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Using motivational interviewing and technology to increase confidence in nutritional counseling among dental hygienists: a thesis

Heather Anderson

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Using Motivational Interviewing and Technology to Increase Confidence in

Nutritional Counseling among Dental Hygienists:

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Master of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Heather Anderson

Spring 2020

Major Professor:

Sarah Jackson, RDH, MSDH

CONFIDENCE IN NUTRITIONAL COUNSELING

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Human Subjects Approvals**EASTERN WASHINGTON UNIVERSITY**

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start something **big**

TO: Heather Anderson, Department of Dental Hygiene
FROM: ^{RG}Ruth A. Galm, Human Protections Administrator
DATE: December 5, 2019
SUBJECT: Using Motivational Interviewing and Technology to Increase Confidence in Nutritional Counseling among Dental Hygienists (HS-5836)

With the final amendments provided on December 4, 2019, human subjects protocol HS-5836 entitled "Using Motivational Interviewing and Technology to Increase Confidence in Nutritional Counseling among Dental Hygienists" has been approved as an exemption from federal regulations under 45 CFR Part 46.104(d)(1-8).

A signed and approved copy of your application is attached.

Student research qualifying for an exempt IRB review is valid for a period of one year. If subsequent to initial approval, the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departure from the original proposal must be reviewed through a Change of Protocol application submitted to the IRB before the protocol may be altered. Please refer to HS-5836 on future correspondence as appropriate as we file everything under this number.

Cc: HS-5836 file
Prof. Sarah Jackson, RPI
Prof. Lisa Bilich, Dept. Chair
Graduate Office

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HS-5836

Application for Exempt Research
EWU Institutional Review Board for Human Subjects Research

Return this form, signed + 2 copies (3 total) to the Office of Grant and Research Development, 210 Showalter (SHW)

Principal Investigator (PI): Heather Anderson, RDH, BSDH		<i>If PI is a student, an RPI is required.</i> Responsible Project Investigator (RPI) (faculty/staff sponsor): Sarah Jackson, RDH, MSDH					
Student Investigators, does the RPI have permission to renew the study in their own name after you have left the university? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>		Department: Dental Hygiene Campus address/Mail stop: 310 N. Riverpoint Blvd. Phone number: (509) 828-1299 E-mail: sarah.jackson@ewu.edu					
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For students only: Is this research being done to meet a course, thesis or other academic requirement? X Yes <input type="checkbox"/> No If yes, please specify: Thesis for MSDH If not, why is it being done?							
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Funding: X Non-funded <input type="checkbox"/> Internal funding <input type="checkbox"/> External funding							
Funding agency (if applicable): Grant or Contract Number:							
Check the type of exemption applicable to the project using the "Exemption Decision Aid." X 1. X 2i. <input type="checkbox"/> 2ii. <input type="checkbox"/> 2iii. <input type="checkbox"/> 3i. <input type="checkbox"/> 3ii. <input type="checkbox"/> 3iii. <input type="checkbox"/> 4i. <input type="checkbox"/> 4ii. <input type="checkbox"/> 4iii. <input type="checkbox"/> 4iv. <input type="checkbox"/> 5. <input type="checkbox"/> 6. <input type="checkbox"/> 7. <input type="checkbox"/> 8.							
Rationale for exemption. Why should this project be exempt? This research will be conducted through an educational module to students and anonymous pre and posttest surveys with minimal risk to the participants.							
Please state the purpose and methodology of the research: The purpose of this research is to evaluate if confidence in nutritional counseling with dental hygiene students will increase with the introduction of an assessment tool to guide the students through nutritional counseling and motivational interviewing with their patients. This proposed study will examine the following questions: Does an educational module on motivational interviewing affect dental hygiene students' confidence to perform nutritional counseling? Furthermore, does introducing a reference guide for motivational interviewing in conjunction with an electronic Nutritional Risk Assessment and Counseling Tool improve dental hygiene students' confidence in nutritional counseling? There is minimal risk to the students and their identity will remain anonymous. The independent variable will be the educational module developed by the investigator based on nutrition knowledge in relation to oral health and how motivational interviewing can be applied to nutritional counseling. Also, the reference guide and electronic nutrition risk assessment and counseling tool will be introduced to help guide the students chairside. The dependent variable will be the students' confidence level. This will be measured via posttests after 3 weeks of clinic time to have opportunities to utilize these skills.							
Describe the procedures: what specifically will subjects do? If data are anonymous, describe the data gathering procedure for insuring anonymity. Students will attend an educational module on using motivational interviewing with nutritional counseling. Those that wish to participate in the study will be asked to complete a pretest with informed consent (see Appendix A) distributed through Qualtrics via the students' email addresses. The module will be required as part of their dental hygiene curriculum, but the survey/research is optional and does not impact the students' grades. After the module, the students will be encouraged to use the knowledge gained to conduct nutritional counseling sessions with their patients. After 3 weeks, the students will receive a posttest (see Appendix B) Qualtrics survey. Qualtrics will keep the identity of the students' anonymous.							
Attach all proposed recruitment materials (scripts, texts, emails, flyers and/or social media posts), surveys, questionnaires, cover letters, information sheets, consent forms, etc.							

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I certify that the information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and university regulations:		
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Recommendations and Action:	Date	Approve/Disapprove
RPI Signature (Needed only if PI is a student):		(A) D
IRB Rep. or Dept. Chair Print & Sign: (Needed if PI is a student OR for faculty PI if required by department)	isa Bilich 	(A) D
IRB Signature:	Russ C. Galm 12/5/19	(A) D
<input type="checkbox"/> Subject to the following conditions: as amended 12/4/19		
Approved from 12/5/19 to 12/4/20		

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Abstract

Purpose: Research shows definite connections between food choices and caries, periodontal disease, and oral cancer. Dental hygienists have the unique opportunity to educate patients on how nutrition can improve oral health. Dental hygiene students are introduced to these concepts but struggle to gain confidence to share this knowledge with patients. This study looked at an educational module on motivational interviewing (MI) and an electronic assessment tool to build student confidence with nutritional counseling.

Methods: Students participated in an educational module to review MI and introduce the electronic nutritional risk assessment and counseling tool. Prior to the module, participants completed a pretest about attitudes and confidence levels regarding MI and nutritional counseling. After three weeks of clinical practice, participants completed a posttest including the same questions, a report on the frequency of nutritional counseling sessions, and open-ended questions. Data was compared for quantitative changes and qualitative themes from participant responses.

Results: Twenty-two students ($n = 22$) participated in both pretest and posttest. There were statistically significant changes in participants' frequency of nutritional counseling sessions ($p = 0.049$) as well as in their confidence ($p = 0.007$) and comfort ($p = 0.020$) discussing nutrition with patients. Participants struggled to become more confident in MI as demonstrated with no significant change in their feelings surrounding MI ($p = 0.150$). Students reporting increased nutritional counseling sessions showed improvement in their confidence with nutritional counseling.

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Conclusion: Introducing MI with an electronic assessment tool to aid dental hygiene students can improve confidence with nutritional counseling.

Acknowledgements

The success of this thesis and my graduate education could only come with the help of others. While many people over the past 20 months have been by my side to help ensure this achievement, I would like to specifically thank a few. My thesis committee chair, Sarah Jackson, had unending patience and enthusiasm for my work and well-being. The rest of my committee, Lisa Bilich and Craig Hunt, gave incredible advice and support during the research process. Dr. Elizabeth Tipton spent so much time with me to ensure I understood the statistics behind my research and was instrumental in presenting the results appropriately. The dental hygiene students at EWU were at the heart and soul of this research and I am grateful for the time spent with them these past months. My academic and professional colleagues counseled and reassured me. My parents unwavering belief and pride in me fueled my desire to succeed. And finally, my dear family including my husband, Justin, and our three children who were patient through stressful late hours and the best cheerleaders I could ask for. This “Soon Master” is now a real Master!

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Introduction/Literature Review

Introduction to the Research Question

Current health and well-being philosophies recognize the mouth has a relationship with the body; this has not always been the case. In recent decades, the focus on disease prevention has been in the forefront of modern dentistry, including the recognition of the interrelation of oral health and the body. Nutrition is a prime way health is improved or hindered in one's body, including oral health. Risks of dental caries, periodontal disease, and oral cancers can all be impacted by nutrition (Moynihan, 2005). Currently, dental hygienists understand nutritional education is beneficial for their patients; however, they experience barriers, such as time constraints, lack of confidence, and insufficient knowledge, when it comes to performing nutritional counseling (Hayes, Franki, & Taylor, 2016).

Dental hygienists and other clinicians also face challenges with patient compliance. Using motivational interviewing (MI) to approach topics such as nutritional counseling can provide superior patient outcomes (Bray, 2010). As MI is practiced and used correctly, dental hygienists may actually reduce some of these barriers as well as see patient improvement.

Statement of Problem

As healthcare professionals, dental hygienists have the responsibility to educate patients on ways to improve their nutrition, thereby improving oral and overall health. Dental hygienists may benefit from increasing their confidence and experience with nutritional counseling in regard to oral health. This study examined the following

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questions: Does an educational module on motivational interviewing affect dental hygiene students' confidence in nutritional counseling? Furthermore, does introducing a reference guide for motivational interviewing in conjunction with an electronic nutritional risk assessment and counseling tool improve dental hygiene students' confidence in nutritional counseling?

Overview of Research

Oral healthcare providers, including dental hygienists, have a direct effect on the oral health of their patients. The influence they can have on their patients' overall health is substantial as well. Dental hygienists can influence the overall health of their patients through screenings for hypertension (Engström, Berne, Gahnberg, & Svärdsudd, 2011), oral cancer (Walsh, Rankin, & Silverman, 2013), and diabetes (Findrisc, 2017). Nutrition should also be included in these screenings to assess caries risk as well as other oral and systemic conditions. Dental professionals see patients on a regular basis creating an ideal opportunity to discuss nutrition with patients and educate them on nutrition's connection to teeth and oral health (Khan, Holt, & Tinanoff, 2017; Yokoyama et al., 2013).

While the epidemics of obesity and diabetes in our society compel healthcare providers to consider nutrition (Greenberg, Glick, & Tavares, 2017), dental hygienists have the added necessity due to nutrition's effect on oral health. Nutritional counseling can "significantly reduce the risk of oral disease" (Hayes, Wallace, & Coxon, 2016, p. 255). Diets high in sugar and carbohydrates can greatly increase the risk of caries. Educating patients to limit these foods, including drinks containing high amounts of sugar, and to increase homecare after eating or drinking such foods is imperative for caries control, as well as periodontal disease (Hayes, Cheng, Musolino, & Rogers, 2017).

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It is well documented that diabetes and periodontal disease are closely related (DiMaria-Ghalili et al., 2014; Glurich, Nycz, & Acharya, 2017; Gross, Paskett, Cheever, & Lipsky, 2017; Gulati et al., 2013; Hujoel & Lingström, 2017). A patient that is conscientiously controlling their blood sugars should be consuming fewer carbohydrates and processed foods and decreasing the sugar in their diet (Greenberg et al., 2017). Diabetes and periodontal disease have a bi-directional relationship. Poor glycemic control is associated with increased periodontal bone loss. While those with active periodontal disease are at an increased risk for abnormal blood glucose levels (Genco & Borgnakke, 2013).

Nutritional counseling for diabetic patients can be a way for dental hygienists to help control diabetes and thus improve the patient's periodontal condition. Furthermore, including nutritional counseling in dental hygiene care is a way to encourage medical-dental integration and interprofessional collaboration (Donoff, McDonough, & Riedy, 2014; Greenberg et al., 2017; Johnson, 2015; Khan, Holt, & Tinanoff, 2017). By discussing nutrition with patients, dental hygienists can also suggest following up with a patient's primary healthcare provider.

Nutrition and caries risk. Dental caries is a chronic disease of the teeth and directly related to diet. Tooth decay occurs when calcium and phosphate in the teeth depletes faster than they are replenished. This creates a delicate balance of demineralization and remineralization. Diets high in sugar and fermentable carbohydrates, such as breads, cookies, and candy can have a particularly damaging effect on this balance. These foods provide nutrients for bacteria in the mouth to produce acid and create an environment where remineralization cannot take place and tooth decay occurs (Hayes et al., 2017; Morris, 2006). It has been shown that populations accustomed

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to diets low in carbohydrates have a lower incidence of dental caries. In contrast, high carbohydrate diets, that are more widespread in our current population, contribute to a higher prevalence of caries (Hujoel & Lingstrom, 2017). In addition to dental caries, when the oral environment is in a continual acidic state, dental erosion can occur, leading to sensitivity and increased risk of caries. This acidic state most notably comes from drinking acidic beverages that often have added sugar (Franki, Hayes, & Taylor, 2014).

Nutrition recommendations in recent years have agreed limiting added sugars and refined grains helps reduce the risk of diabetes, weight gain, and dental caries (Hujoel & Lingstrom, 2017). Limiting these also provides room for more nutritionally rich foods such as fruits and vegetables (Alexander et al., 2010; Hujoel & Lingstrom, 2017).

Consuming refined carbohydrates is not the only risk factor for developing caries. Poor homecare, age, dietary habits such as snacking on cariogenic foods between meals, and limited saliva flow can all contribute to increased decay risk (Hujoel & Lingstrom, 2017). Given the preventive scope of dental hygienists, these professionals are in a prime position to educate patients about caries prevention, including nutritional counseling.

