

**Oral – Systemic Connection:  
A Survey of the Curriculum in Nursing Schools**

**by**

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## **Abstract**

Existing standards in medicine and dentistry support the inclusion of oral-systemic health learning objectives in the pre-doctoral curriculum (1-4). This raises the question: Are nursing students being educated about the importance between the oral cavity and systemic health? Although nurses provide an important role in health care education, prevention, and management of patients with diabetes mellitus (DM), cardiovascular disease (CVD), and adverse pregnancy outcomes (APO), there is little literature describing their understanding of the oral-systemic connection between periodontal disease (PD), DM, CVD, and (APO). The overarching goal of this study is to determine if nursing programs in the State of Michigan include content related to the oral-systemic connection, specifically between PD, DM, CVD, and APO. This thesis research offers four hypotheses: (1) nursing curricula includes little curricular content in the areas of oral-systemic connection between PD, DM, CVD, and APO; (2) nursing programs utilize little resources when teaching about the oral-systemic connections specific to PD, DM, CVD, and APO; (3) nursing program administrator's are satisfied with current curricular content regarding oral-systemic health specific to PD, DM, CVD, and APO; and (4) nursing directors foresee little or no changes with curricular content specific to the oral-systemic connection between PD, DM, CVD, and APO. Findings emanating from the literature review as well as the factual research are presented. The findings indicate that nursing program directors are confident about the education on oral-systemic content provided to their nursing students. Based on the results, it is recommended that nursing programs adopt a practice-oriented, curriculum implementation strategy, focusing on teaching the oral-systemic health relationship.

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## Chapter 1 - Introduction

The changing health care practice environment requires nursing education programs keep up with the competence requirements of a changing healthcare practice environment and develop their curricula accordingly (5, 6). Research shows increasing evidence shows an association exists between periodontal health and systemic diseases (7-20). In return, periodontal disease (PD) is a potential risk factor for diabetes mellitus (DM) (9, 10, 13, 18, 21-29), cardiovascular disease (CVD) (10, 18, 23, 24, 30) and adverse pregnancy outcomes (APO) (31-34). Studies suggest periodontal disease worsens glycemic control and increases the likelihood of negative cardiovascular events. The literature also suggests a correlation between periodontal systemic bacteria, increased serum C-reactive protein levels (11, 17, 22), an increased risk of stroke (19, 21-26), and coronary heart disease (7, 12, 14, 15, 17-19, 21, 22, 24-29). In addition, studies show an increase in cytokine production in mothers, a direct result of the inflammatory process related to periodontal disease, putting the patient at risk for adverse outcomes such as preterm low-birth weight (PLBW) (35). Moreover, most oral diseases are preventable and easily treated when detected early.

In July 2010, the Institute of Medicine (IOM) released a report, *“Improving access to oral health care for vulnerable and under served populations”*, which examines the outlook and consequences of inadequate oral health care services in the U.S. One recommendation includes expanding the oral health work force by training physicians, nurses, and other non-dental health professionals to recognize risk for oral diseases. The report also suggests adding or changing recommendations to update educational practices (36).

The total number of nursing programs (PN/VN, ADN, Diploma, BSN, BSRN, Master’s and Doctorate) in the U.S., as reported by the National League for Nursing (NLN), is reported to be 4,503 as of 2011. Of these, there are 1,400 programs offer a Registered Nursing (RN) degree (ADN, Diploma, BSN, and BSRN) in the U.S. The State of Michigan has 123 nursing programs with 77 offering a RN degree (37). What is not reported in the nursing literature is what is being taught to RN students regarding periodontal disease and the relationship it has with systemic

conditions such as DM, CVD, and APO. It is not known if nursing students are being prepared to manage patients with periodontal-systemic health complications. A further understanding of oral-systemic relationships would improve the knowledge of patients by educating them on the standards related to good oral and systemic health.

To address these questions, this study aims to determine whether nursing programs in the state of Michigan that include oral-systemic subject matter in their curriculum, specifically:

- 1) Who instructs the nursing students?
- 2) What didactic content related to the oral systemic connection is presented?
- 3) How much time is devoted to these topics?
- 4) What setting is the material taught in (classroom, clinical setting, both)?
- 5) When is the material introduced into the curriculum?
- 6) Which resources are included when teaching about this topic?
- 7) How are educational outcomes/competencies assessed?
- 8) How satisfied are nursing program administrators with current curricular content specific to the oral systemic connection, and
- 9) What changes in the nursing curriculum are needed in order to include oral-systemic connection?

### **Statement and Significance of the Problem**

Although nurses provide an important role in the health care education, prevention, and management of patients with DM, CVD, and APO, there is little literature describing nurses understanding of the oral-systemic connection. The infectious and inflammatory burden of PD has been consistently associated in patients with DM, CVD and APO such as PLBW (38-40). There is very little literature describing the oral-systemic connection in nursing curricula. It is essential that nurses are knowledgeable about the current literature pertaining to the periodontal oral-systemic relationship. By considering a plan in collaboration with patients based upon their personal oral health goals and immediate dental health needs nurses would give individuals and families the background information needed to make informed decisions about their oral and overall health.

## **Purpose**

The purpose of this study is to determine if the oral-systemic connection is included in nursing curricula. Education of nursing professionals often does not include oral health. Patient education regarding how oral health affects persons with diabetes mellitus, cardiovascular disease and adverse pregnancy outcomes may be overlooked. This thesis seeks to answer the following hypotheses through four specific aims.

## **Hypotheses**

The overarching goal of this study is to determine if nursing programs in the state of Michigan include curricular content regarding the oral-systemic connection, specifically between PD and DM, CVD, and APO.

**Specific Aim #1: To determine whether nursing programs in the state of Michigan include oral-systemic subject matter in their curriculum.**

Null Hypothesis: Nursing Programs in the state of Michigan include curricular content in oral-systemic subject matter.

Alternative Hypothesis: Nursing Programs in the state of Michigan lack curricular content in oral-systemic subject matter.

**Specific Aim #2: To assess the method(s) used for teaching the oral-systemic connection between PD, DM, CVD and APO.**

- (a) Who instructs the nursing students;
- (b) What didactic content related to the oral systemic connection is presented;
- (c) How much time is devoted to this the topic;
- (d) What setting the material is taught in (classroom, clinical setting, both);
- (e) When the material is introduced into the curriculum;
- (f) Which resources are included when teaching about this topic;
- (g) How are educational outcomes/competencies assessed?

Null Hypothesis: Nursing programs in the state of Michigan utilize various resources when teaching about PD and the oral-systemic connection.

Alternative Hypothesis: Nursing programs in the state of Michigan use limited resources when teaching about PD and the oral-systemic connection.

**Specific Aim #3: To assess nursing program administrator's level of satisfaction with current curricular content between PD and the oral-systemic connection.**

Null Hypothesis: Nursing program administrator's are satisfied with current curricular content regarding PD and the oral-systemic connection.

Alternative Hypothesis: Nursing program administrator's are not satisfied with current curricular content regarding PD and the oral-systemic connection.

**Specific Aim #4: To identify proposed changes in the nursing curriculum to include PD and the oral-systemic connection.**

Null Hypothesis: Nursing directors foresee little or no changes with their curricular content specific to PD and the oral-systemic connection.

Alternative Hypothesis: Nursing director's foresee changes with their curricular content specific to PD and the oral-systemic connection.

## Chapter 2 – Literature Review

### Periodontal Disease and Systemic Health

There is increasing evidence that oral health is a critical component of overall health and that poor oral health may lead to initiation or exacerbation of chronic inflammatory diseases/conditions such as cardiovascular disease (CVD), diabetes (DM), and adverse pregnancy outcomes (APO). Periodontal disease (PD) refers to the inflammatory processes that occur in the tissues surrounding the teeth in response to bacterial accumulations (19). Approximately 500 different bacterial entities and various human viruses are involved in dental microbial plaque (41). Oral mechanical manipulation (such as tooth brushing, dental procedures, and even routine mastication) can cause bacteremia. Periodontal bacteria get into the blood stream. The bacterial accumulations of chronic periodontal infections cause an inflammatory response from the body (42, 43). According to research from the Centers for Disease Control and Prevention (CDC), 64.7 million (47.2 %) of the U.S. adult population aged 30 years and older has periodontal disease. These findings are based on epidemiologic data from the 2009–2010 National Health and Nutrition Evaluation Survey (NHANES) (44).

Diabetes Mellitus (DM) demonstrates an association with periodontitis (38). The periodontium experiences constant exposure to bacteria in the plaque biofilms that colonize the oral cavity. This continuous exposure to bacteria acts like continual wounding. Studies have shown PD can cause insulin resistance in people with diabetes due to the inflammation of the periodontal tissues. Taylor et al. found evidence to support the effect of severe periodontitis on increased risk for poorer glycemic control. Taylor et al. performed a longitudinal study of Pima Indians with Type 2 diabetes and found those with severe periodontitis at baseline had over 6 times the risk of developing poor glycemic control over 2 years as compared to those with diabetes and little periodontal disease at baseline (45). There are 29.1 million people or 9.3% of the population with diagnosed or undiagnosed diabetes in the United States according to the National Diabetes Statistic Report for 2012 (46). Furthermore, studies suggest that oral disease awareness among diabetic persons is rather low (47, 48).

Periodontal disease, in addition to having a systemic effect on diabetes, can also influence cardiovascular disease (CVD). Existing evidence suggests that having periodontitis contributes to the infective and inflammatory burden associated with CVD (39). Gram-negative pathogens present in dental plaque can result in bacteremia since the subgingival tissues are inflamed and ulcerated in PD. Periodontal pathogens invade epithelial cells and connective tissue, and can then enter the bloodstream, traveling to distant locations in the body. The release of bacteria and pro-inflammatory mediators, such as bacterial endotoxins and cytokines in the bloodstream, which causes the release of C-reactive proteins, achieves greater inflammatory activity in atherosclerosis, which may represent the link between periodontal infection and CVD. Periodontal disease provides a rich source of subgingival microbial and host response products and effects over a long time period. CPR, IL-6, and neutrophils may make a contribution to the mechanism for the observed associations between chronic infections and cardiovascular diseases (42, 49). In addition, Haraszthy et al. research shows specific periodontal pathogens, such as *P. gingivalis*, *B. forsythus*, *P. intermedia* and *A. actinomycetemcomitans* have been detected in carotid atheromatous plaques (50). Data from the National Health Interview Survey for 2012 shows there are 26.6 million or 11.3% of adults with diagnosed heart disease in the United States (51).

Pre-term delivery and/or low birth weight represent a significant cause of infant morbidity and mortality as the leading perinatal problem in the U.S. Liu et al. recently reported the leading cause of death in children under 5 is being born prematurely, surpassing individual infectious diseases in young children around the world. Approximately 1.1 million children died in 2013 as a result of being born prematurely (52). It's worth noting one birth can have more than one Adverse Pregnancy Outcome (APO). Ide et al. defines APO as one which encompasses various outcomes, including low birth weight (LBW), preterm birth (PTB), pre-eclampsia, and miscarriage and/or still birth could be seen as an example of systemic outcomes associated with periodontal diseases (53). Periodontal disease has been linked to APO such as PTB and LBW. While the direct causal relationship remains unknown, evidence suggests that maternal infection is a key factor in APO. In response to maternal gram-negative periodontal infection, there is production of cytokines, TNF-alpha, and prostaglandins. This response signals to the body that it is time for delivery, regardless of fetal age (40, 54). According to Goldenberg et al. LBW

infants die at rates of up to 40 times those of infants of normal weight, and LBW infants are many times more likely to end up with long-term handicapping conditions (55). Data from the Center for Disease Control and Prevention for 2010 shows 7.99% of infants were born with a low birth weight in the United States (56).

