Association.

Procedures: A simple survey was created using the survey software Psych Data. The survey queried New Mexico dentists about the abilities of dental hygienists to educate patients on risk factors for periodontal disease. The 20-question, multiple-choice survey covered the four major risk factors for periodontal disease—diabetes, cardiovascular disease, cigarette smoking, and parafunctional habits like bruxism.^{4,6,10} Additional topics included questions regarding dental hygienist knowledge and communication skills, hygienist degree level and experience, and additional demographic questions.

Human Subjects Addressed: This research/survey was determined “exempt” and was approved by the University of New Mexico School of Medicine’s Human Research Protection Office HRPO #14-291, not subject to continuing review. The survey link and the approved and stamped consent documents from HRRC were e-mailed to all New Mexico Dental Association (NMDA) members via NMDA. An invitation to participate was sent to each member, and the survey was also advertised on the NMDA’s Facebook page. By clicking on the link, participants consented to take the

survey. Survey questions were strictly anonymous. The electronic survey was designed to hide the IP addresses of the participant's computer or mobile device from the primary investigator, adding privacy. Once completed, the participant was advised to close their browser window to remove the survey from their browser. Participants were also allowed to exit and discontinue with the survey at any point they chose.

Materials/Survey Instrument: The survey instrument was an electronic survey designed to measure descriptive statistics on New Mexico dentists' attitudes and experiences. The electronic survey format allows for reduced cost and time, quick response, and the ability to survey a large population.¹⁸ However, limited sampling and low response rate from "survey saturation" are distinct disadvantages of this format.¹⁸

Timeline: The research was approved by the University of New Mexico's Health Science Center Human Research Protection Office (HRPO) on October 22, 2014. The survey was e-mailed to the target population on November 3, 2014, and the survey was available for an 18-day period ending on November 20, 2014. At completion of the survey, the data were processed and analyzed with aid and statistical counseling from a University of New Mexico statistical counseling group.

Data Collection and Statistical Analysis: The online survey data were collected through the Psych Data survey software in the form of a spreadsheet, which were then transferred into a statistical program R. Response rate for this survey was about 5%.

Descriptive data collected included demographic information as well as views on adequacy of SPT protocols; level of satisfaction on dental hygienist knowledge

and recommendations pertaining to oral/systemic risk factors and parafunctional habits; current percentages of periodontal patients wearing some type of occlusal appliance; what is communicated to patients in terms of increased bleeding or blood pressures; and finally, which risk factors dentists feel need most recognition. Frequency distribution plots were created through R for each of the 20 survey questions to present an overview of the data.

Inferential data was used to determine if any relationships existed between variables. Chi-square tests were run to determine any relationships/associations between: 1) dentist area of practice and their attitude on whether dental hygienists need increased education on risk factor communication strategies; 2) dentist age category and their preference on how patient education is provided, and who in the dental office communicates most with patients on oral/systemic links; and 3) dentist area of practice and their view on the importance of a specific periodontal protocol to increase patient understanding.

RESULTS

Demographics: The majority of survey respondents were male dentists (76%) aged 45-55 years old (54%), who came from an urban practice (62%) and who practice in a general dentistry office (84%). (Tables 1,2,3,4)

Attitudes and Opinions: The overall response results indicate that most New Mexico dentists (70%) are satisfied with the knowledge and recommendations of dental hygienists for discussing oral/systemic inflammation and cigarette smoke damage. (Table 5) Likewise, nearly half of dentists (43%) say they are satisfied with the knowledge and recommendations a dental hygienist has when discussing bruxism/clenching habits with patients. (Table 8)

With regards to periodontal disease, the top two risk factors/indicators that New Mexico dentists would like to see hygienists educate more patients on include: #1=diabetes and periodontal disease, and #2=cigarette smoking and parafunction and periodontal disease diabetes. (Table 14)

While the overwhelming majority (89%) of New Mexico dentists rated their SPT protocol as adequate, most dentists surveyed either strongly agreed (27%) or agreed (46%) that having a specific protocol with risk assessment for a dental hygienist to implement into SPT appointments would increase understanding and motivation for the patient. (Tables 15 and 16)

Nearly half (49%) of New Mexico dentists reported that they feel dental hygienists need increased education on communication strategies for discussing oral/systemic links with patients, approximately (43%) disagreed. (Table 17) In addition, 81% recognized that the amount of experience a dental hygienist has on the job contributes to his/her knowledge of risk factors and predictors for periodontal disease. (Table 18)