Nutrition and inflammation. Inflammation is the body's normal response to trauma or infection. It is part of the immune system's ability to help heal and/or protect the body. However, when inflammation becomes chronic, it devastates healthy tissues and is associated with a multitude of diseases such as asthma, lupus, diabetes, heart disease, and arthritis (Hutchisen, 2018). These types of noncommunicable diseases account for 41 million deaths annually, equivalent to 71% of deaths worldwide (World Health Organization [WHO], 2018). These preventable diseases should be scrutinized to evaluate how the healthcare field can combat their prevalence. Medications can help with

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some of these inflammatory diseases. Alternatively, evaluating one's diet to reduce foods that are considered inflammatory (see Table 1), such as sugar and fried or processed foods, can help to reduce the chronic inflammation and the risk or severity of these diseases (Hutchisen, 2018). Inflammation can happen anywhere in body, including the mouth, and altering a patient's nutrition can create more beneficial outcomes (Ritchie & Kinane, 2003).

Table 1

Types of Inflammatory Foods

Inflammation Causing Ingredient	Food Example
Sugar and high fructose corn syrup	Candy, soda, cakes, cookies, doughnuts, sweetened cereals
Artificial trans fats, partially hydrogenated oils	Margarines, French fries and other fast food, shelf stable baked goods, processed foods
Vegetable and seed oils	Canola oil, soybean oil, many processed foods
Refined carbohydrates (most of fiber removed)	Bread, pasta, pastries, cookies, processed foods containing sugar or flour
Excessive alcohol	More than 2 drinks per day for men and one for women
Processed meat	Sausage, bacon, ham, smoked meat, beef jerky

(Spritzler, 2019)

One large, international study ($N = 12,366$) evaluated participants' diets compared to risk for cancers and cardiovascular diseases. It was found the more inflammatory the diet, the greater the risk of death from cancers, particular digestive-tract cancers, and cardiovascular disease (Shivappa, Steck, Hussey, Ma, & Hebert, 2017). Both cardiovascular disease and cancer are associated with chronic inflammation. Because cardiovascular disease is the leading cause of death worldwide, investigating ways to alleviate the inflammatory burden on the body is imperative (Shivappa et al., 2017).

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Inflammatory diets have also been shown to increase the risk of depression (Jorgensen, White, Sekikawa, & Gianaros, 2018). Research shows anti-inflammatory diets can make a significant difference in the prevention and treatment of these and other chronic inflammatory diseases (Hujoel, 2009; Hutchisen, 2018; Shivappa et al., 2017; WHO, 2003). Furthermore, connections between cardiovascular health and periodontal health can potentially be linked to poor nutrition in some cases (Hujoel & Lingstrom, 2017).

Periodontal disease and nutrition. Dental hygienists combat the most common chronic inflammatory disease in their operatories every day: periodontal disease (Jenzsch, Eick, Rassoul, Purschwitz, & Jentsch, 2009). As this disease progresses, gingivitis or inflammation of the gingival tissue can turn to actual destruction of the periodontal ligament and surrounding bone (Nazir, 2017). Due to its inflammatory nature, inflammatory diets may have an effect on periodontal disease. In a 2009 study, Jenzsch et al. discussed how nutrition can influence the oral microflora and have an effect on inflammation in the mouth. In their study, after 12 months on a wholesome nutritional diet, participants ($N = 20$) who all had metabolic syndrome such as hypertension, hyperglycemia, and increased waist circumference showed a significant reduction of gingival inflammation ($p < 0.001$). Albeit a small study, these findings demonstrate simply decreasing inflammatory foods in general may decrease gingival inflammation. One quasi-experimental study had subjects ($N = 10$) placed on a strict diet of whole grains, herbs, milk, meat, plants, fish and nuts and dental homecare was eliminated. After four weeks, plaque levels had increased but there was no increase in gingival inflammation. Certain bacteria, probing depths and bleeding had decreased (Baumgartner et al., 2009). A similar more recent study was conducted placing subjects ($n = 10$) on an

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oral health optimized diet by reducing carbohydrates and increasing Omega 3-fatty acids, vitamin C, vitamin D, antioxidants, and fiber in periodontal patients. A significant reduction in gingival and periodontal inflammation ($p < 0.001$) was noted compared to the control group ($n = 5$) (Woelber et al., 2016). These studies demonstrate the importance of evaluating and improving nutrition as an adjunct to successful periodontal therapy. Additionally, in a summary of papers about the microbiome, Moelling (2016) discussed how changes in bacteria throughout the body can also create risk for metabolic diseases, obesity, immune deficiencies, and cognitive deficiencies. Nutrition can be a large reason for a shift in one's microbiome.

Fermentable carbohydrates, such as breads and crackers, also have an effect on the periodontium. Hujoel (2009) discussed at length the etiology of carbohydrate rich diets on periodontal disease and other systemic diseases. It is believed both dental and systemic chronic non-communicable diseases are due to excessive fermentable carbohydrates. Furthermore, dental diseases, such as caries and periodontal disease, could be early signs for systemic diseases, such as cardiovascular disease, diabetes, and certain cancers (Hujoel, 2009). This demonstrates the restriction of fermentable carbohydrates could be beneficial both systemically and locally in the oral cavity, preventing many types of chronic diseases. The author suggested patients should be encouraged to eliminate certain inflammatory foods from their diets (see Table 1) rather than adding more homecare and fluoride to prevent oral diseases. While homecare and fluoride can positively affect oral health, combatting the negative effects of carbohydrates on the oral cavity cannot be simply alleviated with brushing and flossing (Hujoel, 2009).

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Dental hygienists are oral health specialists in the treatment and prevention of periodontal disease. This can include scaling and root planing the teeth and root surfaces to remove bacterial biofilm and deposits and providing home care instructions. Dental hygienists see nutritional counseling as an adjunct to typical treatment and education, but it is often omitted (Hayes, Franki et al., 2016). Because food choices can have an effect on the periodontium, nutrition education ought to be included in periodontal care. This education could incorporate increasing protein, vitamin C, and other micronutrients to aid in healing after non-surgical periodontal therapy and decrease inflammation (Hayes, Wallace et al., 2016; Jenzsch et al., 2009). Treating periodontal disease essentially creates a wound within the gingival tissue. In order for a wound to heal, there needs to be adequate nutrition, especially protein and micronutrients, for tissues to grow and repair (Nazarko, 2014). The healing process is no different in the periodontium. Studies show that increasing certain nutrients usually found in whole foods (see Table 2), especially fruits and vegetables, has a positive association with periodontal health and healing after non-surgical therapy (Dodington, Fritz, Sullivan, & Ward, 2015; Najeeb, Zafar, Khurshid, Zohaib, & Almas, 2016). Other research has shown vegetable oils high in Omega 6, such as corn, canola, soy, and sunflower (Hujoel & Lingstrom, 2017) and saturated fat from animals (Iwasaki et al., 2011) are both inflammatory in nature and may be linked to an increased incidence of periodontal disease. Another study demonstrated vitamin C, calcium, and protein in particular can have a positive effect on periodontitis. It was noted, however, that nutrition is a single factor and needs to be seen as playing an adjunct role in periodontal disease (Adegboye et al., 2014). While poor nutrition does not cause periodontal disease, nutrition does play an imperative role in general health and can

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improve periodontal health making it appropriate and necessary for the dental hygienist to counsel with their patients about their dietary habits.

Table 2

Nutrient Dense Food Options

<u>Leafy greens</u>	<u>Whole grains</u>	<u>Fruits</u>	<u>Protein</u>	<u>Vegetables</u>	<u>Healthy fats</u>
Kale	Whole wheat	Blueberries	Salmon	Broccoli	Avocado
Spinach	Barley	Apples	Chicken	Sweet potato	Olive oil
Romaine	Quinoa	Strawberries	Sardines	Bell peppers	Coconut oil
		Cantaloupe			Walnuts

(Harvard Medical School, 2015)

Diabetes, nutrition, and periodontal disease. Over 34 million people in the United States have diabetes, equaling over 10% of the population (Centers for Disease Control and Prevention [CDC], 2020, p.2). The bidirectional relationship between diabetes and periodontal disease is well-accepted among healthcare providers (Kading, Wilder, Vann Jr, & Curran, 2010; Touger-Decker & Mobley, 2013; Lamster, Lalla, Borgnakke, & Taylor, 2008). As gingival inflammation improves or worsens, so do the glycemic levels of a diabetic patient. Also, as blood sugar and HbA1C levels are controlled, the periodontal condition is more likely to be treated successfully. The links have been irrefutable such that periodontal disease is now considered a complication of diabetes (Gross, Paskett, Cheever, & Lipsky, 2017b; Gulati et al., 2013). Nutrition is essential in the treatment and management of diabetes. The most recent guidelines from the American Diabetes Association and the American Heart Association do not endorse a specific diet plan but rather emphasize some key recommendations such as including quality fats like unsaturated types rather than saturated or trans fats, nutrient and fiber dense carbohydrate choices, lean protein choices, and avoiding sugar-sweetened beverages (Evert & Boucher, 2014). These are similar recommendations for caries

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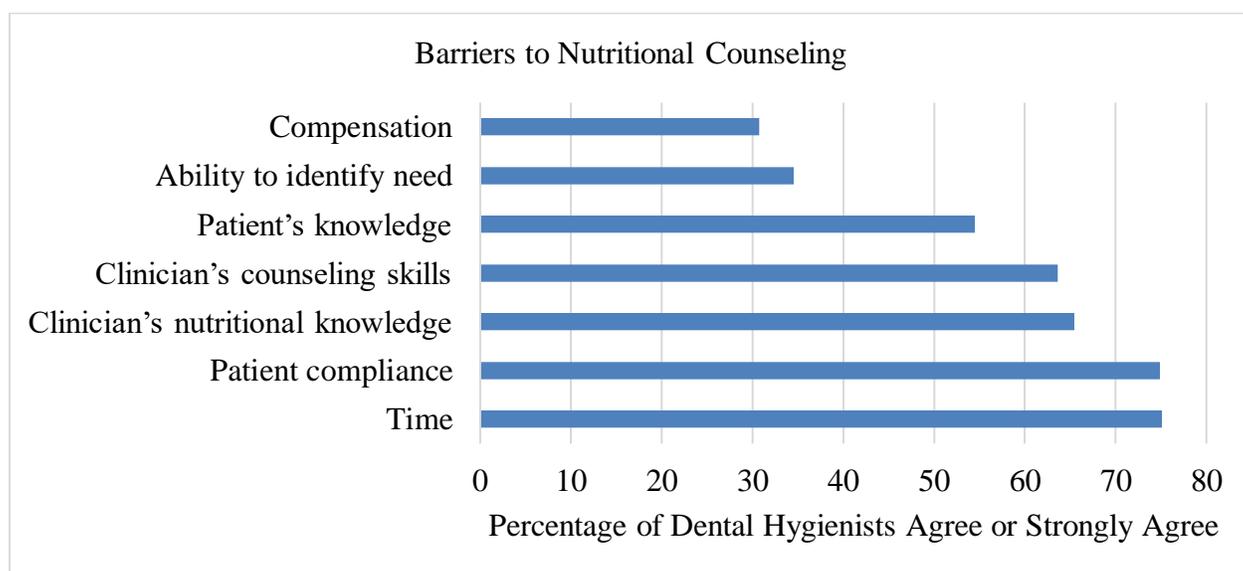
prevention, periodontal health, and healing after periodontal therapy. Considering the relationship between periodontal disease and diabetes, the prevalence of both diseases, and the similar nutritional recommendations for diabetes management and oral health, the link between nutrition and oral health becomes clearer.

Obesity and periodontal disease. Obesity is an aspect of overall health that cannot be overlooked when evaluating nutrition. Obesity is a significant risk factor for several chronic diseases including heart disease, hypertension, and diabetes. However, research is also pointing to obesity as a factor of periodontal disease (Jagannathachary & Kamaraj, 2010; Wood, Johnson, & Streckfus, 2003). During the periodontal disease process, pathogenic bacteria and the immune system interact causing the supporting structures around the teeth to be compromised (Ritchie & Kinane, 2003). Adipose tissue releases inflammatory cytokines and hormones suggesting obesity and periodontitis routes are similar (Pischon et al., 2007). Since obesity affects the immune system as well, this could create an increased risk for periodontal problems (Saito, Shimazaki, Koga, Tsuzuki, & Ohshima, 2001). One source claimed “obesity is second only to smoking as the strongest risk factor for inflammatory periodontal tissue destruction” (Jagannathachary & Kamaraj, 2010, p. 97). These studies show that decreased immunity and increased inflammation associated with obesity could increase the risk of periodontal disease in addition to the well-known affects to the rest of the body.

Barriers to providing nutritional counseling. An overwhelming majority of dental hygienists believe they should actively help patients consider making changes in their diets but admit difficulty discussing nutrition with patients (DiMaria-Ghalili et al., 2014; Hayes, Franki et al., 2016; Kading, Wilder, Vann Jr, & Curran, 2010). Hayes,

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Wallace et al. (2016) examined several barriers that contributed to this lack of chairside nutritional counseling for dental patients (see Figure 1). Patient compliance, time, clinician’s nutritional knowledge, counseling skills, and confidence were at the top of the list. Attempting to reduce these barriers was the purpose of this study. With proper education, “dental hygienists should be able to assess patients’ diet risk and incorporate nutritional counseling into the dental hygiene process of care” (Johnson, Gurenlian, & Freudenthal, 2016, p. 74).