Given the large number of U.S citizens with periodontitis and systemic diseases, it is important to consider whether these patients are able to maintain effective systemic health. Analysis of data among the US population in 1999 shows only two-thirds (64.1%) visit the dentist annually (57). Currently, there are over 3 million licensed registered nurses in the US health care workforce (58). The RN workforce is expected to grow from 2.71 million in 2012 to 3.24 million in 2022, an increase of 526,800 or 19% (59). The CDC estimates the number of visits (to physician offices, hospital outpatient and emergency departments) is 1.2 billion patients per year (60). In view of this fact, nurses make up the largest portion of health care persons in the work force today and are far more likely to encounter underserved and vulnerable populations than dental professionals (61, 62). As a result, increasing nurses' awareness and knowledge about oral health can increase nurses' knowledge and skills in oral health care.

In 2000, the Surgeon General's Report *Oral Health in America* noted that "Oral health and general health are inseparable", and the mouth "is a portal of entry for infections that can affect local tissues and may spread to other parts of the body" reinforced the view that oral health should be included as a piece of a larger view of systemic health (63). In addition, these reports: *Advancing Oral Health in America* (64) *Improving Access to Oral Health Care for Vulnerable and Underserved Populations* (36), *National Prevention Strategy: America's Plan for Better Health and Wellness* (65), and *Core Competencies for Interprofessional Collaborative Practice: Reforming Health Care by Transforming Health Professionals' Education* (66), reminded educators, practitioners, and the public, of the fundamental fact that oral diseases present a systemic burden. The reports also highlight the focus of the nursing profession in improving oral health outcomes, the nurses' role in health promotion and prevention, and the value of interprofessional education and collaborative practice in improving oral health.

The 2011 IOM's *National Call to Action* report specifically addressed nursing education and oral health. The IOM Committee on Leading Health Indicators for Healthy People 2020 is asking nursing programs to prepare nurses with oral health core competencies:

“To effect change in oral health workforce capacity, more training and recruitment efforts are needed. The lack of personnel with oral health expertise at all levels in public health programs remains a serious problem.... Routinely transfer oral health research findings to health professional school curricula and continuing education programs and incorporate appropriate curricula from other health professions-- medical, nursing, pharmacy, and social work--into dental education” (67).

The report highlighted the need for partnerships of leading collaborators, including nurses, to be involved in oral disease prevention. The committee recommended that “accrediting bodies incorporate the core competencies into accreditation requirements for undergraduate and graduate non-dental health education programs” (68).

*Advancing Oral Health in America:*

“Evidence shows that oral health complications may be associated with adverse pregnancy outcomes, respiratory disease, cardiovascular disease, and diabetes.... individuals and many health care professionals remain unaware of the risk factors and preventive approaches for many oral diseases, and they do not fully appreciate how oral health affects overall health and well-being.... The committee stresses three key areas needed for successfully maintaining oral health as a priority issue: strong leadership, sustained interest, and the involvement of multiple stakeholders” (64).

*Improving Access to Oral Health Care for Vulnerable and Underserved Populations Report* recommended integrating oral health care into overall health care, stating:



“Non-dental health care professionals need to take a role in oral health care.<sup>1 1</sup> ....Several non-dental health care professions have made great strides in improving the oral health education and training for their students through development of oral health curricula and requirements for training in oral health care....However, these types of initiatives have not spread widely through the health professions” and concludes that the best way to encourage adoption of a core set of competencies is for “professional accreditation and certification bodies to require these competencies for accreditation and maintenance of certification” (36).

*National Prevention Strategy: America's Plan for Better Health and Wellness* advocate “Expand public-private partnerships to implement community preventive services (e.g., school-based oral health programs, community based diabetes prevention programs)” (65).

*Core Competencies for Interprofessional Collaborative Practice* states:

“Interprofessional communication: Communicate with patients, families, communities, and other health professionals in a responsive and responsible manner that supports a team approach to the maintenance of health and the treatment of disease” (66).

With regards to the aforementioned, the Institute of Medicine (IOM) Committee on Leading Health Indicators for Healthy People 2020 is asking nursing programs to prepare nurses with oral health core competencies (67). This study focuses on Registered Nursing (RN) education earning a diploma, associate, or baccalaureate degree. According to the Accreditation Commission for Education in Nursing, there are currently no accreditation guidelines or requirements for nursing programs regarding oral-systemic health education (69).

### **Oral-Systemic Connection in Medical and Dental Education Curricula**

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<sup>1</sup> In this report, the committee uses the term *dental professionals* to refer to dentists, dental hygienists, dental assistants, and dental laboratory technicians. The term *non-dental health care professionals* include all other types of health care professionals (e.g., nurses, pharmacists, physician assistants, physicians). Together, they are referred to as *oral health care professionals*.

In 2003 the U.S. Surgeon General specifically called for efforts to “review and update professional educational curricula to include content on oral health.” (68). In 2011, the Committee on Oral Health Access to Services; Institute of Medicine and National Research Council recommended oral health goals and competencies for medical students:

“Has knowledge in periodontal disease prevention and recognition, and can collaborate with dentists.... Can counsel patients about systemic importance of periodontal disease (e.g., can affect diabetic control; possible linkages with prematurity/low birth weight, heart disease).... Has understanding of the important oral-systemic interactions and can monitor for these” (36).

In 1985, Curtis et al. surveyed U.S. and Canadian medical schools and reported that comprehensive instruction in dental topics did not take place in surveyed institutions (70). In 2006, The Macy Study panel 2 report discusses curriculum and clinical training in oral health for physicians and dentists with the goal to identify learning objectives in oral and systemic health (11). In a 2008 report of the Association of American Medical Colleges, which advocates for oral health education for medical students suggested that “specific oral-systemic health learning objectives can be created and matched with clinically relevant experiences to enhance oral health knowledge and the collaboration with dental schools” (11).

Existing standards in medicine and dentistry support the inclusion of oral-systemic health learning objectives in the curriculum (11). Outside of the nursing profession, there are studies that examined oral-systemic education in health care professional programs. In 2008, Formicola et al. studied medical and dental schools curricula and clinical training in oral health and identified a need for “significant change in the curricula of both professions” in order to stay responsive to the emerging science, which includes oral-systemic relationships (11). In addition, investigators at the University of Washington surveyed 398 pediatricians and 632 family physicians licensed to practice in the state of Alabama and estimated pediatric and family physician medical students received about 2 hours of lecture on oral health during their 4 years of medical school (71).

In 2010, Al-Habashneh et al. investigated Jordanian doctors' knowledge, perception and practices between diabetes and oral health. His research showed that 68% of the medical doctors surveyed did not believe that periodontal health affects glycemic control among patients with diabetes and 30% believed that the treatment of periodontitis might improve glycemic control (72). An investigation of internal medicine trainees' level of knowledge and orientation in oral health, specifically in regard to periodontal disease and adverse health events, suggests that medical schools should provide more comprehensive training in periodontal health. Also in 2010, Quijano et al. surveyed 125 incoming internal medicine residents about their knowledge and orientations toward periodontal disease. Eighty-two percent responded that they never asked patients if they were diagnosed with periodontal disease, 90% reported not receiving any training about periodontal disease during medical school, 76% reported never screening patients for periodontal disease, and 23% stated that they never referred patients to dentists (73).

### **Oral-Systemic Health Education in Nursing Curricula**

Although there is growing evidence-linking PD to systemic health, there is little knowledge about what nurses are doing to incorporate this information into patient care. Following is a review of several studies that have sought to evaluate oral health care in nursing.

Oral health has not been a high priority in nursing practice and educating nurses about oral health has been reported as unsatisfactory (74). To support these findings, Jablonski performed an extensive literature search for nursing textbooks published in English from 2006 to 2010 using the search terms "nursing", "fundamentals", and "textbook". Seven textbooks were identified and examined for quantity (number of pages and percentage of pages) and quality (accordance with best care practices) of information, and found 0.6% of the content was devoted to oral health and hygiene. The author further stated, "nearly every textbook contained some erroneous or outdated information" regarding oral health education information (75). The author's research showed information about oral health and hygiene was infrequent. The number of pages ranged from less than 1.0 to 3.3. Information quality was highly variable and was likely deterred by a lack of evidence-based guidelines for oral care. The author concluded, "Nurses are encouraged to collaborate with dental professionals and to incorporate current clinical

guidelines” (75). In addition, just one textbook by Potter and Perry provided information pertinent to oral health assessment and emphasized the oral-systemic link. Jablonski reported the text contained the best description of oral health assessment (defined and described periodontal disease, gingivitis. In addition, the authors of the text stated that foam swabs are ineffective at removing plaque and only recommended them for patients without teeth (8, 76).

Time devoted to teaching oral health in nursing curricula has been reported in the literature. Jones et al. reported an hour or less of overall oral health content in the entire undergraduate curricula for 50% of the surveyed schools. Fourteen percent of the undergraduate programs included 2 to 3 hours of oral health content specific to older adults and the remaining schools reported zero to 1 hour (77). In a survey of nursing students, McAuliffe found that 76% had only 2 to 3 hours of oral care education and states, “Students are exposed to and influenced by outdated and non-research based practices” (78). In addition, Sole et al. found that 72% of the 960 nurses they surveyed used a cotton swab once every four hours, while 5% used a toothbrush once every four hours and 34% used a toothbrush once every 8–12 hours as part of their oral care practice (79).

In 2011, Skeie et al. evaluated to what extent oral health is integrated into the basic educational curriculum of nurses in Norway and concluded, “Oral health should have a bigger place in the basic educational curriculum” (80). To support this finding, Pettit et al. studied 382 registered nurses working in specialty areas of Texas hospitals to measure oral care knowledge, practices and opinions. In a survey, when asked if their nursing program had prepared them for providing oral care, 45% reported only “minimally prepared”. Regarding their confidence to provide oral care, 54% reported “confident” and 32% “very confident”. When asked how important the oral health of their patients was to them, 50% responded “important” and 45% “very important” (14). Additionally, in 1998, Longhurst conducted a cross-sectional study of the oral health care instruction given to nurses during their basic training and concluded “nurses knowledge of oral health problems is due to the absence of oral health education at the prequalification stage” (81).

There are studies that examined oral-systemic education in health care professional programs of nursing, dentistry, medicine and pharmacy. In 2010, Ward et al. researched the role of education of nurses and the oral-systemic link. The authors investigated 200 Nurse Practitioner's understanding of the periodontal disease- systemic link. Their survey was designed to determine nurses practice behaviors, attitudes, opinions and knowledge pertaining to the relationship between periodontal and systemic disease. Eighty-five percent of nurses thought there was a relationship between oral and systemic inflammatory markers and that treatment for periodontal disease or diabetes had a positive impact on both diseases. Twenty-two percent of the nurses reported that they screen patients for periodontal disease, 69% of nurses incorrectly thought that diabetes caused periodontal disease or periodontal disease contributes to diabetes, and 94% of nurses thought that there was promising evidence supporting the treatment of periodontal disease in the reduction of cardiovascular events (8).