Regarding educational level (4-year versus 2-year) of a dental hygienist contributing to his/her overall knowledge and confidence—with one-third (33%) of respondents stated that dental hygienists who earn a Bachelor degree have increased knowledge and confidence. Thirty-five percent of dentists did not answer the question, and 27% responded that both graduates have equal amounts of knowledge and confidence. (Table 19)

Lastly, the majority of New Mexico dentists (76%) prefer a team approach in which both dentist and dental hygienist educate and communicate with the patient on oral/systemic links and disease. (Table 20)

Patient Education & SPT Protocol: As a whole, the results support that New Mexico dentists view dental hygienists as providing adequate or above adequate patient education on four of the most common risk factors for periodontal disease.

Specifically, regarding discussions with patients about the relationship between periodontal disease and diabetes, over one-third (37%) of respondents report witnessing a dental hygienist inquiring about a periodontal patient's HbA1c levels, and providing oral/systemic periodontal education. (Table 6)

In addition, nearly half of dentists surveyed (46%) said that their SPT appointments include discussions of increased gingival bleeding as a sign of inflammation that may be related to elevated blood glucose levels and systemic inflammation. (Table 7)

The majority of respondents (54%) stated that parafunction is evaluated and discussed during patients' SPT appointments. (Table 9)

With regards to the frequency with which New Mexico dentists make some type of occlusal appliance for their patients, 68% said they have made occlusal appliances for up to one-quarter of their patients (0-25%). (Table 10) In addition, 70% of respondents estimated that within the last five years, their recommendations for occlusal appliances have increased. (Table 11)

A few questions were asked with regards to the overall medical history and health of the patient. Specifically, 41% of respondents say that health questionnaire/medical history and blood pressures are measured by a dental hygienist at every SPT appointment, and 27% say this is done every 6 months. An equal number of respondents (35%) say they do refer patients to a primary physician to evaluate for inflammatory markers in the presence of periodontal disease or non-responsive periodontal disease. (Tables 12 and 13)

Relational Indicators: Chi-square statistical tests were run to see if any correlations existed between New Mexico dentist responses and some of their demographic information. This particular study did not show any significant relationships on variables such as dentist area of practice (rural vs. urban) and attitudes on dental hygienist knowledge and effective communication strategies; dentist age category and preference on who provides patient education and how it's implemented; or area of practice (rural vs. urban) and having structured and specific SPT protocols. (Table 21)

DISCUSSION

A review of the results from this study shows that, overall, New Mexico dentists are satisfied with dental hygienist knowledge on four of the most common risk factors for periodontal disease.

The review of the literature supported the importance of dental hygienists including basic education for patients on the link between periodontal disease and diabetes, and inquiring regularly on the number of their current HbA1c.¹⁰ The majority of respondents indicated that they regularly see dental hygienists educating patients on diabetes/periodontal disease during SPT appointments. In addition, dentists reported that most of their SPT appointments include discussions on a possible relation between increased bleeding/inflammation and elevated blood glucose levels.

New Mexico dentist responses also revealed a high satisfaction rate and overall good performance on dental hygienist experience and knowledge on patient education for the links between CVD and cigarette smoking with increased oral inflammation/periodontal disease. Discussions of CVD and elevated blood pressure

were shown in the review of the literature to be crucial elements to address due to the link between inflammatory activities and destruction of epithelium.¹¹

New Mexico dentists reported approximately 35% of their hygienists will refer a patient to their primary physician for elevated blood pressure. Most New Mexico dentists report their dental hygienist reviews medical history and blood pressure either at every SPT appointment (3-4 months) or every 6 months. In circumstances where elevated blood pressure was noted, responses were split equally, with 35% of dentists reporting that they do refer patients to their primary physician, 35% saying they do not refer, and 22% referring "sometimes." This possibly would benefit from further discussion and study as the trend towards communication between health fields increases. Reasoning for the non-referring group could be investigated more closely to identify which factors would increase confidence and prompt the decision to make the referral.