(Hayes, Wallace et al., 2016)

Figure 1. Percentage of Dental Hygienists ($n = 426$) Agree or Strongly Agree with Barriers to Nutritional Counseling

Education in nutrition and nutritional counseling in dental hygiene school may be insufficient. When graduated dental hygienists ($N = 246$) were asked about their nutritional education during school there were mixed results. Those who graduated after 2001 report more nutritional education and training than those who graduated in earlier years. Dental hygienists with a 4-year degree report more nutritional education than dental hygienists with a 2-year degree (Kading et al., 2010). Entry-level dental hygiene

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programs have noted that nutrition education is missing in most patient care plans (Johnson et al., 2016). The main obstacles to incorporating more nutrition in dental hygiene curricula are lack of time and lack of those qualified to teach nutrition (Johnson et al., 2016). DiMaria-Ghalili et al. (2014) describe those assigned to teach nutrition in these settings as not having “applied clinical nutrition expertise” (p. 1188S) so it is often not viewed as necessary to patient care. If instructors had more experience with chairside nutritional counseling with their own patients, confidence to share this knowledge with students would increase. Students have shown difficulty conveying the connection between food choices affecting the mouth as well as the body (Franks, Wallace, Baines, & Taylor, 2018). The Commission on Dental Accreditation (2018) has a standard in regard to nutrition education stating, “Biomedical science content must include content in anatomy, physiology, chemistry, biochemistry, microbiology, immunology, general and maxillofacial pathology and/or pathophysiology, nutrition and pharmacology” (p. 23). There are no specifics on the experiences required to students, therefore, leaving the content up to the individual program. Some programs meet this standard through prerequisite nutritional courses while others incorporate nutrition content within the dental hygiene curriculum (Johnson et al., 2016).

Dental hygienists have much to accomplish with their patients during dental hygiene/preventive appointments. Typically, schedules are tight, creating pressure to stay on task throughout the allotted time. In their research, Hayes, Franki et al. (2016) found insufficient time to participate in nutritional counseling during dental appointments was a large concern for many dental hygienists. While in school, this is less of an issue due to time waiting with patients for faculty feedback (Hayes, Franki et al., 2016). Involving

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nutritional counseling during these times should be encouraged and seen as a way to build confidence while in school. Practicing dental hygienists can look for ways to incorporate nutritional counseling into conversation with patients along with health history review or patient oral health education as appropriate. Also, having a convenient guide to help clinicians through the process of nutritional counseling may be beneficial.

Potentially the largest barrier to nutritional counseling among dental hygienists is lack of confidence (Hayes, Wallace et al., 2016). Limited nutritional knowledge, little experience with counseling skills, and minimal patient compliance can all contribute to inadequate confidence (Hayes, Wallace et al., 2016). Adding the emotional aspect of food in our culture as well as obesity further cloud the issue, making it difficult to approach the subject with patients. One study specifically mentioned fear of being seen as judgmental to the patient and not wanting to offend patients (Greenberg et al., 2017). An eager clinician may attempt to counsel an unwilling patient which can be discouraging and diminish confidence. That same clinician may work with an employer who does not share the same enthusiasm regarding nutritional counseling, further decreasing confidence. Building confidence is important but maintaining that confidence through good experiences is also imperative.

Potential solutions to nutritional counseling barriers. The relationship between diet and dental caries is well known (Moynihan, 2005). Also, the link between diet and systemic conditions is well documented (WHO, 2003). There are other indirect ways diet can affect the mouth. This could include diabetes, oral cancer risks, or increased overall inflammation due to poor food choices. Several studies mention dental professionals' desire for a more definitive link between nutrition and oral health to increase confidence

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to discuss these topics with patients (Greenberg et al., 2017; Hayes, Franki et al., 2016). The evidence presented thus far supports this link. Educating dental providers regarding evidence-based research can increase the importance of nutritional counseling with dental patients. Increasing general nutrition knowledge through education may increase confidence. With interprofessional education surging, collaboration with other healthcare professionals to improve nutritional guidance for patients would be beneficial. By increasing knowledge related to nutrition, a dental hygienist may better understand the affects nutrition has on inflammation and disease, not just dental caries and weight management. Understanding this connection between oral health and inflammation may build dental hygienists' confidence to treat their patients with holistic health in mind. Recognizing the oral-systemic link, it is a dental hygienist's responsibility to identify risks involved with not only the mouth but the general well-being of the patient. This is particularly true for diabetic patients.

The United States Department of Agriculture's (USDA) Center for Nutrition Policy and Promotion (2015) score Americans' nutrition through a Healthy Eating Index (see Table 3). These scores show a large majority of American adults are not getting adequate nutrition. American adults are falling short of enough fruits and vegetables and too much added sugar and refined grains (USDA, 2015). Thus, Johnson suggested "the simplest chairside advice dental hygienists can give to their patients is to avoid refined, processed foods as much as possible and to focus on a diet rich in whole foods, vegetables, fruits, nuts, seeds, and plenty of water" (2015, p. 29). Working on one's own personal nutritional changes improves attitudes towards nutrition and increases likelihood of discussing nutrition with patients (Hayes, Wallace et al., 2016). Having anecdotal

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evidence of nutritional improvements one has made could be helpful in building confidence and experiences to share with patients where appropriate.

Table 3

*Average Health Eating Index-2015 Scores for Adult Americans (18-64 years)
WWEIA/NHANES 2015-2016*

Intake Component	Score	Maximum Points	Percentage of achieving goal
Increased Fruits	2.6	5	52%
Increased Vegetables	3.5	5	70%
Increased Whole grains	2.7	10	27%
Increased Fatty acids	4.5	10	45%
Decreased Refined grains	6.7	10	67%
Decreased Added sugars	6.8	10	68%

Note: Scores closer to the maximum points indicate achieving a goal of either meeting or exceeding standards (for fruits, vegetables, whole grains, or fatty acids) or a lower intake in the refined grains and added sugars categories.

(USDA, 2015)

When attempting to educate patients on healthy eating choices, there are many approaches available. The USDA's My Plate is a common choice (USDA, 2011). However, there are several reasons this option is not as favorable as others, such as not qualifying which grains should be eaten, inadequate protein suggestions, and no limitations on sugary drinks (Harvard Medical School, 2017). The Healthy Eating Plate created by nutrition experts at Harvard's T.H. Chan School of Public Health (2011) is another option that has more quality components such as choosing whole grains over refined grains, choosing quality proteins other than red meat, including a variety of fruits and vegetables (not including potatoes or fruit juices), encouraging healthy fats and oils, and opting for water rather than milk. Dental professionals are most concerned with sugar and fermentable carbohydrates to reduce caries and periodontitis risks and increase healing. Refined grains, starchy vegetables like potatoes, fruit juices, and milk are

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commonly found in patients' diets, increasing the amount of sugar and fermentable carbohydrates putting them at risk, especially if diabetes is present as well (Harvard Medical School, 2017).

In their research, Hayes, Franki et al. (2016) found patients who received oral hygiene instructions were 2.5 times as likely to also receive dietary advice. One study in Australia observed oral therapy students promoting nutritional messages, such as limiting sugary foods and drinks, but missed opportunities to relate nutrition to overall health (Franks et al., 2018). Simply discussing increasing fruits and vegetables can be a way to promote overall health along with oral health (Franks et al., 2018; Johnson, 2015). As dental hygienists discuss brushing and flossing techniques with their patients, incorporating nutritional advice is appropriate and should be encouraged. As explained thus far, the importance of integrating nutritional counseling into patient care should inspire practitioners to create ways to have these discussions with their patients.

Motivational Interviewing

As healthcare providers, dental hygienists want to share knowledge with the patient on how to improve health. Unfortunately, 30-60% of health information given to a patient is forgotten shortly after their appointment and up to 50% of recommendations are not followed (Williams & Bray, 2009). Motivational interviewing (MI) looks at the patient's own reason for change rather than the health care provider's reasoning which could help improve these statistics (Curry-chiu, Catley, Voelker, & Bray, 2015). Motivational interviewing is versatile and can be used in a wide range of health care settings. The basis of MI is finding the patient's intrinsic motivation and attaching that to the healthy behavior (Thorpe, 2003). There are often opposing feelings within the patient

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about change. Motivational interviewing is designed to help guide patients through this conflict and focus on perception and motivation (Brobeck, Odencrants, Bergh, & Hildingh, 2014). The goal must be meaningful to the patient rather than the clinician, relying on “reflective listening and positive feedback for guiding the patient toward change” (Thorpe, 2003, p. 150). These MI principles can be summarized by Elicit-Provide-Elicit where the clinician finds out what the patient already knows, asks permission to give more information, and then asks the patient what this information would mean for them (Bray, 2010; Smith, 2018). Table 4 demonstrates this concept using OARS: open-ended questions, affirmations, reflective listening, and summaries (Croffoot, Krust Bray, Black, & Koerber, 2010).

Table 4

Elicit-Provide-Elicit Approach Using OARS

Open-ended questions	Affirmations	Reflections	Summaries
What is your understanding of how brushing time affects your gum health? What would the benefits be of brushing longer?	I commend you for your commitment to brushing at least twice daily.	I know it is easy to cut your brushing time short, especially when you have such a busy schedule.	Generally, you are not sure how long you spend brushing your teeth, but a powered toothbrush with a build in timing device might help you meet two-minute brushing goals.

(Bray, 2010)

While these are helpful ways to approach MI, clinicians should focus on the spirit of MI rather than the specific words or strategies. The objective is not to solve a problem or create a plan but to help the patient believe change is possible through skillful reflection, genuine conversation, and expressing empathy (Bray, 2010; Stewart & Fox, 2011). The patient can be guided to their own conclusion of a goal that would work for

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them. This brainstorming with the patient rather than the clinician telling the patient what to do to change prevents the patient from becoming ambivalent (Bray, 2010). One qualitative study with a descriptive content analysis design looked at medical patients' ($N = 16$) experiences with MI. A mutual interaction was crucial as well as the patient's desire to make a change. If these criteria were met, then as MI continued, patients felt supported, respected, and encouraged which enabled self-determination (Brobeck et al., 2014). Even if a patient is not interested in a lifestyle change at that moment, MI can still set a foundation upon which future growth could happen (Brobeck, Bergh, Odencrants, & Hildingh, 2011). Understanding behavior changes, which MI introduces, can facilitate patient compliance and should be included in MI education.

Hayes, Wallace et al. (2016) mention "stages of change" or the transtheoretical model outlining patients' readiness to make changes. Learning to recognize these stages can be instrumental in MI and nutritional counseling success. The transtheoretical model suggests people have stages they progress through as lifestyle changes are made. These include precontemplation (change is not yet considered), contemplation (thinking about change has begun), preparation (intent for change but action has not occurred), action (behavior modification), and maintenance (continual relapse prevention). While learning these stages and how to use them in practical settings can be challenging, including awareness of the stages in MI training is helpful (Salmela, Poskiparta, Kasila, Vähäsarja, & Vanhala, 2009).

Learning MI techniques does take time and continual effort. Curry-Chiu et al (2015) stated "MI is difficult and requires a complex set of skills to implement" (p. 904). Learning MI has also been likened to learning a sport or musical instrument, requiring

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practice with feedback to be successful (De Roten, Zimmermann, Ortega, & Despland, 2013). Due to its increased application in healthcare, MI is becoming more standard in dental hygiene curriculum (Krust Bray, Catley, Voelker, Liston, & Williams, 2013). One study demonstrated a brief in-class training as a successful method for introducing dental students ($N = 91$) to MI techniques to address various oral health behavior including diet change (Hinz, 2010). However, faculty need to be trained on and believe in the MI method. All clinicians can easily fall back to old habits of simply giving advice rather than using MI (Brobeck et al., 2011). Several sources emphasized the importance of continuing education to reinforce clinicians of MI techniques (Brobeck et al., 2011; Curry-Chiu et al., 2015; Fortune, Breckon, Norris, Eva, & Frater, 2018). Fortune et al. (2018) looked at teaching MI to physiotherapy and occupational therapy students. While the MI courses were highly interactive, including role play and case studies, the researchers found still a lack of confidence with the students when they went to use these skills with their patients. The researchers suggest ongoing training throughout the curriculum and self-reflection is necessary for further skill development.

Motivational interviewing in the dental setting. For the dental professional, MI can be used to support lifestyle changes including improved homecare, tobacco cessation, and better nutrition (Bray, 2010; Colvara et al., 2018; Mantler, Irwin, Morrow, Hall, & Mandich, 2015; Wu et al., 2017). In a 2010 article, Bray mentions brief MI sessions during chairside dental appointments can improve outcomes better than traditional education alone. Multiple studies have shown MI to be successful in the dental setting. In one study, mothers ($N = 674$) with young children receiving MI showed lower caries incidence when compared to those that received traditional oral health education with a

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60% decline in the risk of caries in the MI group during a three year follow up (Colvara et al., 2018). Another study looked at MI with adolescents ($N = 512$), demonstrating MI positively affects oral health behaviors (decreasing cariogenic snacking and increasing toothbrushing) when compared to traditional oral health education (Wu et al., 2017).

Smoking cessation is another important topic for dental professionals to approach with their patients. Motivational interviewing can be an effective way to encourage patients to quit smoking. One study had smoker participants ($N = 40$) receive MI for smoking cessation. A significant decrease in smoking was noted as well as 27.5% continued to be smoke-free one-year post study (Mantler et al., 2015).