Wilder et al. investigated periodontal-systemic disease education in U.S. and Canadian dental schools. The topics most covered in the didactic curriculum regarding periodontal oral-systemic disease included CVD and DM. The author's research showed 88% percent of the respondents reported that their students are educated about the role of inflammation and its impact on oral-systemic conditions. Forty-eight percent of the respondents said they provide formal training for their students in how to discuss or communicate aspects of periodontal oral-systemic disease with patients. Seven schools reported teaching didactic content to dental students intermixed with other health professions students, and two schools reported conducting joint projects. Nine percent of the respondents said they think nurses and physicians are knowledgeable about oral-systemic disease. Their findings indicated that dental schools are confident about the knowledge of their students regarding oral-systemic content (17).

Wilder et al. researched periodontal-systemic disease education in U.S. dental hygiene programs and found that respondents were confident about the education on oral-systemic content provided to their students and agree they need additional evidence based materials to help their students learn this topic. In addition, 88% of respondents indicated that they provide formal training for their students in how to discuss aspects of periodontal-systemic disease connections with patients (18).

In 2008, Formicola et al. argued there are significant faculty development challenges regarding the oral-systemic topic and suggested collaboration between medical and dental faculty to strengthen teaching in this area so that both may work towards a shared responsibility for the oral and systemic health of the public (11). To support these findings, the Society of Teachers of Family Medicine Group on Oral Health launched Smiles for Life, a national oral health curriculum designed to “enhance the role of primary care clinicians in the promotion of oral health educational resources” (82).

### **Nursing Education**

As a process of continuous quality improvement, nursing curricula should be examined as changes occur in practice as increasing evidence-based research is available (83). When considering the diverse educators that nursing programs can utilize when teaching about oral systemic health it is important to consider the expertise of the educator. Health professionals are generally trained separately and, consequently, may have limited knowledge of each other's practice. Teaching nursing students about the oral-systemic connection can be accomplished by using different professions to teach about their distinctive expertise. Communication and decision making between a team of health providers creates the ability to share skills and knowledge between professions to improve the quality of patient care. Previous studies support the importance of collaborative education between medicine and dentistry to meet the diverse health needs of diverse populations (84).

To support those findings, Spielman et al. suggest medical, dental and nursing students have the opportunity to integrate as part of their training (85). Daniel et al. argue that to enhance students' education, individual schools of nursing should examine their institution as well as surrounding colleges, practice sites, and community resources for potential collaborators for Interprofessional Education (IPE). They acknowledge this cross-teaching would allow each professional to share expertise and knowledge, and create a heightened awareness of the importance of oral health in patients (86). In addition, Madrid et al. agree that education, highlighting the importance of communications between healthcare professionals, will lead to

better treatment options and enhance the level of care (87). Nursing school accreditation requirements do have some concern regarding interprofessional education (85).

Interprofessional education could serve as a mechanism used to increase oral-systemic health awareness and education.

The next question of interest when evaluating nursing curricula is how this type of informative material is included in these curricular efforts. Nursing instructors use diverse instructional settings when educating nursing students about different topics in the curriculum such as the classroom, a clinical setting, or a combination of both. To better prepare students to work in challenging health settings, Flood et al. encourage faculty to make efforts to transition students' learning from the classroom, into hands-on practice in simulation laboratories, and then implementation in the clinical setting (88).

There are many resource materials nursing programs can utilize to educate students on the oral-systemic connection such as peer reviewed dental, medical and/or nursing journals, textbooks, and guest speakers who are recognized for their expertise in the area (89). In addition, Lin et al. investigated intensive care unit nurses' knowledge, attitudes and practices of oral care for intubated patients and found that nurses who have more resources for learning about oral care have a greater knowledge about it and provide oral care to intubated patients more frequently (90).

There are different approaches to determine whether students are competent in certain areas. Assessments are one method to assess students' knowledge and their ability to explain concepts. In addition to written exams, clinical application is a second way to test the students' competence to manage patients with oral-systemic conditions. Clinical assessments can consist of observations of students in a clinical setting with patients. In 2004, Utley-Smith surveyed 363 nurse administrators in three states at three different health care settings. The nurse administrators from hospitals, home health agencies and nursing homes rated nurses' performance on 45 nursing competencies. The authors stated: "Nursing education should keep pace with the competence requirements of the changing healthcare environment and develop the curricula accordingly, and students should have opportunities to practice new skills in the clinical

contexts” and concluded that more importance on Interprofessional Communication Competence, Direct Care Competence, and Health Promotion Competence are needed (6).

Faculty who teach about the oral-systemic connection should know how to critically evaluate the evidence on these associations so that they are teaching current research. Modern nursing practice demands that nurses provide patients with care based on the best available evidence, as opposed to care that is simply based on tradition or authority (91, 92). With rapid developments in the creating of knowledge and technology, current knowledge becomes obsolete relatively quickly. In 2011, Duffy states: “nursing leadership has been slow to apply evidence-based practice to their own work” (93). Spitzer argues a competent nurse must know how to seek out the latest research relevant to their field of practice, be committed to doing so, have sufficient knowledge of research to critically appraise the validity of research findings, and be able to implement these findings in practice (94). To ensure students are learning concepts fundamental to their success as professional nurses, nursing faculty should study current evidence based nursing and health care literature for the most current information on essential approaches and competencies needed by nurses. Mailloux stresses nursing programs should incorporate patient centered care, teamwork and collaboration, evidence based practice, quality improvement, and patient safety as important competencies needed in nursing curriculum. (95, 96).

In 2014, Dolce presented an interprofessional faculty tool kit to facilitate the integration of oral health into professional nursing practice. This tool kit builds upon *The Essentials of Baccalaureate Education for Professional Nursing Practice* and interprofessional collaborative practice competencies (96). The tool kit serves as a framework for preparing professional nurses with basic competencies in oral health promotion and disease prevention. A model of interprofessional teaching and learning strategies is offered to assist nursing faculty with integrating oral health into baccalaureate nursing curricula (97).

### **Innovation in Nursing Education**

Overall there appears to be agreement that nursing students need to learn about the oral-systemic connection. New York University (NYU) College of Nursing initiated the Oral Health



in Nursing Education and Practice (OHNEP) program in 2005. The overarching goal of their national initiative is the creation of an educational infrastructure for the nursing profession that will advance nursing's contribution to reducing oral health disparities across the lifespan. One of their outcomes was an electronic newsletter, *Oral Health Matters*, developed for nurses and other health professionals. The inaugural issue was released in Fall 2011 and has been widely disseminated through print media and the Internet. In 2012, a research article by Dolce et al. discussed the Oral Health Nursing Education and Practice (OHNEP) program at NYU College of Nursing. The program partnered with the NYU College of Dentistry to strengthen oral health outcomes by focusing on faculty and professional development to integrate oral health best practices in primary care settings. The authors state, "The nursing curriculum includes oral care as an intervention" (97). Dolce et al. conclude that with adequate education and training in oral health, nurses have the potential to have a major impact on improving access and quality of oral health care and further state "Medical and nursing schools should include faculty from dental schools as adjunct faculty to teach these topics" (97). The Smiles for Life curriculum consist of individual courses. The first course is titled "The Relationship of Oral to Systemic Health" (82).

Further agreement that nursing students need to learn about the oral-systemic connection has been shown with Smiles for Life: A National Oral Health Curriculum for Family Medicine, development by Society of Teachers of Family Medicine (STFM) groups. The Smiles for Life curriculum consists of four PowerPoint modules: The Relationship of Oral to Systemic Health, Adult Oral Health, Child Oral Health, and Oral Emergencies. Accompanying materials include pretests and posttests, program and learner evaluations, resources for further learning, and an implementation guide. In September 2006, a fifth PowerPoint module titled Oral Health and the Pregnant Patient was released along with patient education materials, including posters and handouts, physician pocket guides, and handheld computer applications. All Smiles for Life materials are available at the FMDRL Web site ([www.fmdrl.org](http://www.fmdrl.org)) and the group's Web page ([www.stfm.org/oralhealth](http://www.stfm.org/oralhealth)) (82). Furthermore, OHNEP promotes the Smiles for Life curriculum as a comprehensive resource for competency development and faculty development (97).

## **Proposed changes in nursing curriculum to include the oral-systemic connection between PD and DM, CVD, and APO.**

Improvements in health care delivery and outcomes ultimately depend on changes in health professions educational programs. O’Neil says “the continued and future relevance of health professions education programs will depend on their ability to undertake meaningful reform of curricula and teaching practices” (98). The *Macy Study Panel 2 Report* highlights strategies to better integrate oral and systemic learning objectives and promote collaboration education for creating specific oral-systemic health learning objectives with clinically relevant experiences. The highlighted strategies consist of: curriculum in oral-systemic health content, service-learning, educational methods, collaborative education, and faculty development (11).

### **Summary**

There is a rising base of evidence that supports an association between periodontal disease and systemic health conditions. Findings concerning the lack of education regarding this topic in nursing schools highlight the importance of this topic. There is a vast population with periodontitis and systemic disease(s). Recommendations of the Surgeon General and reports from the Institutes of Medicine concerning improving the general health of the US population, it seems essential to investigate nursing programs curricular content regarding the oral-systemic connection.

The purpose of this study was to determine if, and how, oral-systemic health education is included in accredited nursing curricula in the state of Michigan. The study also sought to assess nursing faculty’s perceptions as to the importance of oral-systemic health education to nursing curricula. The selected oral-systemic issues included: PD and its relationship to DM, CVD, and APO.

This researcher believed that this study helped to: (a) determine whether nursing programs include oral-systemic subject matter in their curriculum, (b) assess the method(s) used when teaching the material, (c) assess nursing program administrators level of satisfaction with current curricular content regarding this topic, (d) identify proposed changes in the curriculum to include periodontal disease and the oral-systemic connection, (e) determine if a relationship

exists between inclusion of the oral-systemic connection in curriculum and selected program characteristics: type of institution and type of degree granted. With curriculum change and innovation, nursing education can address oral-systemic connections and promote overall health.

## Chapter 3 – Materials and Methods

### Materials

The materials consisted of (a) a recruitment email sent by the student researcher (Appendix 1), (b) the web-based survey (Appendix 2) posted on the Qualtrics Web page, and (c) a recruitment email by a graduate faculty member of the dental hygiene program at the University of Michigan, School of Dentistry (Appendix 3).

The recruitment letter was written according to the guidelines of the Institutional Review Board (IRB) for the Health Sciences at the University of Michigan. These documents provided information about the study, about the rights of the respondents, and the way the survey could be assessed.

The survey consisted of 20 questions. Two questions were concerned with the educational setting of the program and the degree granted (#1, 2).

The first question concerning the teaching of oral health asked if oral health care was part of the nursing curricula (Question #3) and one follow up question inquired if the curriculum has a method of instruction dedicated to oral health (Question #4).

Question #5 was concerned with the professional background of the faculty presenting this material. This question asked whether the instructors are dentists or dental hygienists. Choices consisted of six options of different qualifications such as physicians, nurses, psychologists, and social workers. The respondents were asked to choose all that applied and provide any other qualifications that were not listed.

One question asked if nursing students are taught about the pathogenesis of periodontal disease (Question #6). Question #7 was concerned with the teaching of the relationship between periodontal disease and systemic health. Question #8 inquired in which educational setting oral health education was provided.