The effects of cigarette smoking on inflammation response and tissue damage, as well as smoking cessation, are reported as being discussed regularly at SPT appointments. The importance and continuation of educating patients on smoking cessation is strongly supported through previous research showing that the exposure to cigarette smoke increases the body's cellular defense, which increases inflammation and tissue damage.^{18,19}

The literature review found no significant studies that indicated parafunction/bruxism links with periodontal disease to be a large topic of education for the dental hygienist. However, 43% of New Mexico dentists reported they were satisfied with the knowledge and recommendations a dental hygienist has when educating patients on bruxism and clenching habits and their relation to periodontal disease. Previous research articles indicated mostly that the role of trauma from occlusion and pathogenesis of periodontal disease is not fully understood.¹⁴ However, increased tooth mobility and accelerated bone loss have been studied and proven to

link parafunction and periodontal disease together.^{14,15} This study supported the trend of patient education in that 54% of New Mexico dentists said occlusion and parafunction is discussed at every SPT appointment. Furthermore, 70% of New Mexico dentists estimated that within the last five years, their recommendations for an occlusal appliance have increased. It appears that periodontal trauma from occlusion plays a role in the overall healing and maintenance of patients with periodontal disease. Results from this study show that some SPT protocols do not involve treatment of parafunction habits. Perhaps this is an area needing more research and practitioner education.

From New Mexico dentists' perceptions and experience, diabetes, cigarette smoking, and parafunction were the top risk factors indicated as the most crucial topics for patient education. New Mexico dentists reported that dental hygiene patient education on these risk factors is mostly satisfactory, with just a small margin needed for expanded or continued education. New Mexico dentist responses supported the ideas in the literature review that having a structured and specific SPT protocol may increase patient understanding and motivation for being an active participant in their overall health and periodontal healing. The majority of New Mexico dentists are on board with an SPT protocol, and 89% of them rate their current protocol as adequate. The American Dental Association includes assessment of oral health, overall health, counseling patients on proper food nutrition, and identifying possible risk factors for periodontal disease as part of the services provided by a dental hygienist,¹⁸ so it would be logical to include these in a structured/checklist SPT appointment.

It seems natural that New Mexico dentists observe more experienced dental hygienists as having an increased knowledge on risk factors and communication strategies with patients. This may be attributed to the fact that experience improves one's comfort and confidence of speaking openly on patient overall health and

contributing risk factors to periodontal disease. While the majority of New Mexico dentists felt risk factors/indicators were covered and discussed in a satisfactory manner during SPT appointments, 49% reported that they feel dental hygienists need increased education on communication strategies for patient education on oral/systemic links. This supports past research studies that have proven the growing correlation between oral and systemic health. With the information from this study, one could suggest the need and importance for more didactic instruction or clinical role-playing to strengthen the confidence of students in educating patients on periodontal risk factors. One could also conclude that results from this study support a need for more continuing education classes with instruction on oral/systemic health, effective strategies for patient communication, and motivation techniques for patients to help them improve their overall health.

Along with experience levels, New Mexico dentists further reported they believe that dental hygienists who possess a 4-year Bachelor degree have increased knowledge and confidence in patient education, as compared to dental hygienists with only a 2-year Associate degree.

Finally, the results identified that most New Mexico dentists (76% from a 5% response) prefer a team approach in which both dentist and dental hygienist educate and communicate with the patient on oral/systemic disease and correlations between the two. This result seems positive and supports previous findings in research studies that show good communication skills between dentist and dental hygienist about their roles and expectations will be much more valuable to patients. If dentist and dental hygienist are working together and the dentist (the front of the dental team) supports this, then a variety of skills can be used successfully in the management of periodontal disease.¹⁷

CONCLUSION

The intent of this study was to examine the attitudes and answers New Mexico dentists have regarding their experiences with dental hygienist knowledge in risk assessment for periodontal disease, and patient education on oral/systemic links contributing to periodontal disease. The main goals were to discover which risk factors/indicators were thought by New Mexico dentists to be the most crucial to address in helping to stabilize periodontal disease; to determine how effective New Mexico dentists believe dental hygienists are in discussing and educating patients on four of the main risk factors (diabetes, CVD, cigarette smoking, and parafunctional habits); to discover where the gaps may be in educating patients on certain risk factors; and to determine if New Mexico dentists observe SPT as more effective with structured protocols, and through a dentist/dental hygienist team approach for patient education.