When used in a dental setting, MI has been found to be a superior way to motivate patients but is not without obstacles. Insufficient time with patients, lack of education or training, and increased effort tend to hinder this type of counseling approach (Curry-chiu et al., 2015). Time constraints are an issue for dental hygiene clinicians but less for students since they have more time with patients during lengthy appointments and waiting for faculty (Hayes et al., 2016). However, students still claim a lack of sufficient time to conduct adequate MI with patients. When Curry-Chiu et al (2015) questioned dental hygienists ($N = 9$) in a qualitative thematic analysis study they overwhelmingly agreed that including MI in dental hygiene program curricula improves patient care. This allows for practice of MI when patient care is lengthier which could translate to more confidence in post-graduate practice. While MI may take more time chairside, behavior change can be more effective and happen in less time than other motivation methods (Brobeck et al., 2011). To save time, rather than using multiple full MI strategies with each patient, clinicians can utilize brief (5 minute) MI encounters that were shown to be

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successful (Mills et al., 2017; Stewart & Fox, 2011). With practice, these can be part of regular conversations with patients. Learning some simple questions to ask and letting go of expectations can help make meaningful strides in patient behavior changes, even if those changes happen later in life (Stewart & Fox, 2011). The same dental hygienists ($N = 9$) Curry-Chiu et al (2015) questioned earlier mentioned while it can be time consuming there are ways to gently work MI into their patient care time. For instance, time may not allow elaborating on all the steps of MI but asking a few open-ended questions (what, how, or why questions) can evaluate if the patient is ready to talk about change. If the patient is willing, taking a few moments to discuss some behavior changes based on what the patient has brought up and attempting to reach a goal the patient can work towards. The most effective way to incorporate MI is in a friendly, natural conversation (Stewart & Fox, 2011).

Along with additional time chairside, MI typically requires more energy to perform, especially with older patients (Curry-Chiu et al., 2015), but having proper education and practice facilitates its effectiveness. Stewart and Fox (2011) mention, however, despite more effort to use open-ended questions with patients, if a patient is not even considering change, the clinician can move on. This can be freeing for the clinician and ends up taking less time than trying to convince patients with facts and figures that a particular change is right for them (Stewart & Fox, 2011). As with any learned skills, the energy required to participate in MI is reduced as the strategies are practiced.

Nutritional counseling is important for quality comprehensive care. Dental hygienists agree it should be a part of their treatment plan. However, breaching the barriers of lack of confidence and knowledge can be difficult. Often dental hygienists and

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patients have difficulty conveying the connection between food choices affecting the mouth and the body in a way that promotes actual lifestyle changes (Franks et al., 2018). Motivational interviewing (MI) can be an effective way to encourage a patient to make difficult nutritional changes.

Motivational interviewing and confidence. Confidence and comfort are other key factors in the success of MI and nutritional counseling. These concepts are often used interchangeably, however, they are not the same. There is little research on the general difference between confidence and comfort. One study looked at confidence and comfort in neonatal palliative care and provided definitions (Peng et al., 2018).

Confidence was defined as “the clinician’s belief that she/he possesses the professional skills to appropriately care for patients and their families” while *comfort* was “the clinician’s emotions and attitudes” about the care they can provide as well “their ability to provide care in a natural manner without a sense of risk or anxiety” (Peng et al., 2018, p. 1558). Confidence and comfort often manifest together but not exclusively so. There is potential to be comfortable doing something but lack confidence. Further, a clinician could be confident in their ability but not comfortable performing the task.

A clinician with confidence is willing to try, regardless of the outcome. Also, when practitioners have their own healthy habits and have witnessed how those habits have affected their lives, confidence could increase making them more likely to discuss with and motivate patients (Hayes, Wallace et al., 2016). Further, studies show MI skills reduce barriers between clinician and patient through empathy towards their patients (Brobeck et al., 2014; Marley, Carbonneau, Lockner, Kibbe, & Trowbridge, 2011; Stewart & Fox, 2011). Patients feel less judged and more willing to consider lifestyle

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changes when they have some autonomy in a collaborative, friendly conversation (Stewart & Fox, 2011). When approached as a conversation rather than a formal intervention, clinician confidence could improve but other designs for increasing MI confidence should be investigated.

Confidence can be increased merely through experience (Brame, Martin, Tavoc, & Stein 2012; Claiborne, 2019; Simonian, Brame, Hunt, & Wilder, 2015). A study providing tobacco cessation education for dental hygiene students ($N = 27$) indicated practical experience with patients may be most important in gaining confidence (Brame et al., 2012). Claiborne (2019) showed similar results as dental hygiene students ($N = 36$) increased pediatric experiences. Furthermore, students ($N = 32$) on a 3-week practicum experience indicated the repetitive practice during the practicum could positively influence students' confidence (Simonian et al., 2015). Nutritional counseling could be another area where confidence is bolstered with increased exposure.

Using technology to aid in MI and nutritional counseling. Dental hygiene students are a convenient group to research because they are in a more controlled environment and under close supervision by faculty (Hayes et al., 2016). Further, the barrier of not enough time is lessened as students have more time with patients than licensed dental hygienists. Many current dental hygiene students are of the millennial generation and are very comfortable with technology, particularly smartphones, tablets, and laptops (Rung, Warnke, & Mattheos, 2014).

A study from 2006 showed the benefits of healthcare providers using handheld computers, particularly as reference tools (Rothschild et al., 2006). Now, years later, “handheld computers” or smartphones/tablets are even more mainstream. The early

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2010's saw growth in the use of smartphones for academic purposes, particularly self-directed learning because they are familiar and portable (Dukic, Chiu, & Lo, 2015).

Dental students use smartphones and tablets as a way to access learning resources.

Developing learning activities that use smartphones or tablets can enhance the learning experience for students (Rung et al., 2014). Researchers Valle, Godby, Paul, Smith, & Coustasse (2017) found that "medical students have been increasingly relying on smartphones as a 'pocket brain' for fast and easy access to needed information" (p. 295). Further, the general public across multiple demographics often turns to digital applications to increase compliance in various health endeavors and several studies show the effectiveness of this (Cummiskey, 2013; James & Harville, 2018; Mundi, Lorentz, Grothe, Kellogg, & Collazo-Clavell, 2015). One study mentioned patients preferring computer-based programs and found they significantly helped learning (Geiger & Rhee, 2017).

Not only could clinicians use a reference guide, an electronic tool could also help evaluate patients' dietary condition and potential risk factors. Also, data collected through this tool could be incorporated into the patient's chart. Electronic Health Records have been shown to improve clinicians' quality of patient notes. An electronic, computer-based tool makes it more efficient for complete evaluation and current legislature is increasing requirements of electronic health records (Burke et al., 2015; ONC, 2019). The use of a reference guide and an electronic nutritional risk assessment and counseling tool could be instrumental in bridging the gap of nutritional counseling through MI in the dental office. Dieticians believe these types of technology are underutilized and have the potential to make nutritional education more efficient (Chen, Gemming, Hanning, &

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Allman-Farinelli, 2018). This could also be true in the dental setting.

Part of nutritional risk assessment must include evaluating the patient's current diet. Any method of intake assessment may be time consuming and potentially inaccurate. Traditionally, a 24-hour food recall has been performed, but inherent limitations with this method exist. There is a tendency for patients to forget what their typical food intake is when asked. Patients can also be biased to what their typical diet consists of (Shim, Oh, & Kim, 2014). An alternative method is a Food Frequency Questionnaire (FFQ) (Shim et al., 2014; Khalesi, Doshi, Buys, & Sun, 2017). This assessment asks the patient to report on specific foods, and the number of foods depending on how the questionnaire is developed. Patient bias still occurs however helping the patient recall more accurately by providing a list of foods makes the process less demanding. Research shows no significant difference in the amount or type of data gathered (nutrients, etc.), but the FFQ can be less burdensome and in some cases more accurate (Khalesi et al., 2017). For the dental hygienist, the purpose of nutritional assessment is a screening tool and can transition to a conversation about improving one's diet. The primary concern is general nutrition and the ways it affects the oral health. By asking foundational questions related to general nutritional intake- not a specific day necessarily- the dental hygienist can relate this information to the risk factors specific to oral health.

Summary

Dental hygienists understand the importance of nutritional counseling for their patients' periodontal and overall health. However, few dental hygienists feel they have the knowledge and confidence to provide nutritional counseling beyond what pertains to

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caries prevention. Motivational interviewing can be an effective way to encourage behavior change in patients, including nutritional changes. This study examined if introducing a reference guide and electronic tool to assist students through MI increased their confidence in providing nutritional counseling to their patients.

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Methodology

Research Method or Design

This study used a quasi-experimental, one-group, pretest-posttest design to gather qualitative and quantitative data to answer the following research questions: (1) Did an educational module on motivational interviewing affect dental hygiene students' confidence in nutritional counseling? (2) Did introducing a reference guide for motivational interviewing in conjunction with an electronic nutritional risk assessment and counseling tool improve dental hygiene students' confidence in nutritional counseling? The data was primarily quantitative with additional qualitative measures to bolster the evidence.

Procedures

Human subjects' protection/informed consent. Approval was obtained from the Eastern Washington University (EWU) Institutional Review Board (IRB) prior to proceeding with the research. Students who elected to participate completed the pretest (see Appendix A) and posttest (see Appendix B) which each included consent (see Appendix C and D). The pretest and posttest invitations were sent via email with informed consent included and entering the survey through a link was their consent to participate. Attending the module presentation was a requirement as a DNHY 452S Clinic IV student; however, participating in the research/surveys was optional. Students were able to decline or withdraw from the study at any time.

Sample source, plan, sample size, description of setting. For pragmatic purposes, the EWU Class of 2020 senior dental hygiene students were invited to participate in this

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study. This convenience sample was easily accessible by the Principal Investigator (PI) but limited the generalization of the results to dental hygiene students. Because the entire senior dental hygiene class ($N = 39$) was asked to participate and it is reasonably representative of other dental hygiene classes, it is a sensible assumption that it can be treated as a random sample. With a sample size of 39, an alpha of 0.05 and a strong power of 0.8, an effect size (d_z) of 0.44 was computed by sensitivity analysis. Because participation was optional, an a priori power analysis was done (see Figure 2) to evaluate the impact of varying sample sizes at this effect size. As an incentive, those who participated in both pretest and posttest were entered for a drawing of a \$25 Amazon gift card.

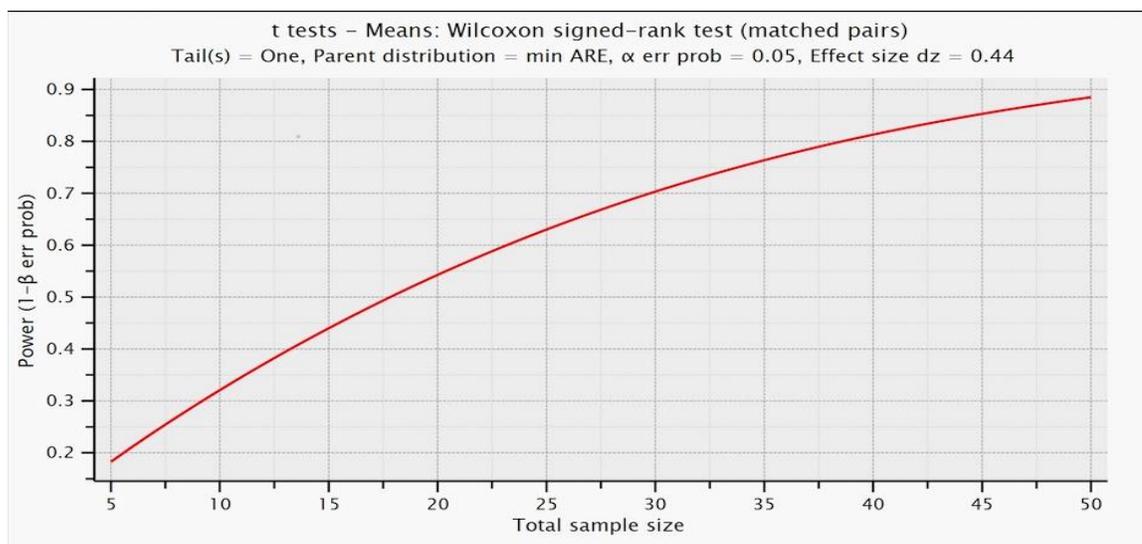


Figure 2 Prior Power Analysis

The students had exposure to a nutrition course as a dental hygiene program prerequisite, as well as several lectures on nutrition in the dental hygiene curriculum (DNHY 360 S Disease Prevention Strategies during fall semester of first year; DNHY 350S Clinic I, DNHY 321S Periodontology, and DNHY 345S Foundations of

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Physiology, Pathophysiology, and Pharmacology during spring semester of first year). Also, they had one lecture on MI from a guest lecturer with a focus on tobacco cessation (fall semester of first year) as well as two other touchpoints of MI during clinic course lectures (DNHY 350S Clinic I, spring semester first year, and DNHY 452S Clinic III, fall semester second year) including a two-hour simulation workshop and 1-hour lecture after simulation workshop. No exclusion criteria was necessary. The PI is a part-time clinical faculty at EWU but had no direct influence on the students' grades.

The EWU Dental Hygiene program was an appropriate place for this proposed study to take place. The program had a cohort of students to work with and was convenient for the PI. There were ample opportunities during clinic times for students to provide nutrition education interventions and practice MI nutritional counseling. The educational module presentation took place in a classroom as a mandatory lecture with healthy snacks and chocolate provided. The module (see Appendix E) consisted of a PowerPoint® presentation (see Appendix F) and role-play activity. The voluntary pretest and posttest invitations were sent via email, completed via Qualtrics®. Confidentiality from the PI was maintained by results being gathered by Dr. Elizabeth Tipton, EWU Decision Sciences professor, and not shared until study was completed.

The focus was on diabetic patients, patients with high caries risk, or patients receiving non-surgical periodontal therapy. Through the research previously discussed, these were the populations of patients that would most benefit from nutritional counseling and are patients commonly seen by dental hygiene students.

Variables. The independent variable was the educational module developed by the PI based on nutrition knowledge in relation to oral health and how MI can be applied

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to nutritional counseling. Also, the reference guide (see Appendix G) and electronic nutrition risk assessment and counseling tool (see Appendix H) were introduced to help guide the students chairside. The dependent variable was the students' confidence level. This was measured via posttest after 3 weeks of clinic time for opportunities to practice these skills.