The next questions explored how the material was actually covered. Question #9 asked

in which courses oral health education is taught. Question #10 requested the respondents to identify the categories of teaching resources used when educating students about treating patients with oral-systemic diseases, namely whether they used dental journals, nursing journals, medical journals, internet sites, outside guest speakers, or textbook specialists.

In order to collect information about how the instructors evaluated the students' competency and progress, Question #11 asked the respondents to provide all the assessment methods used such as written exams, case studies, faculty supervised patient care, and simulation exercises.

The next 3 questions were concerned with how many hours of educational experiences the students had regarding the association between oral health and systemic health conditions. Question #12 inquired how many hours were spent teaching content material regarding the relationship between oral health and diabetes. Question #13 inquired how many hours were spent teaching content material regarding the relationship between oral health and cardiovascular disease. Question #14 inquired how many hours were spent teaching content material regarding the relationship between oral health and adverse pregnancy outcomes, specifically, pre-term low birth weight.

The final six questions asked the respondents for their evaluation of the educational experiences their students receive about this topic and any future changes they considered. Three questions inquired whether changes in the curriculum were anticipated regarding periodontal disease education and diabetes (Question #15), cardiovascular disease (Question #16), and pre-term low birth weight (Question #17).

The respondents were asked to evaluate the educators' competency to review and critically evaluate oral-systemic associations by using a five point answer scale ranging from "1" = "strongly agree" to "5" = "strongly disagree" (Question #18). In a scale of 1 to 5 where "1" signifies "strongly agree" and 5 signifies "strongly disagree", Question #19 executes the instructors' satisfaction toward experts who teach this subject. In a scale of 1 to 5 where "1" signifies "strongly agree" and 5 signifies "strongly disagree", Question #20 asked about the importance of nurses in assessing patients' risk for systemic complications due to oral health

status.

Design: A systematic review of the literature was performed during 2012 using electronic databases within PubMed and Ovid search engines.

## **Methods**

A cross-sectional electronic survey was sent to 61 program directors in the State of Michigan Board of Nursing Approved Education Programs. One school was not a participant as their program is no longer open. These registered nursing programs offer the following: Baccalaureate Degree, Associate Degree, Colleges granting certificates, and Technical/Vocational Schools Granting Certificates. The list of nursing programs in the state of Michigan was obtained from the State of Michigan Department of Licensing and Regulatory Affairs Bureau of Health Care Services Health Professions Division website [http://www.michigan.gov/documents/mdch\\_nurse\\_approve\\_ed\\_prog\\_98366\\_7.pdf](http://www.michigan.gov/documents/mdch_nurse_approve_ed_prog_98366_7.pdf) (Appendix 4), retrieved on November 13, 2012.

The recruitment program websites along with telephone calls were utilized to locate email addresses for the program directors. On January 11, 2014 the survey instrument URL and cover letter explaining the purpose of the survey were emailed to 66 state of Michigan nursing program directors. A second email was sent on February 16, 2014 asking for participation from non-respondents. Program Directors were informed that their participation was completely voluntary.

The survey instrument was developed by the research team and pilot tested after IRB approval. In order to maximize comprehension, the survey was pilot tested by the nursing program director and one other nursing faculty member at Hagerstown Community College in Maryland. The questionnaire explained the purpose of the study, directions for completion, and affirmed confidentiality of the participants. The survey was then revised to facilitate more accurate collection of the desired information. The survey included 20 items using Likert-scale questions and closed ended questions. Qualtrics survey software was used for data collection. The link to the survey is: [http://umichdentistry.qualtrics.com/SE/?SID=SV\\_e5a5gXG8kffk8iF](http://umichdentistry.qualtrics.com/SE/?SID=SV_e5a5gXG8kffk8iF)

An email was sent for recruitment purposes by the principle investigator, graduate student at the University of Michigan, Rackham School of Graduate Studies, Heather Messenger, to nursing program directors in Michigan asking them to participate in the survey with the web-link for the survey attached (Appendix 5). The web-link contained information about the study, informed consent, and the questionnaire. The informed consent stressed that participation is voluntary. It also explained the methods used for maintaining confidentiality. Non-respondents were contacted after two weeks via email with a second cover letter by the graduate program director of Dental Hygiene at the University of Michigan, School of Dentistry (Appendix 3), along with a second questionnaire.

### **Statistical Analyses**

The data were collected in the form of an Excel file. This excel file was imported into SPSS (Version 22.0) (SPSS Inc., 2014). Step 1 in the data analyses consisted of computing descriptive statistics in the form of frequency distributions, variability (variances, standard deviations, ranges) and of relationships (chi-square coefficients for categorical and ordinal data). Step 2 consisted of inferential statistics to determine (a) whether relationships between variables were significant, and (b) whether certain group differences (such as between different types of programs) were significant. Level of significance was set at 0.05.

## Chapter 4 - Results

### Response Rate

Of the 61 surveys emailed, 13 were returned after an email reminder and a second email to non-respondents, resulting in a 23% rate of return.

### Descriptive Statistics

Of the 13 respondents, 8 respondents taught at programs at community or junior colleges (62%), 4 at university or at 4-year colleges (31%), and only one respondent directed a program at a technical college (8%) (Table 1). Eight programs were associate degree programs (62%), with four programs (8%) giving baccalaureate degrees, and one program (8%) offering diplomas/certificates (Table 2).

### **Specific Aim 1: To determine whether nursing programs in the state of Michigan include oral-systemic subject matter in their curriculum.**

The first aim of this study was to ascertain how many nursing programs include material concerning the oral-systemic connection into their curricula. Four programs responded that their program teaches oral health care (31%), while nine programs did not have oral health material included in their curricula (69%) (Table 3). As can be seen in Table 4, six of the programs reported their curriculum includes a method of instruction in oral health, while the other seven programs do not have a method for addressing oral health.

As can be seen in Table 5, only four programs (31%) report teaching the pathogenesis of periodontal disease, while most programs (69%) do not teach this subject to their nursing students.

The respondents were asked to indicate on a scale from 1 = “strongly agree” to 5 “strongly disagree” how much of a priority nurses will play in the future assessing patients’ risk for systemic complications due to oral health status. Of the 1 response that was reported “agree” indicating an above average priority (Table 6).



**Specific Aim 2: To assess the method(s) used for teaching the oral-systemic connection between PD and DM, CVD, and APO.**

- (a) who instructs the nursing students;
- (b) what didactic content related to the oral systemic connection is presented;
- (c) How much time is devoted to oral-systemic health?
- (d) what setting the material is taught in (classroom, clinical setting, both);
- (e) when is the material introduced into the curriculum;
- (f) which resources are used when teaching about this topic?
- (g) how are educational outcomes/competencies assessed?

Concerning the question who instructs the nursing students about the oral-systemic relationship between PD, DM, CVD and APO (Aim 2a), the data showed that nurses were most frequently involved as educators of oral healthcare (69%). Followed by 8% of respondents reporting dental hygienists teach the material, and 31% report there is no faculty who teach nursing students about the topic (Table 7).

In addition to exploring who teaches nursing students, determining what didactic content (Aim 2b) relating to the oral-systemic connection present within the curriculum was inquired. As seen in Table 8, 5 programs (56%) reported their curriculum includes material specific to periodontal disease and its relationship to diabetes, 6 programs (67%) reported their curriculum includes material specific to periodontal disease and its relationship to cardiovascular disease, three programs (33%) indicated they teach PD and its relationship to DM, CVD, and APO in their curriculum.

The next aspect concerning the question of how this material was taught centered around the amount of time devoted to teaching content material regarding the association between oral and systemic health (aim 2c), namely whether and how much education was provided teaching the link between PD and DM, CVD, and APO. Table 13 shows the majority of time spent teaching the link between PD and DM was 0-1 hours (46%), followed by 2-3 hours (15%). Five (38%) of programs reported there was no time spent teaching this material. Table 14 represents

that the majority of time spent teaching the link between PD and CVD was 0-1 hours (62%), followed by 1 respondent indicating 2-3 hours (8%). Four (31%) of programs reported there was no time spent teaching this material. Table 15 represents that the amount of time spent teaching the link between PD and APO was 0-1 hours (38%). The majority of programs (62%) reported there was no time spent teaching this material.

Aim 2d investigated what setting the material was taught in. Programs that reported having oral health education as a part of their curriculum were further asked what setting oral health education is taught. As can be seen in Table 9, six (46%) of programs utilize both the classroom and clinical settings to teach this topic. Four programs (31%) teach this material in only the classroom and 1 program (8%) teaches oral health education solely in a clinical setting.

When asked when the material is introduced into the curriculum (Aim 2e), the respondents indicated which course(s) oral health care is included (Table 10). Most programs cover this material in general nursing studies (44%) and medical-surgical nursing (44%), while 33% of respondents teach this material in community health, 22% in geriatric courses. In addition, 11% of respondents report the material is taught in Obstetrics/Gynecology, Psychiatric/Mental Health, Cardiology, Endocrinology, Pharmacology, and Pathophysiology nursing courses.

Concerning which resources are used when teaching about this topic (Aim 2f), respondents indicated which material(s) are used when teaching students about the correlation between periodontal disease and systemic disease education. The respondents reported utilizing “nursing textbook(s)” and “nursing journals” (63%), and “internet sites” (13%) (Table 11). Two programs (25%) provided open-ended responses and mentioned other resources used (Appendix 6). None of the programs reported using “Dental Journals”, “Medical Journals” or “outside guest speakers” as resources when teaching about this subject.

Regarding how educational outcomes/competencies are assessed (Aim 2g) to evaluate nurses’ competency regarding the oral-systemic health relationship, 89% of respondents indicated that they used multiple choice testing, 33% used faculty supervised patient care. None

of the programs indicated using case studies, assignments and simulation exercises for outcome assessment purposes (Table 12). Two respondents contributed open-ended answers to this question, mentioning that they assess outcomes by “Skill practice by brushing another student’s teeth and maintenance of oral care on patients”. Another respondent listed “no formal outcomes” (Appendix 7).

**Specific Aim 3: To assess nursing program administrator’s level of satisfaction with current curricular content between PD and the oral-systemic connection.**

While Aim 2 focused on gaining a complete understanding of all the specific aspects of teaching about the oral-systemic connection, three questions addressed the respondents’ overall perceptions and attitudes concerning this subject matter. A first question assessed any foreseen changes in the nursing curriculum as it relates to the teaching of PD and the association to DM. Table 16 shows nine respondents (69%) indicated they do not anticipate any changes within their curriculum related to this topic, while 4 respondents (31%) do anticipate changes.

The second question sought to determine any foreseen changes in the nursing curriculum as it relates to the teaching of PD and the relationship to CVD. Table 17 represents that ten respondents (77%) indicated they do not foresee any changes within their curriculum related to this topic, while 3 respondents (23%) do anticipate changes. The final question sought to determine any foreseen changes in the nursing curriculum as it relates to the teaching of PD and the association to APO, specifically pre-term low-birth weight. Table 18 shows nine respondents (69%) indicated they do not anticipate any changes within their curriculum related to this topic, while 4 respondents (31%) do anticipate changes.