Overall, the descriptive data summed up that New Mexico dentists believe their dental hygienists to be mostly satisfactory in discussing and educating periodontal patients on all four risk factors studied (diabetes, CVD, cigarette smoking, and parafunctional habits). These results can support the idea that, in general, dental hygiene curricula and education for covering periodontal risk factors is proving effective. Admittedly, the size of this study was small. A 5% survey response rate does not allow generalization to a population, and it is only representative of dentists in New Mexico.

It seems the three risk factors that New Mexico dentists agree on needing the most attention in periodontal patient education are diabetes, cigarette smoking, and parafunctional habits/malocclusion. This result differed somewhat from previous research, which stated that the conditions dental hygienists are most likely to discuss as risk factors are tobacco use, pregnancy, and genetics.^{4,6} This study can provide

the motivation for educational institutions to put forth more effort in training students to interview and educate periodontal patients on ways to control or eliminate risk factors for periodontal disease.

Parafunctional habits, including the discussion of clenching/bruxism and fabrication of occlusal appliances, are a growing topic of importance. In this study, 70% of the 5% response of New Mexico dentists reported that within the last five years, their recommendations for occlusal appliances have increased. Perhaps because parafunction/bruxism is an increasing contributing factor to the stabilization of periodontal disease, increased dental hygiene education on occlusal appliances or bite stabilization could be useful.

New Mexico dentists reported that, in general, dental hygienists with more years of experience and more years of school (4-year vs. 2-year degree) had increased knowledge on periodontal risk factor evaluation, and more confidence in patient communication and education. Again, given the limited, smaller sample size, this study cannot be generalized to an entire population; however, we may say that perhaps additional education and confidence-building exercises for students upon graduation may ideally become a new focus of future dental hygiene programs.

Conclusions can be made from the 5% response rate of this study that more than half of the total respondents of New Mexico dentists witness effective and satisfactory periodontal risk factor assessment, and that structured SPT protocols are carried out by a dental hygienist. Most dentists agree or strongly agree that continued education on periodontal risk factors, understanding of the oral/systemic links of disease, and patient education and communication strategies are always important to deliver superior and current oral health care. Half of the respondents said that they refer patients to a primary physician for further examination if they suspect a connection between non-responsive periodontal disease and overall health. Perhaps through increased knowledge on current links between oral and systemic

health, dental hygiene providers and dentists will gain increased confidence to discuss with patients their reasons for referring them to their primary physician. This may also increase confidence for dental hygienists to discuss a patient's overall care with other health professionals.

Lastly, 76% of the 5% of the NMDA member dentists who responded to the survey stated that they prefer and support a team approach in which both the dentist and dental hygienist provide periodontal patient education on risk factors for periodontal disease. In accordance with the literature review, previous studies have shown that a team approach is the most effective way to educate a patient.¹⁷

This study concludes that New Mexico dentists' attitudes are that dental hygienists are overall effective in periodontal risk factors and patient education. Through increased oral/systemic link education, dental hygiene professionals can continue to reduce the incidence of inflammatory/oral/systemic disease through patient education—benefitting dental practices and patients, as well as elevating the status of dentistry and oral health providers as regarded by other health professionals.

APPENDIX A

UNM HUMAN RESEARCH REVIEW COMMITTEE STUDY

PROTOCOL APPLICATION

1. **Protocol Title**

Assessment of the Awareness of Dental Professionals Regarding Identification and Basic Management of Dental Patients with Systemic/Parafunctional Conditions in a Routine SPT Appointment: A Survey
August 27, 2014

2. **IRB Review History**

“NA” New Survey

3. **Objectives**

- Analyze previous studies on the knowledge and importance of patient education on risk assessment links to periodontal disease.
- Acquire feedback from New Mexico dentists on their experience related to a dental hygienist’s role in patient education for periodontal risk assessment.
- Identify which risk factors dentists view dental hygienists addressing most often and have the most knowledge on.
- Identify which risk factors dentists rank as most important for discussion on periodontal risk assessment.
- Identify if age category of New Mexico dentists affects their practice of risk assessment and periodontal protocols.
- Identify if dentists in rural or urban communities differ in periodontal protocols.
- Identify if New Mexico dentists expect a dental hygienist to discuss oral/systemic risk assessment with patients.
- Identify if New Mexico dentists agree/disagree that a specific protocol for periodontal risk assessment may increase patient motivation.
- Identify if differences are seen in the number of years of experience or years of school/training for a dental hygienist in relation to confidence/knowledge in discussing periodontal risk assessment.