Instruments. The pretest and posttest were designed by the PI based on research on nutritional counseling and MI. The pretest was designed to measure the current confidence level and experience of the students before being introduced to the module. The posttest was administered after 3 weeks of clinical time to utilize the nutritional counseling/MI skills learned. The pretest and posttest included Likert scale questions. The posttest also included open-ended questions to gather qualitative data. The tests were administered through Qualtrics® with the help of Dr. Elizabeth Tipton, an EWU Decision Sciences professor. The pretest was sent by the Qualtrics® system prior to the educational module. Email addresses of the senior dental hygiene class were available to the PI through the EWU Dental Hygiene Department. Respondents were assigned an ID code in non-alphabetic order by Dr. Tipton. The posttests were delivered the same way. Once the survey period for the posttest was completed, Dr. Tipton extracted the data from the Qualtrics® system and used the ID codes to match pretest and posttest responses. The index table matching ID codes and email addresses were permanently deleted by Dr. Tipton at this point. Dr. Tipton had sole access to this information, and all survey responses were anonymous to the PI and kept confidential.

Because an interactive iPad app was not feasible for this study, an electronic nutritional risk assessment and counseling tool and reference guide was created to guide

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students through the nutritional counseling process. The tool was created specifically for the students similar to a checklist to help gather nutritional risk factors, including a simple FFQ, and guide them through MI for nutritional counseling as well as creating documentation for the patient's chart to verify completion of nutritional counseling. The tool also included the "Healthy Eating Plate" which provides structure to nutritional advice the students could give their patients (Harvard, 2011). Students used the electronic nutritional risk assessment and counseling tool particularly for diabetic patients, caries risk patients, and/or patients undergoing periodontal therapy, as these were the patients who would most benefit from nutritional counseling (Hujoel & Lingstrom, 2017; Ritchie & Kinane, 2003). However, nutritional counseling was open to any patient.

Equipment. Students had access to the reference guides on their laptops or iPads as well as laminated hard copies in the clinic. The electronic nutrition risk assessment and counseling tool was available to each participant through patients' charts SmartDocs® on Eaglesoft®, the patient management software the EWU dental hygiene clinic uses. Neither the identity of the patients nor patient information from the electronic tool were gathered through this study.

Steps to implementation. Senior dental hygiene students were invited the first week of spring semester to a nutritional counseling module presentation scheduled after class. Prior to the module presentation students were sent an email with the pretest that included consent to participate in the study. Students were reminded and given time at the beginning of the module to complete the pretest if they had not done so already. During the hour, the PI presented a PowerPoint® module involving a brief nutrition review, nutritional counseling, and MI based on research gathered through the literature review.

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The tool and guide were also presented to the students during the module. The module included case studies and role playing with the students to practice using the tool and guide. Questions within the PowerPoint® presentation (see Appendix I) were designed to assess their comprehension of the module content and keep the students engaged.

At the end of the PowerPoint®, the students were encouraged to use this knowledge and experience to provide nutritional counseling using MI to their patients. Based upon the research that shows more exposure to experience can increase confidence (Brame et al., 2012; Claiborne, 2019; Simonian et al., 2015), an incentive was created to encourage as many nutritional counseling interactions as possible in the three-week study period. Senior dental hygiene students put their name in a labeled box located beside the faculty mailboxes each time they completed a nutritional counseling session for a chance to win a \$25 Amazon gift card. The more nutritional counseling sessions conducted meant more chances to win the prize. This was in addition to an incentive for participating in the study by completing both pretest and posttest. The students were given three weeks to participate in the study, with opportunities to increase nutritional counseling skills and confidence. Kaufman, a specialist in teaching professionals how to master a skill, believes 20 hours is long enough to experience improvement in a skill (as quoted in Schwabel, 2013). Senior dental hygiene students in their final semester had up to 20 hours of clinic each week providing ample time to gain experience with nutritional counseling. While developing habits and confidence happens at different rates for everyone (Lally, Jaarsveld, Potts, & Wardle, 2009), the PI felt three weeks would be adequate to see some change in confidence.

After three weeks, a posttest was sent to students to question their current

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perception and confidence level of nutritional counseling and MI. This posttest included open-ended questions for students to elaborate on their experience. Self-reporting of nutritional counseling incidences were tracked as well to see if students did more nutritional counseling after the educational module. Students self-reported nutritional counseling sessions on a clinic requirement form (see Appendix J) where they could receive up to two extra clinic points for their Clinic IV course. The PI sent email reminders each week of the study to remind students to utilize nutritional counseling with MI and the assessment tool with their patients. Subsequently, the PI sent two reminder emails to students one week apart to encourage completion of the posttest following the study period. To be eligible for the second gift card drawing for participating, students entered their email at the end of the survey which kept their responses confidential by separating their identity from their survey responses. This separation was done by using the redirect to another site at the end of the survey function in Qualtrics®. In this case, students were redirected to a Google Form to enter an email address and be entered into the drawing for finishing the study. Email addresses were deleted after the winner was drawn and notified. This was in addition to the incentive to encourage multiple nutritional counseling sessions.

Summary

Nutritional counseling is an important aspect of complete oral healthcare. Teaching dental hygiene students how nutrition is directly related to oral health could encourage chairside nutritional counseling. Introducing an education module on MI with access to a reference guide and electronic tool for risk assessment could build

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confidence among dental hygiene students to successfully complete nutritional counseling.

Results

Description of Sample

Dental hygiene students at Eastern Washington University were recruited to participate in this research evaluating if an educational module on MI including an introduction of an electronic tool to clinically facilitate their discussions would affect the students' confidence in performing nutritional counseling. A convenience sample of senior dental hygiene students ($N = 39$) enrolled in the DNHY 452S Clinic IV course at EWU participated in the study. Of the 39 students who attended the educational module and were invited to participate, 34 completed the pretest (87% initial response) and 22 completed the posttest ($n = 22$, 65% pre-to-post completion and 56% total population participation). Based on the demographic questions, a large majority of participants were 18-27 years old (81.8% of participants) with either some college or an associate degree (90.8% of participants). A summary of demographic data is provided in Table 5. The participating students were overwhelmingly under 27 years of age, which is under the average for practicing dental hygienists (datausa.io, 2017). However, an American Dental Association (2019) Survey of Allied Dental Education reported an overwhelming majority of female dental hygiene students as under 29 years old (78.1%) which is consistent with this study. This same survey reported 12.2% of dental hygiene students having a bachelor's degree, similar to this study of 9.1% of participants with this level of education (ADA, 2019). All other participants in this survey or the current study had either an associate degree or some other amount of college. These students will be continuing on in their career to become the future dental hygienists, following the

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existing demographics for dental hygienists. While the representativeness of the population cannot be guaranteed, the sample used should be adequate for this pilot study.

Table 5

Demographic Characteristics of Participants who Completed Both Pretest and Posttest

Demographic Characteristic	<i>n</i>	%
Age		
18-22	11	50.0%
23-27	7	31.8%
28-32	1	4.5%
33-36	2	9.1%
37 or older	1	4.5%
Education		
Associate degree	7	31.8%
Bachelor's degree	2	9.1%
High school degree/ Some college	13	59.0%

A total of twenty-two participants ($n = 22$) completed the research study. Likert scale data from seven questions as well as qualitative data from three open-ended questions were gathered and analyzed. The lack of posttest completions and students reporting the same response on some survey questions caused the statistical power to be generally low. A question with an effect size equivalent to the sensitivity analysis optimal (0.44) and the maximum sample participants ($n = 22$) would have a power of 0.55 (see Figure 2). However, the Wilcoxon signed-rank statistical test that was completed requires N be adjusted by omitting pretest and posttest values that are equal (no difference), causing the N for test to be small. Furthermore, there is variability in the effect sizes due to how strongly the differences between pretest and posttest responses were. Statistical power ranged from 0.1330-0.7620, depending on the survey question (see Table 6). Careful interpretation of the data needed to take place due to these and other limitations (LoBiondo-Wood & Haber, 2014).

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Statistical Analysis

The aim of this study was to observe the effects an educational module and an electronic nutritional risk assessment and counseling tool had on the students' confidence to perform nutritional counseling with MI. After completing the pretest, dental hygiene students were introduced to the use of MI for nutritional counseling using the electronic assessment tool and then given the opportunity to practice with their patients. After the study period, students completed the posttest. To evaluate the research questions, the pretest and posttest answers were matched, and a Wilcoxon signed-rank test conducted to determine if a statistically significant difference occurred using the established significance level $p < 0.05$. This test was chosen as a strong non-parametric test to compare paired observations in a non-normal, but symmetric population (Doane & Seward, 2007). Minitab® was utilized for these statistics. The qualitative data gathered from the open-ended questions was evaluated with content and narrative analysis focusing on themes that were frequently present in students' answers. In addition, students were asked if they increased the frequency of nutritional counseling during patient care after the educational module and instruction on use of the reference guide and electronic tool.

When asked if nutrition is currently discussed with their patients, a statistically significant change was noted for the students when compared before and after the module ($p = 0.049$). Statistically significant changes were noted as well with comfort ($p = 0.020$) and confidence ($p = 0.007$) in nutritional counseling. The question regarding confidence in nutritional counseling had the greatest statistical power, which demonstrates the validity of the results. Once MI was mentioned in the questions, the strength in statistical

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significance dropped. When asked if MI could improve the ability to perform nutritional counseling, fewer students agreed with the statement ($p = 0.106$). Similar results occurred when asked about comfort with using MI ($p = 0.150$). However, with a p value of approximately 0.1, these results are approaching statistical significance ($p < 0.05$). The pretest and posttest comparison of the one negatively worded question about lacking nutritional education also showed a significant difference ($p = 0.012$). The question about dental hygienists in general discussing nutrition with their patients showed no significant difference ($p = 0.306$) after the module. Results are summarized in Table 6.

Participants were asked to reflect on the number of nutritional counseling sessions completed during the three-week study. One participant ($n = 1$, 4.5%) had over seven nutritional counseling sessions and five participants ($n = 5$, 22.7%) had three to four sessions. Over half of the participants ($n = 12$, 54.5%) had one to two self-reported nutritional counseling sessions. Four participants ($n = 4$, 18.2%) had no nutritional counseling sessions. A large majority (68.2%) of the participants ($n = 15$) reported an increase in their nutritional counseling sessions compared to their clinical experience prior to the educational module. The number of sessions stayed the same for 27.3% of participants ($n = 6$) and one person ($n = 1$) reported a decrease. Of the participants who had a positive change in confidence from pretest to posttest ($n = 14$), all but three had an increase in the number of nutritional counseling sessions performed ($n = 11$, 78.6%). Two of those participants reported no nutritional counseling sessions for the study time frame.

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Table 6

Pretest and Posttest Questions Statistical Analysis

Survey Item	Respondents showing difference**	Statistical Power	Wilcoxon Statistic	<i>p</i> -value	Effect Size
1. I currently discuss nutrition with my patients.	9	.2676	37.00	0.049*	.407
2. A dental hygienist should discuss nutrition with his/her patient.	7	.1330	17.50	0.306	.133
3. I am comfortable with nutritional counseling.	13	.4900	75.50	0.020*	.517
4. I lack the nutritional education to discuss nutrition with my patients.	17	.6819	28.00	0.012*	.581
5. I am confident discussing nutrition with patients.	17	.7620	128.50	0.007*	.647
6. Motivational interviewing could improve my ability to perform nutritional counseling.	15	.2578	82.50	0.106	.292
7. I am comfortable using motivational interviewing.	14	.2134	69.50	0.150	.260

P-values based on Wilcoxon signed-rank test. Statistical significance set at * $p < 0.05$.

** Respondents showing difference is observed data after omitting pretest and posttest values that are equal (no difference) per the Wilcoxon test (also known as Wilcoxon *N* for test).

Thematic Analysis

Data gathered included a series of three qualitative questions in the posttest given after both the module implementation and three-week period to practice their nutritional counseling skills. These questions discussed barriers, MI and the designed electronic nutritional risk assessment and counseling tool. Thematic analysis of the students'

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comments identified prominent primary and secondary themes. Comments were read by the PI looking for commonalities, or “patterns of experience” (Aronson, 1995) among the students’ reactions to the questions. Identical and similar words or phrases mentioned in the comments were identified. Grouping these words and phrases found students improved confidence, increased comfort, and had greater alignment with patients’ goals.

When asked in what ways MI influenced nutritional counseling with their patients, three students ($n = 3$) directly mentioned confidence and comfort with the knowledge gained in the module and experience with the new electronic tool. Seven students ($n = 7$) discussed goal setting and willingness among their patients, including being more open with and focused on the patients’ desires. One student ($n = 1$) mentioned patients seemed more comfortable with this approach. Students also explained the barriers they experienced when attempting nutritional counseling with their patients. The main barrier involved a lack of patient interest. Only two students ($n = 2$) stated a lack of time while nine ($n = 9$) described the reluctance of patients to discuss nutrition. Finally, when asked specifically about the electronic tool students reported the ease and effectiveness of the tool. Of the 14 responses ($n = 14$) for this question, 100% were positive and half of those responses ($n = 7$) mentioned the ease of the nutritional counseling tool. Table 7 provides examples of student responses to the open-ended questions in the posttest.