To further gain an understanding of the confidence nursing programs have with regards to prepared faculty who teach the material the respondents were asked whether they thought they needed more experts at their school to teach this topic. As can be seen in Table 19, the majority of respondents (6) stated that they “neither agree/nor disagree”, followed by 5 respondents “disagree”, 1 respondent “agree”, 1 respondents “strongly agree” and no one responded stating “strongly disagree”.

**Specific Aim 4: To identify proposed changes in the nursing curriculum to include PD and the oral-systemic connection.**

Given these differences in the perceptions of foreseen changes in the nursing curriculum as it relates to oral-systemic health, it is also interesting to look at the findings concerning the respondents' opinion about how well faculty who teach this material are able to critically assess the literature related to this topic. To gain an understanding of the confidence nursing programs have with regards to prepared faculty to teach the material, respondents were asked whether faculty who teach about the oral-systemic connection know how to critically evaluate the literature and determine the levels of evidence for associations. As can be seen in Table 20, the majority of respondents (7) indicated they "agree", followed by 5 respondents reporting, "neither agree nor disagree", and 1 responded, "strongly disagree".

## Chapter 5 – Discussion

### Introduction

There is limited data on the status of programs of nursing and the curricula that present oral-systemic content theory and practice taught in the United States. The purpose of this study was to determine if the oral-systemic connection is included in nursing curricula. To explore these issues, a survey questionnaire was e-mailed to the program administrators of the accredited programs of nursing in the State of Michigan. When interpreting the data for this study, it must be recognized that the population was very small (N=13); therefore, generalizing to other educational programs should be done with caution. This study can inform and guide future and ongoing curriculum development initiatives for specific oral-systemic health content.

This study addresses public concerns and recommendations made by various government agencies and reports from the Institute of Medicine (IOM). The IOM Committee on Leading Health Indicators for Healthy People 2020 is asking nursing programs to prepare nurses with oral health core competencies (67). The surgeon general's report on oral health focused on the emerging associations between oral health and systemic conditions and emphasized the impact of systemic health problems on poor oral health (63). Specifically, the report discussed emerging associations of chronic oral infections such as periodontal disease to diabetes, heart and lung diseases, stroke, adverse pregnancy outcomes, and other conditions. This study collected data from nursing program administrators concerning how their program addresses the oral-systemic connection in their curricula. However, only 13 of the 61 programs that received the email with a request to respond to this web based survey actually responded (23% response rate). Three articles have been reported that investigated the inclusion of oral-systemic health in various curricula. Administrators of universities of medical, nursing and pharmacy across Canada, the United States, Europe, Asia, Australia, and New Zealand showed a similar 23% response rate (99). U.S. and Canadian dental school administrator's showed a 77% response rate (17). U.S. dental hygiene programs showed a 63% response rate (18).

Wilder et al research of the periodontal-systemic connection in U.S. and Canadian dental and U.S. dental hygiene schools show higher response rates. Their methods involved the use of both electronic and mailed paper surveys.

Perhaps a reason why schools of dentistry and dental hygiene have higher response rates is because these administrator's/academic deans are familiar with the oral-systemic connection present in their curriculum. The researcher reasons that such ambivalence would not exist if faculty were well educated in this area. It should be noted other unknown faculty members might have been more knowledgeable about oral-systemic health in the curricula of the programs than the individual who completed the survey. Oral-systemic education, however, clearly represents a potential growth area for nursing education. Regardless of self-assessments, the researcher concluded that the knowledge, interest, and preparation of faculty regarding the oral-systemic health were probably not as good as these educators indicated.

While this response rate is quite low for a survey, it could be that program directors who assess their curricula as not including a sufficient amount of material might have been less likely to respond to this survey. However, studies of response rates show that web based surveys tend to have lower response rates than mailed surveys. Although web based surveys are convenient to use, they might receive less attention and a lower rate of responses than surveys that are delivered by mail. It is the researcher's belief the use of a hard-copy mail survey might have elicited a better response rate (96).

Although convenient to employ, this web-based survey may have appeared less appropriate. Using an anonymous response makes identifying the characteristics of non-respondents difficult which makes response bias a considerable concern. There was one respondent who started the survey but did not respond to any of the questions. This may be seen as more professionally acceptable than admitting that they lack knowledge, interest, comfort with the subject, and preparation to teach it, and that, for these reasons, they do not consider it an important component of the curriculum. If the survey were not nameless, the researcher would send emails to figure the dilemma and solve it in an attempt to improve the response rate. The researcher speculates that a number of faculty may not have given much thought to oral-systemic

health education in the nursing curriculum prior to completing the questionnaire. In fact, the questionnaire may have been educational for some faculty. On the other hand, it may have been intimidating and confusing to those who had not given much previous thought to this topic, and who were unsure of how they felt or where they stood on various issues. Another reason could be that the survey lacked clarity or structure. The survey was pilot-tested by three nursing faculty for the purpose of identifying whether responders perceived the survey to be understandable, adequate, and only one response.

## **Interpretation of Research Findings**

**Aim 1: The objective of this aim was to determine how many nursing programs include the oral-systemic connection in their curriculum.**

The results from this cross-sectional survey of Michigan nursing programs indicated that nursing programs are incorporating some aspects of oral-systemic evidence into their curriculum. For the purpose of improving the general health of patients who present with oral-systemic risk factors, nursing program administrators were asked, “Does your nursing program have a part of the curriculum dedicated to teaching oral health care?” Four (31%) programs responded that their curriculum includes oral health care (Table 3). In addition, four programs (31%) reported they teach the pathogenesis of periodontal disease (Table 5).

It is of concern that oral-systemic education is currently being taught without focusing on the association between PD and CVD, DM, and APO. CDC figures indicate that an alarming number of patients with oral-systemic conditions are expected to increase; therefore, it seems necessary oral-systemic health education is present in all schools of nursing. Although associations between periodontal and systemic health have been well established, there is a need for added emphasis on the provision of oral-systemic health. It is important to recognize that this research is not reflected in nursing textbooks. Research shows there is a need for updated, more current nursing textbooks with current oral-systemic research findings. The literature review of oral health material in nursing textbooks is brief and outdated. Jablonski’s research shows the percentage of oral health content in nursing textbooks ranged from 0.27% to 1.1% (75).

It appears oral health and periodontal disease education is not perceived to be a high priority among non-dental health professional curricula (99). Hein et al. recent research of nursing, medical and pharmacy schools shows the majority of academic deans ranked their perception of periodontal disease to be only “somewhat (24.4%)” important, followed by “very important (24.4%)”. A respondent from their research study commented: “Oral-systemic science is not clearly defined in our curriculum”. Another respondent mentioned: “The growth in information on the importance of oral health has not been reflected in changes to our curriculum”. In addition, the author’s research asked “Are there any requirements to incorporate oral health education within your current curriculum?” 51.2 percent of the respondents replied at the lower end of the five-point scale: 1=not at all (26.8%) and 2=a little (24.4%). Furthermore, curriculum in oral-systemic health across all three non-dental disciplines was predominantly (59.6%) rated as less than adequate (99).

To improve this knowledge gap among nursing educators and practitioners, there should be an emphasis in the areas of continuing education. Also, nursing board examinations should recognize the importance of this topic and include test questions relating to the oral-systemic connection addition; support from peer reviewed nursing journals should include research regarding the oral-systemic connection. Furthermore, nurse educators are encouraged to engage in partnerships with dental professionals, especially those teaching in dental hygiene programs. Nurse educators are also encouraged to incorporate the use of current clinical practice guidelines if the available textbooks do not contain the appropriate oral health content. Finally, it is imperative for nurse researchers involved in oral health and hygiene activities to actively engage in the dissemination of accurate information through publication and presentations. A review of the literature suggests that interprofessional education is used to generate additional opportunities for students to interact with patients and provide services to the community. One such venue is the Oral Health Nursing Education and Practice (OHNEP) initiative within the New York University's College of Nursing at the College of Dentistry. This initiative was launched in April 2011, and one of its goals includes disseminating best oral care practices to nurse educators (97). Emphasizing a collaborative educational approach would improve access to new protocols.



**Aim 2: The objective of this aim was to ascertain method(s) used for teaching the oral-systemic connection between PD and DM, CVD, and APO.**

Given the need to care for populations with oral-systemic conditions in health care, nursing curricula need to be examined in terms of methods being used and the frequency with which methods are used among the various nursing programs (diploma, associate, and baccalaureate). Findings of this study showed that various methods are used when teaching about the oral-systemic connection.

Question 4 asks, “Does the curriculum include a method of instruction in oral health? Six (46%) of nursing programs reported their curriculum includes a method of instruction in oral health. Ferullo et al. reports almost 70% of medical schools include 4 hours or less of oral health in their curricula, and more than 10% has no oral health education present (100). By comparison, when deans of nursing, medicine and pharmacy were asked: “Are there any requirements to incorporate oral health education within your current curriculum?” 51.2 percent of the respondents replied at the lower end of the five-point scale: 1 = “not at all” (26.8%) and 2 = “a little” (24.4%) (99). These findings indicate research should be aimed at determining a plan for implementing oral-systemic concepts in nursing curricula.

***Who instructs the nursing students (aim 2a)?***

Concerning the question who instructs the nursing students about the oral-systemic relationship between PD, DM, CVD and APO, question 5 asked “What faculty are involved as presenters regarding oral health care? (Please, check all that apply)” the options are “Physician”, “Nurse”, “Dentist”, “Dental hygienist”, “Social worker”, “Psychologist”, “Other” and “None”. The majority (69%) of faculty who teach nursing students the oral-systemic connection are nurses. It is not known whether or not nurses received any education in the area of oral-systemic principles. Just one other program identified a dental hygienist as a presenter of oral health care. An overwhelming four (31%) program administrators reported there are no faculty who teach nursing students about the oral-systemic connection (Table 7). It is concerning that oral health

care providers who are experts in their field are not involved in this aspect of the nursing curriculum. Nursing educators teaching about oral-systemic links may not be delivering quality education based from current research findings.

***What didactic content related to the oral systemic connection is presented (aim 2b)?***

Existing standards in medicine and dentistry support the inclusion of oral-systemic health learning objectives in the curriculum (11). Recommendations of the IOM National Research Council regarding Oral Health Goals and Competencies in 2011 was for medical students to have an “understanding of the important oral-systemic interactions and can monitor for these.... and can counsel patients about systemic importance of periodontal disease” (36). However, there are no accreditation standards for nursing regarding oral-systemic health education (69).

This research study shows few nursing programs include oral-systemic subject material concerning PD and DM, CVD, and APO in their curriculum (Table 8). A majority of programs reported their curriculum includes material specific to the relationship between PD, CVD and DM. The majority (67%) of U.S. and Canadian dental school respondents reported that their students are evaluated on assessing risk for potential systemic disease with CVD (62 percent), DM (59 percent), and APO (51 percent) (17). Similarly, Wilder et al. research shows the majority of U.S. dental hygiene respondents indicated CVD (72%), DM (89%) and APO (78%) are emphasized in the curriculum (Figure 1) (18).

It is encouraging to know that oral health content and the pathogenesis of periodontal disease is being taught in context with other systemic diseases and not as a separate entity. However, only 9 of the 13 respondents (64%) answered this question. The fact 4 respondents did not report teaching oral health related to systemic health is a disturbing finding. The four respondents who did not answer this question may not have known whether or not the oral-systemic connection is being taught to nursing students.