4. **Background**

As links between oral and systemic health continue to grow, it is of interest and importance for dental hygienists to incorporate and educate patients on all risk factors for periodontitis, which may include some systemic conditions or illnesses. Previous studies have indicated that dental

hygienists want more education on risk assessment for oral disease, and factors for improving patient compliance and effective results of therapy to treat these oral diseases.^{5,8} Research already conducted indicated lower levels of knowledge and formal training for dental hygienists in addressing expanded risk factors and indicators for periodontal disease.^{5,8,12}

Furthermore, it is found that dentists are more likely to assess for risks and discuss parafunction and/or occlusal trauma/disease with their patients.^{5,8} To gain more insight on the confidence, knowledge, and frequency of patient education on oral/systemic links from a dental hygienist, this study will survey New Mexico dentists on their experiences and attitudes of this practice. Additionally, it will address if differences are seen in dentists' perceptions depending on age category, or area of practice of the dentist, and the number of years of experience/number of years of school/training of the dental hygienist.

5. Inclusion and Exclusion Criteria

The survey will be sent via e-mail through the New Mexico Dental Association listserv. All members of the Association will receive the study. This study will not include adults who are unable to consent, individuals who are not yet adults, or prisoners.

6. Number of Subjects (Recruitment Target)

Total number of participants who will be invited to participate is estimated to include between 600-700 individuals. All New Mexico dentists recruited will be current members of the New Mexico Dental Association.

7. Recruitment Methods

A recruitment letter will be sent via mass e-mail through the New Mexico Dental Association asking for all Association members to participate in taking a 20-question survey. The recruitment letter will contain a brief description of the survey intent.

8. Study Timelines

The study timeline for participants is two weeks from the date that the initial e-mail invitation is sent out. Individuals will be asked to click on a web-based survey link; total participation time is 10-15 minutes. The estimated completion time for this study, including data analysis, is October 15, 2014.

9. Study Endpoints

The primary endpoint for data analysis and reporting is estimated to be October 15, 2014. Reporting and presentation of results is expected to continue through to December 2014.

10. Research Setting

Research study will be conducted through a 20-question survey sent via

e-mail through the New Mexico Dental Association. The survey link will be housed through a web-based survey engine (Psych Data). Participants will have the freedom to choose their place of participation; possible choices include their personal office, home, or mobile device.

11. Study Methods

A descriptive design study using a 20-question survey will be sent to all members of the New Mexico Dental Association following documents sent for recruitment and informed consent. Participants are required to read the initial page of the survey detailing the involved procedures, risks, benefits, protection of confidentiality, and time committed. The survey will include questions such as the types of risk assessment topics dentists witness dental hygienists educating periodontal patients on, or what they would like a dental hygienist to educate periodontal patients with, as well as ways dentists think this would benefit a patient and a practice. The survey will take approximately 10-15 minutes to complete, and all data will be kept in the hard drive of the secure private computer of the proxy PI. All data will be deleted from this hard drive three months following completion of the study. There are no known risks in this study, except some individuals may experience discomfort when answering questions.

12. List of Appendices

Attached are the following items:

- Recruitment Letter
- Cover Letter for Informed Consent
- Departmental Review Form
- Study Survey

13. Data and Specimen Banking

All survey data is stored on the Psych Data internal database and can only be accessed by authorized personnel. The Principal Investigator and the proxy PI will be the only individuals able to access the survey data. The data will be downloaded to a secure private computer belonging to the proxy PI for analysis. The data will be stored for three months following the completion of the study, and then will be deleted from the hard drive of the personal computer by the proxy PI.

14. Data Management

Upon completion of the survey timeline for participation, the data will be downloaded onto the proxy PI's personal computer via the SPSS software package. The data will be analyzed using descriptive statistical tests in consultation with a statistician. All surveys hosted with Psych Data are encrypted using 256-bit SSL technology (Secure Socket Layer), which is equivalent to the industry standard for securing credit card information over the Internet. Thus, all responses are instantly encrypted and remain so until they are received at the Psych Data database. Once research

data is stored on a Psych Data server, it is held in an isolated database that can only be accessed by a researcher with the correct username and password. This anonymous survey will not contain any direct identifiers. The proxy PI is responsible for receipt and transmission of the data, including transmission of the data to a statistician trained in the ethics of research involving human subjects. The statistician will be provided access to the data via the proxy PI's Psych Data account in the presence of the proxy PI, and will provide consultation with the analysis of the data.