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Table 7

Thematic Analysis: Student Comments Regarding MI, Nutritional Counseling Barriers, and the Use of an Electronic Assessment and Counseling Tool

In what ways, if any, did MI influence nutritional counseling with your patients?	What were barriers experienced when attempting nutritional counseling with your patients?	How did the electronic tool affect your nutritional counseling?
<p>“More confidence in how I speak to my patients and why it matters”</p> <p>“Feeling more open to discussing their nutrition”</p> <p>“They got to set goals to actually achieve them”</p> <p>“It had my patients think about what they had been eating and drinking and helped them realize it could be improved”</p> <p>“Asking patients what they want to do to improve nutrition instead of telling them what to change”</p> <p>“It made it less uncomfortable to ask questions and continue the conversations. I think that it made the patients feel more at ease as well”</p> <p>“I think that motivational interviewing influences nutritional counseling to see how willing they were</p>	<p>“Some were just not interested”</p> <p>“Patients felt it wasn’t necessary”</p> <p>“Many of my patients are older and not as willing to change”</p> <p>“A lot of them said they ate ‘healthy’ and didn’t need or want counseling”</p> <p>“Time, patient interest”</p> <p>“I had a diabetic patient who said that they were not interested because they were just going to die by 65 anyways...”</p> <p>“I found it difficult to talk to my patients about making up a plan that they really wanted to follow through with. Food was a</p>	<p>“Made things much more simple with a better flow”</p> <p>“Increased my ability to talk with patients giving them good ideas of what is good to eat and bad things that may be affecting their teeth and gums”</p> <p>“Loved it! I actually wanted to do it with my patients”</p> <p>“I loved the new form it helped to guide the conversation by asking questions and having prompts to use for goals”</p> <p>“Very easy to follow and helped back up my knowledge/made me feel more confident”</p> <p>“It was great! It helped me to remember leading questions that I could ask my patients”</p> <p>“Easy to save data”</p>

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to make the dietary changes in order to improve their oral health”	way that a lot of my patients deal with their stress so I often talked more about how they could manage their stress in healthier ways and thus wanting to eat better.”	
“Motivational interviewing made it more comfortable for me to introduce nutritional counseling to my patients and better communicate with them to promote into their diet”	“Time- I often don’t have enough time to discuss nutrition because there are so many requirements”	“It made it a lot easier and more effective to be as a clinician”

Note. Comments selected from various students and are unrelated.

The results presented in this chapter demonstrate that adding a module to discuss utilizing MI with nutritional counseling along with an electronic tool can have a positive impact on student confidence when discussing nutrition with patients. The quantitative statistical analysis of student confidence before and after the module gives a strong indication of the importance of this type of educational module and training. Further, the qualitative data reveals the emerging thoughts of the students after the module and research period were positive. These findings will be discussed in the following chapter.

Discussion

Summary of Major Findings

The results of this study provided statistical significance to support an educational module and an electronic risk assessment and counseling tool to improve dental hygiene students' confidence with nutritional counseling. After attending the educational module and learning about the electronic assessment tool, students practiced nutritional counseling with patients. By comparing their confidence levels before the module and after the clinical practice with the electronic assessment tool, it was evident this type of education and tool were helpful to an emerging clinician. Four of the seven Likert scale questions asked to students demonstrated statistical significance ($p < 0.05$). These questions specifically discussed the students' current practice, comfort level, nutritional education, and confidence with nutritional counseling. Two questions asked included the topic of MI and approached statistical significance ($p = 0.1$). Finally, one question asked about a dental hygienist's role in nutritional counseling. This question showed no statistical difference. Students were also asked about the amount of nutritional counseling they participated in over the research period as well as three open-ended questions to evaluate their experience more in depth. This chapter will discuss the findings in both the quantitative and qualitative questions.

Discussion

Research shows dental hygienists understand the importance of nutritional counseling, but struggle to practice this intervention with their patients (Hayes, Wallace et al., 2016; Hayes, Franki et al., 2016). This study demonstrated the use of an electronic

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nutritional risk assessment and counseling tool could positively influence dental hygiene students' confidence and ability to approach nutritional counseling with their patients.

Dental hygienists' role in nutritional counseling. Students showed no statistical change when asked whether a dental hygienist should discuss nutrition with his/her patient. All but one student ($n = 21$) agreed or strongly agreed in the pretest with the statement "A dental hygienist should discuss nutrition with his/her patient" and that student strongly agreed in the posttest. Research agrees with this and establishes that dental hygienists know nutrition is important for oral health (DiMaria-Ghalili et al., 2014; Hayes, Franki et al., 2016; Kading, Wilder, Vann Jr, & Curran, 2010). Students were somewhat unchanged with their feelings about nutrition's place in dental hygiene care. However, when asked if the student currently discussed nutrition with his/her patients there was a statistically significant change ($p = 0.049$) after the educational module and practice with the electronic assessment tool. There was a positive change in current nutrition discussions from the students attending the module and utilizing the tool, showing more nutritional counseling sessions happening among students. The change was not overly significant, however, possibly since these senior dental hygiene students were already introduced to some form of nutritional counseling and currently practicing this to some degree. The nutritional counseling exposure to the students during the educational module could have made students more sensitive to chairside opportunities to discuss nutrition with their patients. This demonstrates the need for more exposure not only for our dental hygiene students but practicing clinicians who may need more education and experience.

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Research shows exposing dental providers to more evidence-based research can increase the importance of nutritional counseling with their patients (Greenberg et al., 2017; Hayes, Franki et al., 2016). In this study, while dental hygiene students already understood the value of discussing nutrition with their patients, and many currently did, this increased with the additional education and use of the electronic assessment tool. The electronic nutritional risk assessment and counseling tool should have particular interest to educators and clinicians who use electronic health records. Geiger and Rhee (2017) showed computer-based programs are often preferred and significantly help learning. The electronic assessment tool guided students through the nutritional counseling in a MI format that was easy and approachable, making the nutritional counseling sessions more successful. These innovative successes in dental hygiene school will hopefully translate into success into their careers, especially if electronic health records are used. An electronic tool such as this can help create efficient and appropriate records for patients.

Comfort and confidence with nutritional counseling. When asked about comfort level and confidence in nutritional counseling, students demonstrated a significant increase in both ($p = 0.020$ and $p = 0.007$, respectively). When asked about a lack of nutritional training, fewer students felt inadequately educated after the module ($p = 0.012$). Through the educational module, introduction of the electronic tool, and practice using the tool, students were able to increase their confidence with nutritional counseling. Some of their confidence may have resulted from being in the last semester of their dental hygiene education and thus a greater overall confidence in patient care. Introducing nutritional counseling and MI skills early in curriculum could increase the opportunities to practice and gain more confidence. Introducing concepts particularly

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around MI even during prerequisite courses could positively influence students' confidence with these challenging skills. Gaining this confidence early could be instrumental in these skills being maintained throughout one's career. Ultimately, this would mean greater patient care and improved health for individuals, societies, and beyond.

Comfort and confidence were chosen to be separate queries to observe any difference between the two concepts. While the research questions focused on confidence, would some students be comfortable talking about nutrition but lack confidence? Could the electronic tool build the confidence to match the comfort? Research has shown these concepts being used often interchangeably. Confidence has been recognized as a belief that one has the ability to do a skill and comfort as the emotions and attitudes about that ability (Peng et al., 2018). In the current study, both comfort and confidence levels improved, and it could be hypothesized that when one increases the other does as well. Previous research has shown this increase in confidence could have been simply from more experience (Brame, Martin, Tavoc, & Stein 2012; Claiborne, 2019; Simonian, Brame, Hunt, & Wilder, 2015). This was why in the current research encouraging the students to participate in as much nutritional counseling as possible was important to build confidence. Dental hygiene school has many requirements and learning opportunities that can be overwhelming to students. While nutritional counseling practice was encouraged and even incentivized for this study, limited participation, possibly due to other requirements taking precedence, created weaker results. Those that did participate and practiced nutritional counseling saw improvement in their confidence and research shows the same would happen for other

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students. In addition, practicing clinicians could also develop their confidence as they applied nutritional counseling with their patients, became more comfortable with this topic and framework, and saw improvement in their patients' health and perhaps their own.

Motivational interviewing with nutritional counseling. The final two Likert scale questions included MI and neither showed statistical significance. MI was first evaluated at its ability to improve performing nutritional counseling and not seen as statistically significant ($p = 0.106$). Second, comfort using MI was assessed and, again, no statistical difference ($p = 0.150$) was noted. This was not surprising as MI is a difficult skill to master and being comfortable and confident with it is challenging, even for seasoned clinicians (Curry-Chiu et al., 2015; De Roten et al, 2013). However, both questions had a p value of just over 0.10 which shows approaching statistical significance of $p < 0.05$. This could signify that with greater emphasis on MI skills and practice, comfort and confidence could improve. The educational module presented to the students was only one hour in duration. Research indicates MI is a skill that takes a significant amount of time to master (De Roten et al., 2013; Curry-Chiu et al., 2015). Despite the role play during the educational module and the experiences with patients during the study time period, MI requires continual training and reinforcement (Brobeck et al., 2011; Curry-Chiu et al., 2015; Fortune et al., 2018). Also, because the research questions focused on confidence with nutritional counseling rather than exclusively MI, the lack of statistical significance of these two questions certainly does not negate the significance of the findings. Using MI as a mode to deliver nutritional counseling can be more effective in creating lasting changes for the patient that will improve patient health more quickly

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(Brobeck et al, 2011; Curry-Chiu et al, 2015; Stewart & Fox, 2011; Bray, 2010).

Completing nutritional counseling with patients is certainly more rewarding when improvements are seen. When positive results are observed with patients, clinicians are more likely to continue with nutritional counseling with other patients. This may not have been witnessed by the students in the short time frame of the study. Educators should evaluate and enhance curriculum to create early access to nutritional counseling and MI. Incorporating these concepts and approaches early in education provides more time for students to practice and build confidence. The more confidence is built within educational settings, the greater chance for the clinician to continue with these practices beyond graduation.

Nutritional counseling practice. Students were asked to self-report the number of nutritional counseling sessions completed during the three-week period. A majority of the participants ($n = 15$, 68.2%) reported an increase in their nutritional counseling sessions compared to their experience prior to the educational module. This could have been from continual reminders from the PI and other instructors to utilize the nutritional counseling tool in clinic or from the incentive developed in the study. This was important, however, to encourage participation in nutritional counseling as the literature points to experience as one way to increase confidence (Brame et al., 2012; Claiborne, 2019; Simonian et al., 2015). One student reported a decrease in nutritional counseling sessions during the study, which could be from a lack of patients during the study period. Fourteen students had a positive change in their confidence in nutritional counseling from pretest to posttest. Of those fourteen, all but three ($n = 11$, 78.6%) had an increase in experiences with nutritional counseling during the study period. This was not surprising

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as experience can help to build confidence which has been demonstrated in this study. As the students used the electronic nutritional risk assessment and counseling tool to evaluate and discuss nutrition with their patients, they gained confidence through each experience.

Over half of the students (54.5%) had one to two self-reported nutritional counseling sessions. Based on these numbers and up to six clinic sessions in a week, as many as 10% of patients could have received a nutritional counseling session at any given time. Considering one student reported over seven nutritional counseling sessions and five students reported three to four, these numbers could even have increased. Six students ($n = 6$) had no change in the amount of nutritional counseling sessions completed before or after the study. Half of these students ($n = 3$) reported no nutritional counseling sessions which could account for some of the lack of improved confidence. Without practice, it is hard to gain confidence. Later, some students reported not having patients appropriate for nutritional counseling. While this may be true, research shows almost all patients benefit from nutritional counseling (Donoff, McDonough, & Riedy, 2014; Greenberg et al., 2017; Johnson, 2015; Khan, Holt, & Tinanoff, 2017). Adding nutritional counseling can support the dental hygienist as a healthcare provider. Interprofessional collaboration could support this concept. Learning to treat patients as a whole team can be powerful. Developing curriculum to include interprofessional education with dietitians, physician assistants, nurses, and resident physicians could be a groundbreaking way to integrate MI into several aspects of health, including nutrition. Incorporating all areas of healthcare demonstrates how practitioners work together to create the best care for the patient and nutrition is one area that directly affects each

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healthcare provider in a direct way. This, along with other research topics, can provide evidence for the need to increase medical-dental integration to treat patients as a whole and improve overall health exponentially.

Thematic analysis of open-ended questions. The most enlightening evidence from this study came from the students' answers to open-ended questions at the end of the posttest. The first question discussed ways MI influenced nutritional counseling with patients. Despite MI being a difficult skill, the overall comments were positive. Three students directly mentioned confidence and comfort which is a direct reflection on the research questions. Another student mentioned "feeling more open to discussing their nutrition" which could show an increase in confidence. An interesting and unexpected theme noted was goal setting with patients. Two students specifically mentioned goals and several others discussed the willingness of patients and even mentioned the "stage[s] of awareness." This is a direct correlation to the objective of MI as it is designed to focus on the patient's needs, setting aside the clinician's desires despite superior knowledge on the subject matter (Curry-chiu et al., 2015). As mentioned before, this type of discussion with patients is more successful and longer lasting (Brobeck et al, 2011; Curry-Chiu et al, 2015; Stewart & Fox, 2011; Bray, 2010). Building on these positive experiences could be instrumental in these students using these skills beyond graduation. These generally positive comments indicate with more experience and education, students could gain more confidence to use MI effectively with patients.