***How much time is devoted to the topic (aim 2c)?***

The most instructional time was devoted to teaching the association between PD and CVD (Table 14). The majority (62%) reported their curriculum devotes only 0-1 hour teaching

the relationship between PD and CVD. One respondent indicated their program devotes 2-3 hours to this subject. Contrary to this study, research from Wilder et al. show the majority (53%) of U.S. and Canadian dental program administrator's reported their program devotes at least 6 hours to teaching content related to CVD (17). Wilder et al. also showed U.S. dental hygiene programs reported using between one and two hours to teach the relationship between CVD and PD (17). Hein et al. research asked program deans of nursing, medicine and pharmacy around the world to rank how important is "Evidence of a relationship between periodontal disease and atherosclerosis". The majority (31.7%) responded "A Little" followed by 26.8% "Somewhat", and only 12.2% responded "Very" (99).

Less encouraging is the number of respondents who teach PD and DM. Six programs (46%) reported teaching the relationship between PD and DM (Table 8). The majority of these respondents indicated their curriculum devotes less than 1 hour to teaching this topic. When U.S. and Canadian dental school administrators were asked which topics are emphasized the most in their curriculum, the majority answered diabetes (89 percent). A majority (37.2%) devotes 1-2 hours to oral-systemic education (18). Forty-four percent of U.S. dental hygiene programs reported they lecture between three and five hours on diabetes (18). Program deans of nursing, medicine and pharmacy around the world were asked to rank how important is "Evidence of a relationship between periodontal disease and diabetes. The majority (n=10) rated this topic "A Little"; followed by "Somewhat" (n=9) and "Not at All" important (n=8) (99).

As can be seen in Table 15, the majority (62%) of nursing programs do not educate their nursing students about the relationship between PD and APO. Table 15 shows 38% of nursing programs include less than 1 hour devoted to teaching the association between oral health and APO. Similar results can be seen among U.S. and Canadian dental schools where the majority (37.2%) reported devoting less than one hour to teaching PD and APO (17). In addition, Wilder et al. research shows the majority (78.7%) of U.S. dental hygiene programs devote 1-2 hours to teach PD and APO (17).

It appears dental hygiene programs spend more time than schools of dentistry and nursing when educating their students about PD and APO. As expected, research from Hein et al. shows

the majority of nursing, medicine, and pharmacy school respondents (26.11%) rated Evidence of a relationship between periodontal disease and adverse pregnancy outcomes as a “somewhat” important oral health topic in from programs of nursing, medicine and pharmacy (99).

Considering the amount of information known about PD and its association with DM, CVD, and APO, the pervasiveness of these diseases, and projections for the future, these are low figures. To do justice to the content areas identified in aim 2 would conservatively require more than 2 hours of classroom time. A vast amount of research is present regarding the oral-systemic connection but this information is apparently not being transmitted to nursing students.

***What setting is the material is taught in (aim 2d)?***

In order for nurses to be competent in the oral-systemic connection, they must have patient encounters. Respondents were asked, “If oral health education is a part of your curriculum, in which of the following setting(s) is oral health education taught? (Please check all that apply)”. Options were “Classroom”, “Clinical practical application”, “Both”, “Neither”, “Other (please specify)”. As seen in Table 9, the majority (46 %) of nursing programs reported teaching this material in both the classroom and clinical settings. Thirty-one percent of respondents reported they do not teach this material in the classroom or clinic.

U.S. and Canadian dental respondents (67%) reported that their clinical curriculum includes risk assessment for potential systemic disease with CVD (62%), diabetes (59%) and adverse pregnancy outcomes (51%) (17). Wilder et al. research shows clinical curricula of U.S. dental hygiene programs addresses periodontal and systemic disease. Dental hygiene students are evaluated on their ability to assess for periodontal –systemic disease connections and discuss those risks with the patient. Dental hygiene students generally evaluate the patient with diabetes (90%), CVD (87%), and APO (79%) in a clinical setting (18).

The findings of this study suggest that nursing students need clinical opportunities to provide care for patients with oral-systemic conditions. If faculty believes that it is helpful for students to have contact with PD patients and other known systemic conditions, one would

expect to see that all programs use both the classroom and clinical settings when teaching the oral-systemic connection. Given these results, this researcher believes there might be opportunities for more interprofessional educational experiences.

***When is the material introduced into the curriculum (aim 2e)?***

Question 9 asked, “If oral health education is taught in the classroom, in which of the following course(s) is oral health included? The main courses the oral-systemic connection is reported being taught in are “General Nursing Studies” (44%) and “Medical Surgical Nursing” (Table 10) (44%). Contrary to this research, Wilder et al. research showed U.S. and Canadian dental periodontal-systemic disease interactions/connections were taught in periodontology (93%), followed by oral medicine (85%), general and oral pathology (80 percent), and clinical periodontics (76%) (17). Research shows the majority of U.S. dental hygiene programs teach oral-systemic disease as it relates to PD in periodontology (95.5%) followed by second-year clinical course (85%), first-year clinical course (79%), dental hygiene theory course (72%) and general and oral pathology (72%) (Figure 3) (18). Hein et al. research shows respondents from nursing, medicine and pharmacy schools commented: “Information on oral-systemic health is spread across several classes” and “Oral-systemic science is discussed in infectious disease and neurology” (99).

Reasons for the absence of the oral-systemic connection in nursing curricula may be that faculty are opting for the inclusion of oral-systemic content in several courses. As can be seen in Table 10, at least one of every course listed was selected as an option for including oral-health information. Another reason may be that nursing curricula are too full of nursing content to allow room for the inclusion of oral-systemic subject matter. Such a topic may not have high enough priority to be included. The pathogenesis of PD is an essential component to understanding the oral-systemic health connection. It is this researchers recommendation that all schools of nursing include teaching the pathogenesis of PD.

***Which resources are included when teaching about this topic (aim 2f)?***

This study sought to determine whether nursing educators utilize the latest evidence based data to evaluate and assess the need for curriculum change. Nurse educators should have the requisite knowledge and resources available to prepare nurses for future oral-systemic

practice. The study showed that nurses were most frequently involved as presenters of oral healthcare (69%). The resources reported most commonly used were "Nursing Journals" (63%) and "Textbook Specialists" (63%). No schools reported using "Dental Journals", "Medical Journals" or "Outside guest speakers" as resources when teaching about the oral-systemic connection (Table 11).

Contrary to this study, ninety-three percent of U.S. and Canadian dental schools said they use journal articles, followed by dental textbooks (89 percent). Of the journals used, the most frequently named were peer-reviewed publications such as the *Journal of Periodontology* (87.5 percent) and *Journal of the American Dental Association* (75 percent). Also mentioned was the use of websites such as those of the American Academy of Periodontology (77 percent), and Cochrane Library (44 percent). Eighty-seven percent reported using American Academy of Periodontology website for reference. One hundred percent reported they use lectures to teach PD-systemic content. Case-bases instruction is used by seventy percent, followed by seminars (47%), and problem based learning (23%). Contradictory to this study, U.S. and Canadian dental schools report using medical/nursing textbooks 17.8% (n=8) to teach periodontal-systemic connections (17). Faculty of U.S. dental hygiene programs who teach content relating PD to systemic disease use journal articles (90%), dental hygiene textbooks (87%), and Internet sites from national health care agencies (58%) as resources to teach this material (Figure 4) (18). This may indicate that there is a weakness of these concepts in the nursing curriculum, which would warrant further investigation. It appears nursing programs are not utilizing diverse resources to teach the oral-systemic connection.

The IOM recommends incorporating appropriate curricula from other health professions from medical, nursing, pharmacy, and social work into "non-dental health education programs" (67). Former Surgeon General Dr. David Satcher stated in the 2000 Surgeon General Report, *Oral Health in America*, "A framework for action that integrates oral health into overall health is critical if we are to see further gains" (101). Former Surgeon General Dr. C. Everett Koop added, "You are not healthy without good oral health" (68). Medical and dental professionals were called upon to work collaboratively for the purpose of incorporating oral-systemic disease education with other healthcare professionals in order to meet the IOM's *National Call to Action*.

U.S. and Canadian dental schools reported a limited amount of interprofessional education and collaboration. Only 16 percent of respondents (N=7) reported that they teach periodontal-systemic content to interdisciplinary student groups such as dental hygiene, nursing, medical, or other allied health students (17). Only 4 percent of dental hygiene program respondents indicated that they teach periodontal oral-systemic content to interdisciplinary student groups (18). The Macy Study panel 2 report provides suggestions for promoting interprofessional collaboration in medicine and dentistry (11). An example of this model is present at New York University (NYU) where collaboration with the NYU College of Nursing merged with the College of Dentistry (102). It is this researcher's belief that nursing instructors are not utilizing the necessary resources needed to thoroughly present this topic based on current research. Perhaps oral health care professionals will need to take the lead in educating other health care professionals about the implications of oral disease to systemic health.

***How are educational outcomes/competencies assessed (aim 2g)?***

A standardized curriculum and a reliable method of evaluation can ensure oral-systemic health is adequately addressed. Types of assessment methods most commonly used for oral-systemic health educational competencies was "multiple choice testing" (89%), followed by "faculty supervised care" (33%) (Table12). Of the nine respondents who answered this question, no programs reported the use of assignments, case-studies, or simulated exercises as ways to assess oral-systemic health educational competencies. Two respondents offered open-ended answers stating "no formal outcomes" and "Skill practice by brushing another student's teeth and maintenance of oral care on patients" (Appendix 2).

Wilder et al. research of U.S. and Canadian dental schools shows similar assessment methods. All respondents said they use multiple-choice testing followed by case-based questions (68 percent) to evaluate knowledge of content for measuring oral-systemic health outcomes/competencies (17).

Wilder et al. research of U.S. dental hygiene programs shows four percent of respondents indicated they teach periodontal oral-systemic content in an interdisciplinary setting involving a combination of dental hygiene with nursing or other allied health students. The author's research

also shows case-based role-plays and presentations on patient treatment planning are used to highlight patient dialogue about oral-systemic disease. In addition, 80% of U.S. dental hygiene programs reported students are instructed and evaluated on their ability to communicate oral-systemic health to clinical patients (18).

A respondent of Hein et al. research commented: “We think our curriculum is adequate, but we don’t have outcome data specific to these objectives” (99). These studies suggests further research is needed to determine which level of oral-systemic connection competence students reach at the time of graduation, as well as the best methods to assist students in reaching the highest level possible.

**Aim 3: The objective of this aim was to ascertain the importance of oral-systemic education in nursing curricula as perceived by responders.**

For any field to stay current, or to employ evidence-based practice (EBP), it is essential that nurses are familiar with the research evidence and are capable of implementing it. *Advancing Oral Health in America* committee stresses three key areas are needed for successfully maintaining oral health as a priority issue: “strong leadership, sustained interest, and the involvement of multiple stakeholders” (64). Given the emerging scientific advances and the number of people with systemic health conditions, it seems important to look at how satisfied program directors are with their own efforts in this area. The current literature (Chapter 2) contends that nursing programs have not adequately altered their curriculum specific to oral-systemic connection education. When nursing administrators were asked if they perceived a need for more experts to teach oral-systemic health, the majority (6) responded they “neither agree nor disagree” (46%), followed by 5 respondents “disagree” (38%), 1 respondent reported “agree”, 1 respondent reported “strongly agree” and no one responded stating “strongly disagree” (Table 19). Only 1 program responded “agree” and another program responded “strongly agree”. It’s unclear why the number of programs who have no one to teach this content would not equal the number of programs who perceive a need for more experts. Fifty-eight percent of dental school administrator’s strongly agreed or agreed that they need more experts at their dental school to teach such content and 9 percent said they think nurses and



physicians are knowledgeable about oral-systemic disease (17). Twenty-eight percent of dental hygiene program respondents strongly agreed or agreed that they needed more experts to teach the content at their programs (18).