15. Provisions to Monitor the Data to Ensure the Safety of Subjects

“NA” This study does not pose greater than minimal risk. Data will be collected and analyzed, then destroyed three months following completion of study.

16. Withdrawal of Subjects

Participants may terminate or withdraw their participation at any point in the study by closing their browser window. Instances in which a participant may need to withdraw include mental/emotional fatigue or insufficient time to complete the survey. Participants will be notified in the recruitment e-mail that the survey will take 10-20 minutes to complete. Participants will not be penalized in any manner should they choose to withdraw early.

17. Risks to Subjects

There are no known risks in this study, except some individuals may experience discomfort while answering questions.

18. Potential Benefits to Subjects

There is no direct benefit to the participants from engaging in this study. Indirect benefits include:

The findings of this project will provide information on dental hygiene periodontal risk assessment education, as well as expectations and practices of New Mexico dentists with incorporating and maximizing the skills of dental hygienists to create a comprehensive care plan for periodontal patients. New Mexico dentists, dental hygienists, as well as dental hygiene program educators can identify which periodontal risk factors need more understanding and concentration to be taught in an educational setting.

19. Vulnerable Populations

“NA” There are no vulnerable populations, or no populations that cannot give informed consent. This research study has the potential to include some pregnant women, but does not contain more than minimal risk to pregnant women or fetuses.

20. Multi-Site Research

“NA” Research is not multi-site.

21. Community-Based Participatory Research/Field Research

“NA” Research is not community-based or field research.

22. Sharing of Results with Subjects/Incidental Findings

Results will not be shared with study participants as an individual or whole. If published, results will be presented in summary form only.

23. Resources Available

The PI has over 15 years of experience in dental hygiene education and administration. Educational expertise includes didactic and clinical instruction, dental public health and research, as well as web-based distance learning. The PI and proxy PI are both licensed dental hygienists with over 20 years of combined experience, and pursue interest in optimizing the educational standard of a dental hygienist for patient education on periodontal and systemic/parafunctional risk factors.

24. Prior Approvals/Attachments Requiring Signatures

Departmental Review Form available in Click IRB under “supporting documents.”

25. Confidentiality

All data will be downloaded from the Psych Data survey engine to a secure private computer belonging to the proxy PI. Data will be accessible to Christine Nathe RDH, MS (PI), and Camille Padilla, RDH, BS (proxy PI). The data produced from the survey will be downloaded to a secure private computer belonging to the proxy PI for analysis. Three months following completion of the study, the data will be deleted from the hard drive of the proxy PI’s personal computer.

26. Provisions to Protect the Privacy of Subjects

“NA” Survey does not contain direct identifiers. All data will be destroyed three months following completion of study.

27. Compensation for Research-Related Injury

“NA” There are no known risks of injury for participation in this project.

28. Economic Burden to Subjects

“NA” Subjects are not responsible for any costs or economic burden in this project.

29. Consent Process (including waiver request for HIPAA, waiver of HIPAA for recruitment only, Waiver of Informed Consent, and Alteration of Informed Consent)

Participants will be invited to participate in the survey via a mass e-mail sent through the New Mexico Dental Association. The e-mail will first

contain a recruitment letter inviting the individuals to participate, along with a brief description of the study design and purpose. Following the recruitment letter, an e-mail containing a cover letter for informed consent as well as a link for the survey will be sent to all members of the New Mexico Dental Association. Participants will be notified that by clicking the survey link, they are providing their voluntary consent to participate in the research study. Recruitment letter and Cover letter for Informed Consent are attached.

Waiver or Alteration of Informed Consent:

We are requesting a waiver of signature, and use of a survey cover letter. There are no known risks in this study, and the survey does not contain direct identifiers. The waiver will not adversely affect the rights and welfare of the subjects.

HIPAA Authorization

We are not collecting PHI or identifiers. HIPPA does not apply.

Waiver of HIPAA authorization:

Planned Emergency Research Consents

“NA” No emergency research is included in this study.

“NA” This survey is anonymous. This survey contains no identifiers or known risks. By clicking on the survey, subjects are giving consent.

30. Drugs or Devices

“NA” No drugs or devices will be used in this study.