Barriers were the topic of the second open-ended question. Not surprising, insufficient time was a barrier to nutritional counseling. Based on similar research, this was a common barrier to nutritional counseling (Hayes, Wallace et al., 2016; Hayes,

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Franki et al., 2016). However, in this study, time was not as frequently mentioned as expected. This could be as students tend to have extra patient time waiting for faculty. Lack of patient interest or willingness was a greater barrier, mentioned by nine ($n = 9$, 40.9%) students. While this was unexpected, in the research done by Hayes, Wallace et al. (2016) patient compliance was another top barrier along with time. In their research, patient compliance was discussed and understanding behavior change, such as developed with MI skills, was suggested. In the current study, students used their MI skills to recognize patients who were not ready or interested in making nutritional changes and moved on. This is appropriate and expected for MI. Students became frustrated with their patients but were making the attempts at nutritional counseling. However, limited positive experiences with nutritional counseling could have long term negative effects on students pursuing nutritional counseling further in their career. Encouraging nutritional counseling early in dental hygiene education and helping students to understand the complexity of the subject could create more willingness to continue pursuing nutritional counseling in their career.

As reviewed in the literature, nutritional counseling and MI are difficult skills with notable consequences. The electronic assessment tool attempted to eliminate some of the hurdles associated with nutritional counseling and MI. The final open-ended question reviewed the electronic nutritional risk assessment and counseling tool. All fourteen ($n = 14$) comments from students were positive. Students felt the tool was simple and easy to follow, guided the conversations appropriately and efficiently, and “increased [their] ability to talk with patients.” Also, it was easy to save data and create an electronic health record for nutritional counseling performed with the patient. Further,

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it could be printed or emailed to the patient for a home reference of the goals discussed. The electronic nutritional risk assessment and counseling tool provided a step-by-step way to approach nutritional counseling and could reinforce nutritional counseling and MI skills for future use. Especially for students learning the steps of MI and becoming more comfortable and confident in nutritional counseling, using a tool like the one developed for this study can help reinforce these concepts.

Implications of research. The results of this research demonstrate an approach to nutritional counseling education to dental hygiene students. Due to CODA requirements, all dental hygiene programs are to include nutritional content in their curriculum (CODA, 2018). The module and electronic assessment tool could be a pedagogical tool for other dental hygiene programs. Furthermore, research shows nutrition as an important part of assessment and should be included in the ADPIED dental hygiene process of care. Utilizing an educational module and electronic nutritional risk assessment and counseling tool as described in this study could be instrumental in greater nutritional education and health of dental patients.

With research demonstrating continued exposure to MI and nutritional counseling is necessary for success (Brobeck et al., 2011; Franks et al., 2018), pursuing ways to develop more continued education on these subjects during school as well as after graduation is crucial. Professional organizations should consider promoting educational opportunities to their constituents in subjects such as MI and nutrition to encourage more frequent use during patient care. As this research has shown, using MI can be challenging but effective. With adequate practice, clinicians can become more proficient and help their patients to understand the importance of quality nutrition to their health.

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Limitations

The main limitation to this study was sample size, limiting the generalizability of findings. The senior dental hygiene class used in this study consisted of thirty-nine students ($N = 39$). Of those students only twenty-two participated fully in the study ($n = 22$), completing both pretest and posttest. While the demographics were consistent with other dental hygiene programs, increasing the sample size to include male participants, a wider age range, and other dental hygiene programs would have been beneficial. Due to the small sample size, randomization into experimental and control groups was not feasible, hence creating a potential bias. Increased exposure to nutritional counseling could have affected the students' confidence rather than the module and electronic tool making cause and effect impossible to determine. Further studies with larger sample sizes and a control group would be ideal. The length of the study may have also been a limitation. Including more time for clinician practice with nutritional counseling with patients could have strengthened the results and increased participation.

Other limitations surrounded the subtleties of the sample group possibly affecting the results of the study. Students who participated in the study were perhaps students who tend to be more highly motivated and more positive about their patient experiences. Also, the Hawthorne effect (LoBiondo-Wood & Haber, 2014) could have played a role with students understanding they were being studied and altering their responses. Finally, while the PI has no direct impact on the students' final grades, she does play a role in their education. Her reputation and presence at the school could have influenced students to participate and swayed their responses.

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Recommendations/Suggestions for Future Research

In addition to addressing the limitations by increasing the sample size and length of study time frame in future research, expanding similar research outside of the educational realm and into the practicing dental hygiene population would prove beneficial. Evaluating ways to incorporate more nutritional education, potentially with interprofessional experiences, would enhance this arena of patient care.

One concept that became apparent through this study was the difference, or lack thereof, between comfort and confidence. Research studies investigating these topics among various subjects provided little in the way of describing the difference between these two (Carter et al., 2019; Tam, You, & Bernaki, 2019; Weaver, Knox, & McPherson, 2019). Rather, comfort and confidence were used more interchangeably. Students also seemed to use either concept to describe similar feelings. More research would be necessary to understand more fully the difference between confidence and comfort in nutritional counseling.

Conclusions

As obesity rates climb, diabetes escalates, and other diet related health concerns heighten, the need for nutritional counseling is evident. Since oral health is related to diet as well, dental hygienists are in a unique position to educate their patients about nutrition to increase oral health as well as overall health. However, this has historically been challenging for dental hygienists. With the recent health issues emerging with COVID-19, it is apparent immune systems are as important as ever. Quality nutrition can fortify one's immune system and dental hygienists can help educate their patients about the implications of nutrition on oral health and beyond (Delsasso, 2020). Educating our dental hygiene students on nutritional counseling could build an arsenal of healthcare providers to widen the influence on patients. This research demonstrated the importance of laying a foundation in dental hygiene education of using MI to complete nutritional counseling. Furthermore, utilizing an electronic nutritional risk assessment and counseling tool can be instrumental in building our future dental hygienists' confidence. Ultimately, this can lead to increased patient care and overall health.

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Appendix A**Pretest Questionnaire**

Demographics:

What is your age?

- 18 - 22
- 23 - 27
- 28 - 32
- 33 - 36
- 36 and older

What level of education have you completed?

- High school degree
- Some college
- Associate degree
- Bachelor's Degree
- Master's Degree
- Other (specify)

Survey Questions:

1. I currently discuss nutrition with my patients.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

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2. A dental hygienist should discuss nutrition with his/her patient.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

3. I am comfortable with nutritional counseling.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

4. I lack the nutritional education to discuss nutrition with my patients.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

5. I am confident discussing nutrition with patients.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

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6. Motivational interviewing could improve my ability to perform nutritional counseling.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

7. I am comfortable using motivational interviewing.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

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Appendix B**Posttest Questionnaire (after 3 weeks practice with MI and nutritional counseling)**

1. I currently discuss nutrition with my patients.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

2. A dental hygienist should discuss nutrition with his/her patient.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

3. I am comfortable with nutritional counseling.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

4. I lack the nutritional education to discuss nutrition with my patients.

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- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

5. I am confident discussing nutrition with patients.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

6. Motivational interviewing could improve my ability to perform nutritional counseling.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

7. I am comfortable using motivational interviewing.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

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8. How many nutritional counseling interactions were completed during the study timeframe?

- None
- 1-2
- 3-4
- 5-6
- 7-9
- More than 10

9. Compared to before the nutritional education, the number of nutritional counseling interactions:

- Increased
- Decreased
- Stayed the same

10. In what ways, if any, did motivational interviewing influence nutritional counseling with your patients?

11. What were the barriers you experienced when attempting nutritional counseling with your patients?

12. How did the electronic tool affect your nutritional counseling?

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Appendix C

Cover Letter and Pretest Consent Form

DNHY452S Students,

My name is Heather Anderson and I am currently pursuing a Master of Science in Dental Hygiene degree at Eastern Washington University. For my thesis, I am conducting research on the effectiveness of an educational module on motivational interviewing and an electronic Nutritional Risk Assessment and Counseling Tool on improving confidence in nutritional counseling.

Professor Barton has required that you complete the educational module as part of DNHY 452S course content. This will include a one-hour module as well as some content questions during the first week of Spring Semester. If you choose to participate in the study, you will be asked to complete a pretest via email through Qualtrics, practice using the Nutritional Risk Assessment and Counseling Tool and complete a posttest also via email through Qualtrics. The data from the pretest and posttest will not be linked to you in any way. You are under no obligation to participate in the study and your consent or non-consent to participate will not impact your academic grade in any way. Please know that your participation in this study is completely voluntary and that your responses are anonymous. Also, you may skip any questions that you are not comfortable answering and you may opt out of the survey at any time. This study is less than minimal risk.

Before we begin the study, we ask that you please take the pre-study questionnaire. Please complete this survey by clicking this link:
https://ewubusiness.az1.qualtrics.com/jfe/preview/SV_b1JCNdNP0BpF0DX?Q_SurveyVersionID=current&Q_CHL=preview

Responses are needed by Thursday January 16th 4:00 pm. Your consent to participate in this study is implied when you access the survey and answer the questions.

As an incentive to participate, those that fully participate will be entered into a drawing for a \$25 Amazon gift card by providing an email at the end of the posttest. This email is not linked to the survey so responses are still anonymous and it will be confidential who participated. Also, for every nutritional counseling session completed, you will be entered into a drawing for another \$25 Amazon gift card. Those who complete nutritional counseling sessions will remain confidential. Your consent to participate in this study is implied when you access the survey and answer the questions.

If you have any questions or concerns about this survey please contact myself or my thesis advisor Sarah Jackson, RDH, MSDH at 509.828.1299, sarah.jackson@ewu.edu; or

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the department chair at EWU Lisa Bilich, RDH, MEd at 509.828.1295, lbilich@ewu.edu. If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Charlene Alspach, Executive Director, Grant and Research Development, Eastern Washington University (509) 359-2517 or calspach@ewu.edu.

Thank you,

Heather Anderson, RDH, BSDH
Email: handers1@eagles.ewu.edu
Cell phone: 425.501.3702

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Appendix D

Posttest Email

DNHY 452S Students,

Thank you for utilizing nutritional counseling skills over the past three weeks. If you would like to finish participating in the study, please access the post-study questionnaire by clicking on the link below. Similar to the pretest, the data from will not be linked to you in any way. You are under no obligation to participate in the study and your consent or non-consent to participate will not impact your academic grade in any way. Please know that your participation in this study is completely voluntary and that your responses are confidential. Also, you may skip any questions that you are not comfortable answering and you may opt out of the survey at any time.

https://ewubusiness.az1.qualtrics.com/jfe/preview/SV_aWq5Q3kqMzLWfAx?Q_SurveyVersionID=current&Q_CHL=preview

Remember, as an incentive to participate, those that fully participate will be entered into a drawing for a \$25 Amazon gift card. Your consent to participate in this study is implied when you access the survey and answer the questions.

If you have any questions or concerns about this survey please contact myself or my thesis advisor Sarah Jackson, RDH, MSDH at 509.828.1299, sarah.jackson@ewu.edu; or the department chair at EWU Lisa Bilich, RDH, MEd at 509.828.1295, lbilich@ewu.edu. If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Charlene Alspach, Executive Director, Grant and Research Development, Eastern Washington University (509) 359-2517 or calspach@ewu.edu.

Thank you,

Heather Anderson, RDH, BSDH
Email: handers1@eagles.ewu.edu
Cell phone: 425.501.3702

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Appendix E**Educational Module for Motivational Interviewing and Nutritional Counseling:***Objectives:*

- Identify ways nutrition can affect oral health.
- Summarize ways to use motivational interviewing
- Demonstrate how to use motivational interviewing for nutritional counseling
- Implement nutritional counseling in clinic with patients using tools introduced during the module

Plan:

Welcome and introduce. Encourage any more pretest participation (5 minutes)

Begin PPT (40 minutes)

- Nutrition review including inflammation, caries prevention, periodontal links (poll everywhere to survey prior knowledge and thoughts)
- Motivational interviewing review including OARS, the spirit of MI (poll everywhere to survey prior knowledge and thoughts)
- Connecting MI and nutritional counseling: Case studies with role playing in partners (diabetic patient, active perio patient, high caries risk patient)
- Introduce the reference guide and nutritional risk assessment and nutritional counseling tool in SmartDocs

Explain study (5 minutes)

Appendix F

NUTRITIONAL COUNSELING

USING MOTIVATIONAL INTERVIEWING TECHNIQUES

PLEASE COMPLETE THE PRETEST SENT TO YOUR CANVAS EMAIL

1

OBJECTIVES

- Identify ways nutrition can affect oral health.
- Summarize ways to use motivational interviewing
- Demonstrate how to use motivational interviewing for nutritional counseling
- Implement nutritional counseling in clinic with patients using tools introduced during the module

2

NUTRITION

- What do we already know?
- poll everywhere



3

What do we already know about nutrition?

4

NUTRITION & CARIES

- Caries Prevention
- Fermentable carbohydrates
- Liquid sugars/acids
- Age (young and elderly)



5

NUTRITION & INFLAMMATION

- Inflammation
- The root cause of most preventable diseases in the body!
- Inflammatory foods: simple carbohydrates, sugar, processed foods
- Diabetes: a HUGE way diet is connected to the body and the mouth



6

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NUTRITION & PERIODONTAL DISEASE

- Periodontal risks
 - Fascinating studies about diet and periodontal disease
 - Healing after NSPT
 - Obesity links to periodontal disease



NUTRITION

- Simple ideas to consider with patients:
 - Increasing fruits and vegetables
 - Decreasing sugar and processed foods
 - Discussions with diabetic patients in particular
 - But how can we get them to make actual changes??

MOTIVATIONAL INTERVIEWING (MI)

- What do you already know?
 - poll everywhere



What do you already know about motivational interviewing?

Motivational Interviewing: A REVIEW

- Elicit-Provide-Elicit
 - Find out what the patient already knows
 - Ask permission to give some advice
 - Review with the patient what this would mean for them

(Haley, 2011, 2016, 2018)

MOTIVATIONAL INTERVIEWING

- OARS
 - Open ended questions
 - Affirmations
 - Reflections
 - Summaries



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OARS: OPEN-ENDED QUESTIONS

- Open ended questions:
 - Tell me about...
 - What will be helpful to you during your visit today?
 - How important is _____ to you?
 - How confident are you that you would be successful at _____?