The majority (54%) of nursing school respondents “agree” that faculty who teach about the oral-systemic associations knows how to critically evaluate the literature and determine the levels of evidence for associations between them (Table 20). It appears dental schools perceive their faculty to be confident in their ability to critically evaluate the literature and determine levels of significance. Contrary to this study, seventy percent of U.S. and Canadian dental program respondents “strongly agreed” or “agreed” they feel confident in their faculty members’ knowledge level regarding oral-systemic content and also in their ability to critically evaluate the literature to determine levels of evidence (97 percent “strongly agreed” or “agreed”) (17). U.S. dental hygiene program directors indicated that all of their faculties who teach this content to dental hygiene students are knowledgeable about how to critically evaluate the literature and determine levels of evidence (18). Perhaps an obstacle to fully incorporating oral-systemic evidence based approaches in nursing programs is a lack of faculty competence.

This study showed nursing program administrators in the State of Michigan are satisfied with current curricular content regarding the oral-systemic connection; however, it is the researchers belief that nursing schools are not reaching their potential when educating about this topic. With nursing journals and textbooks being the main sources for teaching the oral-systemic connection containing insufficient material coupled with the primary resources for students are nursing instructors, it appears nursing programs are not prepared to teach the oral-systemic connection. If nurses are to be well prepared to practice, faculty must take steps to inform themselves and to reevaluate perspectives that may have interfered with providing this education in the past. The responsibility lies on program leaders and those who develop and implement the curriculum. Nursing faculty must be aware of how continuing neglect of this content in the curriculum reflects on the image of nurses as knowledgeable health professionals. Nursing practices can serve as alternate sites of identifying systemic health concerns. The development of nursing benefits would require significant changes in nursing school curricula.

**Aim 4: The objective of this aim was to identify proposed changes in the nursing curriculum to include PD and the oral-systemic connection.**

In 2003, the U.S. Surgeon General called for efforts to “review and update professional educational curricula to include content on oral health.” (68). In 2011, *Improving Access to Oral Health Care for Vulnerable and Underserved Populations (IOM) Report* recognizes oral health initiatives have not spread widely through the health professions and stressed “Non-dental health care professionals need to take a role in oral health care” (36). This study showed the majority of respondents are satisfied with oral-systemic content in their nursing curriculum and do not foresee any changes in their curriculum regarding the association between PD, DM, CVD, and APO (Tables 16-18). This was an interesting finding, since it runs contrary to what some might expect. That is, one might assume that not much time is devoted to this complex topic. Lack of time as the primary reason for not teaching oral-systemic health simply does not hold up under scrutiny. When subjects are perceived by faculty to be essential for nursing practice, time can usually be found for them. Therefore, the researcher contends that other obstacles found in this study are more likely explanations for neglect of oral-systemic health content, such as the expertise of the educator and perceived need to incorporate this subject in current curricula. Unfortunately, faculty who read the nursing literature on oral-systemic health care will find little help with curriculum decisions regarding appropriate and realistic expectations for basic nursing education.

Hein et al. looked at the inclusion of oral-systemic health in pre-doctoral/undergraduate curricula of pharmacy, nursing, and medical schools globally. Their research showed “an absence of accreditation standards, professional requirements, or competencies related to oral-systemic health; lack of opportunities for interprofessional collaboration with dental schools; lack of appreciation for the relevance of oral-systemic health within the discipline; and lack of opportunities for students from various non-dental health disciplines to work with dental and dental hygiene students to move the material from theory to practice”. Fifty-nine percent rated their current curriculum in oral-systemic health as less than adequate. In addition, one respondent commented: “Currently are looking to expand oral health in the curriculum” (99). Likewise, Wilder et al. showed U.S. and Canadian dental school respondents varied with their

perception regarding the level of emphasis on oral-systemic connection in their curriculum from a full curriculum revision to very little change and integration (17).

Question 20 asked, “Nurses will play a more important role in the future in assessing patients’ risk for systemic complications due to oral health status.” Unfortunately, this question had only 1 response: “Agree” (Table 6). Ninety-three percent of U.S. and Canadian dental schools respondents “agreed” or “strongly agreed” dentists will play an important role in assessing patients’ risk for systemic complications due to oral health status (17). Wilder et al. research shows ninety-nine percent “agreed” or “strongly agreed” that dental hygienists will play an important role in the future in assessing patients’ risk for systemic complications due to oral health status (18).

Wilder and colleagues research suggests current dental graduates in the U.S. and Canada as well as dental hygiene graduates in the U.S. are receiving formal education regarding the periodontal-systemic connection. The researcher’s concern is that schools of nursing have not enabled nurses to keep pace with the increasing complexity and diversity of current practice. It is the hope of this author that education can offer a solution. This research arises from that hope that nurses have the educational foundation to care for their patient’s oral-systemic well-being.

### **Do different programs differ in their coverage of these topics?**

Since curriculum structures vary, the differences between the three curriculum types (diploma, associate and baccalaureate) identified for this study were examined. Chi-square analysis and t-tests were used to obtain the most conservative estimates of significance between oral-systemic educations and the type of degree granted and type of institution. However, in all cases the significance of the results were suspect due to small numbers in the table cells. The first consideration could be that the length of the programs affects the degree to which this topic is covered. Nursing programs were divided into three groups according to the length of the program, namely one year versus two years versus four years. The next consideration could be that the type of institution of the program affects the degree to which this topic is covered. The

results of this study show there are statistically significant associations between teaching the pathogenesis of PD and type of institution and degree granted. (Tables 21-22).

As seen in Table 21, T-test results show there is a statistically significant difference between the type of institution: University of 4-year (mean=1.25, DF=5.83), Community or Junior College (mean=1.88, DF=5.83), and Technical College (mean=2.0, DF=5.83) and curriculum includes teaching the pathogenesis of periodontal disease ( $p=0.05$ ) (t-value=2.50,  $\alpha=0.05\%$ ). In addition, T-test results show there is a relationship between the “type of degree granted” and curriculum includes pathogenesis of PD. Among nursing program respondents (N=13) there was a statistically significant difference between the type of degree granted: baccalaureate (mean=1.25, DF=9.05), associate (mean= 1.88, DF=9.05), and diploma (mean=2.00, DF=9.05), and the curriculum includes teaching the pathogenesis of periodontal disease (Table 22). Nursing programs granting a baccalaureate degree are more likely to include the pathogenesis of PD in their curriculum ( $p=0.04$ ) (t-value= 2.38,  $\alpha=0.05\%$ ).

It should be recognized that Community or junior colleges lack curricular content regarding the pathogenesis of PD in their curricula. In addition, associate and diploma granting nursing program curricula is lacking curricular content regarding the pathogenesis the periodontal disease, which is a major concept, needed for understanding the oral-systemic connection.

### **Limitations of the Study**

It should be noted that this is primarily a qualitative study and when quantitative data is used it has been developed from qualitative data. Data from the survey questionnaire have been given a quantitative value, expressed by percentages, but it should be remembered that the source data embodies subjectivity. Participation by the respondents was voluntary and may not reflect the overall population. The oral-systemic connection may be included in courses taught by individuals other than the identified person.

Randomization of the study sample could not be ensured due to the fact that all accredited schools in the selected region were included in the study. Descriptive research design

seeks to increase knowledge in the field of study, and does not seek to make any type of prediction about causal relationships.

Another limitation of this study was the low participant response rate (23%) and limited control over data collection. In this online survey study, less than one third of the potential participants responded. However, classified as an exploratory study, this descriptive study design intended to collect data and increase knowledge in the field of study and therefore small sample sizes are typically adequate.

### **Assumptions**

For the purpose of this study, the following assumptions will be made:

1. The individual who responded to the survey and interview questions was the individual who best represents the program in terms of teaching oral-systemic health content.
2. Accurate results depend upon the appropriate faculty member who teaches oral-systemic content being identified by the program director or dean.
3. Respondents to the survey and interview questions answered honestly and to the best of their ability.
4. Respondents understood the instrument questions and correctly interpreted the intent of each question.
5. Findings from the study reflect self-reported perceptions.

## Chapter 6 - Conclusions

1. There is a significant difference between type of nursing institution and degree granted and nursing curricula includes the teaching the pathogenesis of periodontal disease.
2. There is a disproportion between current required hours of instruction and the high prevalence of oral-systemic diseases in the United States.
3. Nurse educators are challenged to prepare nursing students to practice in a changing environment while oral-systemic health content receives little attention in nursing health professional education programs in the state.
4. This study indicates the need to cultivate appreciation among nursing faculty for the importance of oral-systemic health education in the curriculum, and to encourage them to become educated in this area of health. Developing interest in a subject requires exposure to it, in this case, meaning exposure to theory and research about oral-systemic health. If nursing education in oral-systemic health is poor, then one opportunity to develop interest is lost.
5. Nursing faculty can be instrumental in improving these courses by making their concerns clear to teachers in these disciplines, and suggesting ways in which these components may be strengthened.

### Recommendations

The ultimate purpose of this assessment is program improvement, and therefore it studied oral-systemic content in nursing curricula. Based upon the findings and conclusions from this study, the following recommendations are made:

1. Inclusion of oral-systemic health content requires a modification of nursing curricula. Nursing programs should re-evaluate old content and eliminate that which is no longer relevant to the preparation of entry- level nurses to ensure integrity and strengthening nursing program. Although those with vested interests in teaching outdated content may impede this process, change is possible if enough faculties consider the new material essential.

2. Nursing health care professional educational programs recognize the importance of including oral-systemic health content in their curricula. Nursing education programs should develop oral-systemic courses with common essential components to provide future practitioners the knowledge and skills necessary to apply oral-systemic principles. The future of oral-systemic health includes a future in professional health education programs. It seems likely that oral-systemic principles will become common elements of nursing professional preparation and continuing professional development curricula. However, the form in which this occurs is likely to vary, whether taught in one or two dedicated courses or integrated throughout several courses in a curriculum in both the didactic and clinical setting.
3. Oral-systemic health should be taught by means of an interdisciplinary approach. The combined efforts, experiences, and knowledge that a diverse faculty brings will enhance the learning experience and magnify the level of understanding.
4. A qualitative study, in which faculty are asked to describe their concept of comprehensive oral-systemic health education, might shed some light on this topic and may uncover not only the extent of education in the area of oral-systemic content but education related factors that faculty believe have influenced their attitudes.
5. Studies of students and graduate nurses would be helpful to find out how they perceive the quality and quantity of oral-systemic health content and experiences in their basic nursing education. Also, it would add to our understanding to know what practicing nurses believe was most needed and neglected in their basic education.
6. Participation by dental or medical specialists as either contributors or reviewers of nursing texts is recommended in order to help the credibility of an evidenced-based practice; nursing cannot assure excellence in integrated oral-systemic health without this professional specialist oversight.
7. Curriculum includes a didactic portion and clinical practicum in oral-systemic health education. Both educational approaches are of value in differing ways to nursing education. With logical and meaningful interpretation of content, the application of the oral-systemic health concept becomes possible.
8. NLN accreditation criteria should be modified to insure that all accredited schools are effectively educating their faculty and students about oral-systemic health. Accreditation

standards can be a powerful incentive for improving nursing curricula. They should be used to insure quality in this vital area.