APPENDIX B

HRPO APPROVAL LETTER (STUDY ID # 14-291)



*Human Research Review Committee
Human Research Protections Office*

October 29, 2014

Christine Nathe, RDH
CNathe@salud.unm.edu

Dear Dr. Nathe:

On 10/22/2014, the HRRC reviewed the following submission:

Type of Review: Initial Study
Title of Study: Assessment of dental professionals identification and basic management of dental patients with systemic/parafunctional problems in a routine supportive periodontal therapy (SPT) appointment: A survey Version 10/20/14
Investigator: Christine Nathe, RDH
Study ID: 14-291
Submission ID: 14-291
Funding: None
Grant ID: None
IND, IDE, or HDE: None

Submission Summary: 14-291 Initial Study

Documents Reviewed: • Protocol Thesis v8/27/2014;
• Consent Cover Letter v10/20/2014;
• Recruitment Letter v10/20/2014;
• Dentist Survey v10/20/2014;
With Acknowledgment of:
• Dept Scientific Review Form dated 09/15/2014;

Review Category: Exemption: Categories (2) Tests, surveys, interviews, or observation

Determinations/Waivers: Signature waived; requires written statement about research
HIPAA Authorization Addendum Not Applicable

Submission Approval
Date: 10/22/2014
Approval End Date: N/A
Effective Date: 10/22/2014

The HRRC approved the study from 10/22/2014 to inclusive. If modifications were required to secure approval, the effective date will be later than the approval date. The "Effective Date" 10/22/2014 is the date the HRRC approved your modifications and, in all cases, represents the date study activities may begin.

APPENDIX C

SURVEY INSTRUMENT

Survey

I. Demographics

1. Select your age category:
 - A. 30-35
 - B. 35-45
 - C. 45-55+

2. Select your gender:
 - A. Male
 - B. Female
 - C. I choose not to answer this question

3. Please select the area where you practice:
 - A. Rural
 - B. Urban

4. What type of practice are you in?
 - A. General
 - B. Pediatric
 - C. Periodontal
 - D. Oral Surgery
 - E. Endodontic
 - F. Other (please explain)

II. Survey Questions

The following questions refer to your professional experiences and attitudes on how well educated, prepared, and eager do you feel dental hygienists you work with are in incorporating systemic and parafunctional topics into a periodontal maintenance appointment. Your answers may pertain to dental hygienists you have employed or that you have had other opportunities to work with (i.e., public health setting).

Operational Definitions:

Supportive Periodontal Therapy (SPT)= This starts after completion of active periodontal therapy and continues at varying intervals for the life of the dentition. The phase of periodontal therapy during which periodontal

diseases and conditions are monitored and etiologic factors are reduced or eliminated.

Non-Surgical Periodontal Therapy(NSPT)= An integral part of periodontal treatment and has been defined as plaque removal, plaque control, supra and sub gingival scaling, root surface debridement, and the adjunctive use of chemical agents.

5. How would you rate the SPT protocol in your practice?
 - A. Adequate
 - B. Needs improvement
 - C. Not applicable

6. How satisfied are you with the knowledge and recommendations of a dental hygienist when discussing the inflammatory response and tissue damage caused by cigarette smoke?
 - A. Satisfied
 - B. Somewhat satisfied
 - C. Not satisfied
 - D. My hygienist does not address this issue

7. Are you satisfied with the knowledge and recommendations a dental hygienist has when discussing a bruxism/clench habit with patients?
 - A. Satisfied
 - B. Somewhat satisfied
 - C. Not satisfied
 - D. My hygienist does not address this issue

8. Who do you prefer to communicate mostly with patients on the oral/systemic links in inflammation and disease?
 - A. Dentist
 - B. Dental hygienist
 - C. Dentist for reiteration of hygienist (team approach)

9. For your patients with diabetes, does the dental hygienist inquire with the patient about their HbA1c levels and discuss with the patient the relationship between diabetes and periodontitis?
 - A. Yes
 - B. No
 - C. Sometimes
 - D. Don't know

10. Do your SPT hygiene appointments include discussions of increased gingival bleeding as a sign of inflammation that may be related to elevated blood glucose levels and systemic inflammation?
 - A. Yes
 - B. No
 - C. Sometimes

11. Does your office refer patients to their primary physician to evaluate for inflammatory markers in the presence of periodontal disease, or non-responsive periodontal disease?
 - A. Yes
 - B. No
 - C. Sometimes

12. How often are health questionnaire/medical history and blood pressures measured by a dental hygienist?
 - A. At every SPT appointment
 - B. Every 6 months
 - C. Annually
 - D. Never