OARS- AFFIRMATIONS

- Affirmations:
 - That is wonderful!
 - What a great job you did!
 - That must have been difficult but you achieved a goal.

OARS- REFLECTIONS

- Reflections:
 - Reflect on chart notes, observations, or how the patient answered a question
 - It looks as if you...
 - What I am hearing is...

OARS- SUMMARIZE

- Summarize:
 - Review what was discussed
 - What did I miss?
 - What else would be helpful today?

THE SPIRIT OF MI

- The Spirit of MI
 - Collaboration (Partnership): We are going to work together.
 - Autonomy (Acceptance): I value you and am delighted to talk with you.
 - Evocation: I am going to create a space for you to share yourself and your story with me.
 - Compassion: I want to understand and respect you and your experience.

How can we connect these?

- Let's find a way to realistically approach this!



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Nutritional Risk Assessment

MI Reference Guide

CASE STUDIES/ROLE PLAYING

- Partners (groups of 3 if necessary)
- Each take a turn as the clinician or the patient with the following cases
- Use the guides to walk through the MI process
- Make sure everyone gets a turn to be the clinician

How can we connect these?

- John, 45 year old
 - Overweight
 - Diabetic (A1C 8.5)
 - 3 month perio maintenance, but with active disease present
 - Plaque control seems adequate

How can we connect these?

- Sarah, 17 years old
 - 12 active carious lesions, interproximal and smooth surface areas
 - Generally eats a high carbohydrate diet (crackers, bagels, etc)
 - Only drinks energy drinks
 - Gingival inflammation a concern as well

How can we connect these?

- Debbie, 39 year old
 - Active perio patient, completing NSPT
 - Generally health (no medications, BP normal, non-diabetic)
 - Healing from previous quads seems only marginal
 - (hint: patient seems to be compliant in homecare and no apparent systemic health concerns. Could poor nutrition be causing inflammation to not decrease?)

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QUESTIONS?

- What are some takeaways from today?



Nutrition and Motivational Interviewing Survey
When survey is active, respond at [PollEv.com/handerson424](https://pollEv.com/handerson424)

0 surveys done

3 WEEK STUDY BEGINS NOW!

- Do as much nutritional counseling as you can using MI skills
- Use reference guide to help you
- The assessment form has guidance as well
- Incentives!!
- In 3 weeks, the study will conclude and you will be sent another posttest to complete.

THANK YOU!!!

- Your participation and support are appreciated!

Appendix G

MI & Nutritional Counseling Reference Guide

SPIRIT OF MOTIVATIONAL INTERVIEWING

PARTNERSHIP- patient and clinician are equal partners

ACCEPTANCE- affirm and support the patient

COMPASSION- care about the patient, not your agenda

EVOCATION- what the patient thinks is most important

O.A.R.S.

Open ended questions- getting permission to discuss a topic, questions to gather information and continue conversations (see options below)

Affirmations- sincerity and support, validation, acknowledges difficulty

Reflective listening- clarify your understanding (used throughout MI through questions, affirmations, and summaries)

Summarize- reflections of patient's feelings

How to Get Started-Possible Scenarios:

Diabetic patient- During health history when discussing diabetes, ask permission to revisit nutrition later in the appointment, especially if periodontal inflammation is noted.

(OPEN ENDED QUESTIONS)

- How important is it for you to keep your diabetes under control? (Follow up with Importance ruler*)
- What strategies are you using to control your diabetes? What does your diet look like (FFQ)? (How are these working for you in your life? What prevents you from taking more steps to control your diabetes? (**AFFIRM** and **SUMMARIZE** what they are saying)
- Explain briefly the reason diabetes control is important to oral health care professionals. Would you like more information on this? (**ASK PERMISSION**)
- I am sure you have been told many options for controlling your diabetes and I don't need to add to that list today. However, is there one thing you could see as a reasonable place to start? Could we set a goal today? Follow up with confidence ruler** (**REFLECTIVE LISTENING** AND **SUMMARIZING**).

High caries risk patient- During education of caries risk, use MI tools to discuss nutrition in relation to decay.

(OPEN ENDED QUESTIONS)

- How important is it for you to keep your teeth and prevent more decay? (Follow up with Importance ruler*)

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- What are some choices in your life that could be causing the decay? What does your diet look like (FFQ)? What would prevent you from making some changes to help prevent more decay from happening? (**AFFIRM** and **SUMMARIZE** what they are saying)
- Could I give you some information about what causes decay and together we come up with a plan to help us successfully treat your mouth? (**ASK PERMISSION**)
- Is there one thing you could see as a reasonable place to start? Could we set a goal today? Follow up with confidence ruler** (**REFLECTIVE LISTENING AND SUMMARIZING**).

NSPT healing patient- Post op instructions can include MI tools to review homecare and nutrition to aid in healing.

- How important is it for you to maintain your oral health after this periodontal treatment? (Follow up with Importance ruler*) (**OPEN ENDED QUESTIONS**)
- What is necessary for good healing? (**AFFIRM** and **SUMMARIZE** what they are saying) What does your diet look like (FFQ)?
- Could I give you some information about nutrition and how it affects the periodontal disease that we are treating and how it affects the healing process? (**ASK PERMISSION**)
- Is there one thing you could see as a reasonable place to start? Could we set a goal today? Follow up with confidence ruler** (**REFLECTIVE LISTENING AND SUMMARIZING**).

*Importance ruler:

“On a scale of 1-10, how important is it for you to _____?”

High answer: comment on their answer (“Wow. That is great you are at a 9. How could we get it to move to a 10?”)

Low answer: ask why their answer wasn’t lower than what they gave.

**Confidence ruler:

“On a scale of 1-10, how confident are you that if you say you could do____, you would do it?”

High answer: comment on their answer with praise

Low answer: “why not 0? What would it take to move up to one step higher?”

Developed from Asimakopoulou, K., & Newton, T. (2018). Success with motivational interviewing techniques in the dental clinic: a case for the use of iMI-GPS. *Dental Update*, 45(5), 462–467. <https://doi.org/10.12968/denu.2018.45.5.462>

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Appendix H

Nutrition Risk Assessment & Counseling Tool

Does the patient give permission to discuss nutrition? YES NO
 Is there anything you've been thinking about changing with your nutrition?

Importance Ruler

On a scale of 1-10, how important is it for you to...

- DIABETIC PATIENT: Keep diabetes under control? _____
- CARIES RISK PATIENT: Keep your teeth and prevent more decay? _____
- POST NSPT PATIENT: Maintain your oral health after this periodontal treatment? _____

Discuss with the patient their current diet

Food Frequency Questionnaire- On a daily basis do you consume any of the following (check yes):

Fibrous Vegetables (carrots, broccoli, cauliflower, asparagus, green leafy lettuce)	
Proteins (chicken, beef, beans, pork, tofu, fish)	
Healthy fats (olive oil, avocado oil, coconut oil)	
Fruits (apples, bananas, berries)	
Vitamin C Rich Foods (bell peppers, kiwi, oranges, strawberries)	
Sweetened Beverages (soda, sweet tea, lattes, juices, coffee with sweetener)	
Starches (bread, chips, potatoes, tortillas, crackers, fries)	
Desserts (cake, cookies, ice cream, pie, sweet rolls, donuts, candy)	
Processed and/or fast food	

Risk Factors

Diabetes
A1C over 7
Age (elementary age, teenage, geriatric)
Skips meals
Grazing/snacking all day
High amounts of processed foods, fast food, convenience food
High sugar intake
Frequent consumption of fermentable carbohydrates
Limited fruits and vegetable intake
More than one sweetened beverage per day
Overweight
TOTAL

0-1: Low risk 2-4: Mod risk 5+: High risk

Goal Setting

Is there one thing you could see as a reasonable start?
 Use the following ideas to set some goals together:

Increased fruits and vegetables	Daily goal:
Decreased processed foods	Daily/weekly goal:
Limit fast food	Weekly goal:
Increase water consumption	Daily goal:
Decrease sweetened beverages	Daily/weekly goal:
Increase protein consumption	Daily goal:

HEALTHY EATING PLATE

Use healthy oils (like olive and canola oil) for cooking, on salad, and at the table. Limit butter. Avoid trans fat.

Drink water, tea, or coffee (with little or no sugar). Limit milk/dairy (1-2 servings/day) and juice (1 small glass/day). Avoid sugary drinks.

The more veggies—and the greater the variety—the better. Potatoes and french fries don't count.

Eat plenty of fruits of all colors.

STAY ACTIVE!

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Harvard T.H. Chan School of Public Health
The Nutrition Source
www.hsph.harvard.edu/nutritionsource

Harvard Medical School
Harvard Health Publishing
www.health.harvard.edu

Confidence Ruler

On a scale of 1-10, how confident are you that if you say you could reach your goals, you would do it?

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Appendix I**Nutrition and Motivational Interviewing Quiz (administered during module)**

1. Nutrition can

- Cause few changes in the mouth.
- Be controlled easily.
- Be improved with increasing fruits and vegetables.
- Be more than weight management.

2. Inflammatory foods include all the following except:

- Simple carbohydrates, such as bread
- Sugar
- Chicken
- Packaged granola bars

3. OARS stands for

- Open ended questions, Affirmations, Reflections, Summarize
- Open ended questions, Advice, Reminders, Succinct
- Open statement, Affirmations, Remediation, Solutions
- Ownership, Accommodations, Reflections, Selling point

4. Motivational interviewing can help the patient change by

- The clinician motivating the patient.
- The patient developing ideas to encourage change.

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- The clinician giving facts about why the patient should change.
 - Making the patient feel bad about their habits.
5. Nutrition can directly and indirectly affect oral health.
- True or False

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Curriculum Vita

HEATHER ANDERSON, RDH, BSDH, MSDH(C)

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5819 Parkwest Court
Spokane, WA 99208

EDUCATION

MS	Eastern Washington University, Dental Hygiene. Thesis: Nutritional counseling through motivational interviewing and technology	Anticipated 2020
BS	Eastern Washington University, Dental Hygiene <i>Summa Cum Laude</i>	2003
	Brigham Young University, prerequisites completed	1998- 2000

PROFESSIONAL CERTIFICATIONS & LICENSURES

Washington State Registered Dental Hygienist License #6838 Including local anesthesia and expanded restorative functions	2003-Present
CPR/AED Certification	2001-Present

TEACHING EXPERIENCE

Eastern Washington University, Spokane, WA <i>Adjunct Clinical Faculty, Dental Hygiene</i>	2017- Present
<ul style="list-style-type: none"> Part-time clinical faculty at EWU Dental Hygiene Clinic providing hands-on guidance and encouraging critical thinking skills to students Conduct various lectures and learning experiences as assigned by full-time faculty Practicum working with junior restorative dentistry class Participated in Mock WREB experience for prophylaxis and restorative 	
Eastern Washington University, Spokane, WA Lake Spokane Community Dental <i>Adjunct Off-site Faculty, Dental Hygiene</i>	2015- Present
<ul style="list-style-type: none"> Initiated an affiliation with EWU to have students at our clinic for off-site rotations Weekly interaction with two rotating students throughout the school year, observing their clinical work on patients while giving them real world experiences 	

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Eastern Washington University, Spokane, WA

2003

Teaching Assistant, Dental Hygiene

- Participated in pilot “Teaching Track” elective during senior year of schooling
- Served as Teaching Assistant to first year dental hygiene students

WORK EXPERIENCE

NEWHP, Lake Spokane Community Dental Clinic,
Nine Mile Falls, WA

2012- Present

Registered Dental Hygienist

- Accelerated and traditional dental hygiene procedures
- Providing dental care to an underserved population
- Restorative procedures performed regularly

Dr. Kathy S. Marvin, Everett, WA

2010-2011

Registered Dental Hygienist

- Traditional dental hygiene procedures
- Implemented a fluoride varnish program for adults
- Strengthened periodontal program within the practice by actively assessing periodontal health of all patients and treating accordingly

Desert Sun Dental, Quincy, WA

2007-2010

Registered Dental Hygienist

- Accelerated and traditional hygiene procedures
- Performed restorative procedures

Dr. John C. Walker, Olympia, WA

2004-2006

Registered Dental Hygienist

- Traditional dental hygiene procedures

Dr. Ingrid R. Janssen, Olympia, WA

2003-2005

Registered Dental Hygienist

- Traditional dental hygiene procedures

HONORS AND AWARDS

Hu-Friedy Golden Scaler Award

2003

Clinical excellence and compassionate service

Graduate Studies Appointment

2019-2020

PROFESSIONAL AFFILIATIONS

American Dental Hygiene Association

2015-Present

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Member

Washington Dental Hygiene Association Committee member of Eastern Washington Component	2015-Present
Delegate/Alternate Delegate to WDHA House of Delegates	2017, 2019
American Dental Education Association	2018-Present
American Academy for Oral Systemic Health	2019-Present

SKILLS

Proficient in Dentrix, Eaglesoft and DSN dental computer programs
 Familiar with Dexis and Shick dental radiography programs
 Experience with Microsoft Word, Excel, Outlook, PowerPoint, Zoom

COMMUNITY SERVICE

Scrubs Camp, EWU Introduced high schoolers to dental hygiene profession	2019
Admissions Interviews, EWU Conducted interviews for dental hygiene school candidates	2019
Vet Day, EWU Dental hygiene services to local veterans	2017
Seattle-King County Clinic, Seattle, WA Dental hygiene services to the underserved	2016
Humanitarian Mexico Trip, Ensenada, Mexico Dental services to underprivileged Mexican population	2003