13. Are parafunctional habits/occlusal discrepancies/bruxism/clenching evaluated at SPT appointments?
 - A. Yes, often
 - B. No, never
 - C. Sometimes
 - D. Only when this is a chief complaint

14. What percentage of patients in your office would you estimate having made some type of occlusal/TM joint appliance for?
 - A. 0-25%
 - B. 25-50%
 - C. 50-75%
 - D. Over 75%

15. Would you estimate that within the last five years your recommendations for occlusal appliances have increased?
 - A. Yes
 - B. No

16. Do you feel dental hygienists need more training on communication strategies for discussing oral/systemic link with patients?
 - A. Yes
 - B. No

17. Please select two topics/risk factors, other than plaque control, that you would most likely ask your dental hygienist to educate periodontal patients on.
- A. Cigarette smoking
 - B. Cardiovascular disease
 - C. Diabetes
 - D. Parafunctional habits/occlusal disease
18. Do you feel having a specific protocol with risk assessment for dental hygienists to address at each SPT appointment would be more understandable for a patient and possibly increase patient motivation?
- A. Strongly agree
 - B. Agree
 - C. Disagree
 - D. Strongly disagree
19. Do you think experience contributes to a dental hygienist's knowledge on risk factors/predictors for periodontal disease?
- A. Yes
 - B. No
20. Have you experienced any significant difference in the amount of knowledge and confidence in a 4-year (Bachelor) degree vs. a 2-year (Associate) degree graduate dental hygienist?
- A. Graduates from a 4-year program are more confident in risk assessment discussions with patients.
 - B. Both are equally confident in risk assessment discussions with patients.
 - C. I have not employed hygienists from the two different schools of education and training.
 - D. Graduates from a 2-year program are more confident in risk assessment discussions with patients.

APPENDIX D

UNM HRPO APPROVED CONSENT FORM

University of New Mexico Health Sciences Center
Informed Consent Cover Letter for Anonymous Surveys

STUDY TITLE

Assessment of dental professionals identification and basic management of dental patients with systemic/parafunctional problems in a routine Supportive Periodontal Therapy appointment....A Survey

Camille Padilla RDH, BS is conducting a research study as a graduate student under the Principal Investigator Christine Nathe RDH, MS from the department of dental medicine. The purpose of the study is to examine the experiences of New Mexico dentists with regard to the educational and confidence levels of dental hygienists in patient education on risk assessment for periodontal disease. You are being asked to participate in this study because you are a New Mexico dentist.

Your participation will involve taking a simple survey. The survey should take about 10 minutes to complete. Your involvement in the study is voluntary, and you may choose not to participate. There are no names or identifying information associated with this survey. The survey includes questions such as the types of risk assessment issues New Mexico dentists witness dental hygienists discuss with periodontal patients with, or what they would like a dental hygienist to discuss with periodontal patients. You can refuse to answer any of the questions at any time. There are no known risks in this study, but some individuals may experience discomfort when answering questions. All data will be kept for 3 months on a harddrive of the secure private computer belonging to the proxy PI.

The findings from this project will provide information on dental hygiene periodontal risk assessment education, as well as the goals of New Mexico dentists with incorporating and maximizing the skills of dental hygienists to create a comprehensive care plan for periodontal patients. If published, results will be presented in summary form only.

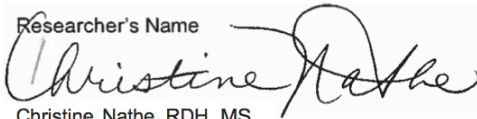
If you have any questions about this research project, please feel free to call Christine Nathe RDH, MS at (505) 272-8147, or Camille Padilla RDH, BS at (505) 272-4513. If you have questions regarding your legal rights as a research subject, you may call the UNMHSC Office of Human Research Protections at (505) 272-1129.

By clicking on the link provided you will be agreeing to participate in the above described research study.

Thank you for your consideration.

Sincerely,

Researcher's Name



Christine Nathe, RDH, MS
Researcher's Title
Professor

HRPO #: 14-291	Page 1 of 1	Version: 10/20/2014
APPROVED: 10/22/2014	OFFICIAL USE ONLY	EXPIRES: N/A



UNM

Human Research Protections Office

The University of New Mexico Institutional Review Board (HRC)

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