9. To insuring adequate emphasis on oral-systemic health, national licensing examinations should include oral-systemic connection related test questions.
10. The American Nurses' Association and state nurses' associations should serve as resource centers for information as progress is made in oral-systemic health education.



**TABLES**

**Table 1**  
**ORGANIZATION OF NURSING PROGRAMS**  
**N=13 (92.86%)**

1	University or 4 year college		4	31%
2	Community or Junior college		8	62%
3	Technical college		1	8%
4	School of Allied Health Sciences		0	0%
5	Medical School		0	0%
6	Separate Nursing Department		0	0%
7	Other (please specify)		0	0%
	<b>Total</b>		<b>13</b>	<b>100%</b>

**Table 2**  
**TYPE OF DEGREE GRANTED**  
**N=13 (92.86%)**

1	Diploma		1	8%
2	Certificate		0	0%
3	Associate		8	62%
4	Baccalaureate		4	31%
	<b>Total</b>		<b>13</b>	<b>100%</b>
Min Value				1
Max Value				4
Mean				3.15
Variance				0.64
Standard Deviation				0.80
Total Responses				13

**Table 3**  
**NURSING PROGRAM CURRICULUM INCLUDES ORAL HEALTH CARE**  
**N=13 (92.86%)**

1	Yes (if possible please attach a copy of your protocol when you submit the questionnaire)		4	31%
2	No		9	69%

**Table 4**  
**CURRICULUM INCLUDES A METHOD OF INSTRUCTION IN ORAL HEALTH**  
**N=13 (92.86%)**

1	Yes		6	46%
2	No		7	54%
	Total		13	100%
Min Value				1
Max Value				2
Mean				1.54
Variance				0.27
Standard Deviation				0.52
Total Responses				13

**Table 5**  
**NURSING STUDENTS ARE TAUGHT THE PATHOGENESIS OF PERIODONTAL DISEASE**  
**N=13 (92.86%)**

1	Yes		4	31%
2	No		9	69%
	Total		13	100%
Min Value				1
Max Value				2
Mean				1.69
Variance				0.23
Standard Deviation				0.48
Total Responses				13

**Table 6**  
**FACULTY FORESEE NUSING STUDENTS ASSESSING PATIENTS' RISK FOR SYSTEMIC COMPLICATIONS DUE TO ORAL HEALTH**  
**N=1 (7.14%)**

1		0	1	0	0	0	1	2.00
Min Value							2	
Max Value							2	
Mean							2.00	
Variance							0.00	
Standard Deviation							0.00	
Total Responses							1	

**Table 7**  
**PROFESSION OF FACULTY INVOLVED AS PRESENTERS OF ORAL HEALTH CARE**

**N=13 (92.86%)**

1	Physician(s)		0	0%
2	Nurse(s)		9	69%
3	Dentist(s)		0	0%
4	Dental hygienist(s)		1	8%
5	Social worker(s)		0	0%
6	Psychologist(s)		0	0%
7	Other (please specify)		0	0%
8	None		4	31%

**Table 8**  
**CURRICULUM INCLUDES CONTENT REGARDING PERIODONTAL - SYSTEMIC HEALTH**

**N=9 (64.29%)**

1	Diabetes		5	56%
2	Cardiovascular disease		6	67%
3	Preterm low birth weight		0	0%
4	All of the above		3	33%

**Table 9**  
**SETTING IN WHICH ORAL HEALTH EDUCATION IS TAUGHT IN**

**N=13 (92.86%)**

1	Classroom		4	31%
2	Clinical practical application		1	8%
3	Both		6	46%
4	Neither		4	31%
5	Other (please specify):		0	0%

**Table 10**  
**COURSES INCLUDING ORAL HEALTH EDUCATION**  
**N=9 (64.29%)**

1	Cardiology		1	11%
2	Community health nursing		3	33%
3	Endocrinology		1	11%
4	General nursing studies		4	44%
5	Geriatric nursing		2	22%
6	Medical-surgical nursing		4	44%
7	Obstetrics gynecology nursing		1	11%
8	Pathophysiology		1	11%
9	Pharmacology		1	11%
10	Psychiatric or mental health nursing		1	11%

**Table 11**  
**RESOURCES USED WHEN TEACHING THE ORAL-SYSTEMIC RELATIONSHIP**  
**N=10 (71.43%)**

1	Dental Journal(s)	0	0%
2	Nursing Journal(s)	5	63%
3	Medical Journal(s)	0	0%
4	Internet site(s)	1	13%
5	Outside guest speaker(s)	0	0%
6	Textbook specialist(s)	5	63%
7	Other(s): (please specify)	2	25%
Min Value		2	
Max Value		7	
Total Responses		8	

<b>Appendix 6</b>	
texts	
Nursing Textbooks	

**Table 12**  
**ASSESSMENT METHODS USED FOR MEASURING ORAL-SYSTEMIC HEALTH**  
**EDUCATIONAL COMPETENICES**

**N=9 (64.29%)**

1	Multiple choice testing		8	89%
2	Assignments		0	0%
3	Case-studies		0	0%
4	Faculty supervised patient care		3	33%
5	Simulation exercises		0	0%
6	Other (please specify):		2	22%
Min Value				1
Max Value				6
Total Responses				9

**Appendix 7**

no formal outcomes

Skill practice by brushing another students teeth and maintenance of oral care on patients

**Table 13**  
**TIME DEVOTED TO TEACHING THE ASSOCIATION BETWEEN ORAL HEALTH**  
**AND DIABETES**  
**N=13 (92.86%)**

1	0		5	38%
2	0-1		6	46%
3	2-3		2	15%
4	4-6		0	0%
5	7-9		0	0%
6	>9		0	0%
	Total		13	100%
Min Value				1
Max Value				3
Mean				1.77
Variance				0.53
Standard Deviation				0.73
Total Responses				13

**Table 14**  
**TIME DEVOTED TO TEACHING THE ASSOCIATION BETWEEN ORAL HEALTH**  
**AND CARDIOVASCULAR DISEASE**  
**N=13 (92.86%)**

1	0		4	31%
2	0-1		8	62%
3	2-3		1	8%
4	4-6		0	0%
5	7-9		0	0%
6	>9		0	0%
	Total		13	100%
Min Value				1
Max Value				3
Mean				1.77
Variance				0.36
Standard Deviation				0.60
Total Responses				13



**Table 15**  
**TIME DEVOTED TO TEACHING THE ASSOCIATION BETWEEN ORAL HEALTH**  
**AND ADVERSE PREGNANCY OUTCOMES; SPECIFIC TO PRETERM LOW BIRTH**  
**WEIGHT**  
**N=13 (92.86%)**

1	0		8	62%
2	0-1		5	38%
3	2-3		0	0%
4	4-6		0	0%
5	7-9		0	0%
6	>9		0	0%
	Total		13	100%
Min Value				1
Max Value				2
Mean				1.38
Variance				0.26
Standard Deviation				0.51
Total Responses				13

**Table 16**  
**FORESEEN CHANGES IN CURRICULA REGARDING THE ASSOCIATION WITH**  
**PERIODONTAL DISEASE AND DIABETES**  
**N=13 (92.86%)**

1	Yes		4	31%
2	No		9	69%
	Total		13	100%
Min Value				1
Max Value				2
Mean				1.69
Variance				0.23
Standard Deviation				0.48
Total Responses				13

**Table 17**  
**FORESEEN CHANGES IN CURRICULA REGARDING THE ASSOCIATION WITH PERIODONTAL DISEASE AND CARDIOVASCULAR DISEASE**

**N=13 (92.86%)**

1	Yes		3	23%
2	No		10	77%
	Total		13	100%
Min Value				1
Max Value				2
Mean				1.77
Variance				0.19
Standard Deviation				0.44
Total Responses				13

**Table 18**  
**FORESEEN CHANGES IN CURRICULA REGARDING THE ASSOCIATION WITH PERIODONTAL DISEASE AND PRETERM LOW BIRTH WEIGHT**

**N=13 (92.86%)**

1	Yes		4	31%
2	No		9	69%
	Total		13	100%
Min Value				1
Max Value				2
Mean				1.69
Variance				0.23
Standard Deviation				0.48
Total Responses				13

**Table 19**  
**PERCEIVED NEED FOR MORE EXPERTS TO TEACH ORAL-SYSTEMIC HEALTH**  
**N=13 (92.86%)**

1		0	5	6	1	1	13	2.54
Min Value							1	
Max Value							4	
Mean							2.54	
Variance							0.60	
Standard Deviation							0.78	
Total Responses							13	

**Table 20**  
**PERCEPTION ABOUT HOW WELL FACULTY IS ABLE TO CRITICALLY ASSESS**  
**THE LITERATURE REGARDING ORAL-SYSTEMIC HEALTH**  
**N=13 (92.86%)**

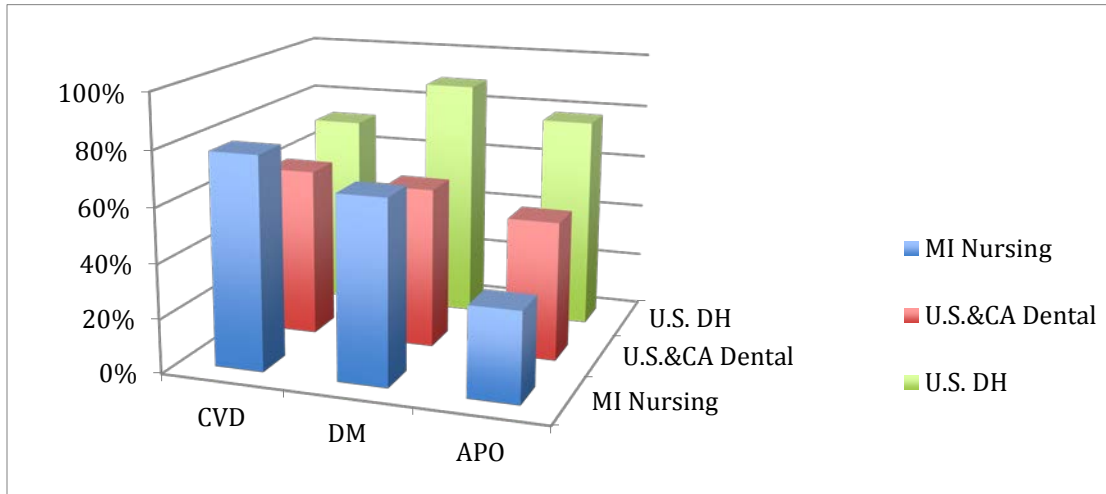
1		1	0	5	7	0	13	3.69
Min Value							3	
Max Value							5	
Mean							3.69	
Variance							0.40	
Standard Deviation							0.63	
Total Responses							13	

<b>TABLE 21</b>						
Chi-Square Analysis Comparing Nursing Institution with Nursing Program Curriculum Includes the Pathogenesis of Periodontal Disease						
		Institution Type			T-Test	Total
		University or 4-year College	Community or Junior College	Technical College		
Nursing Students are Taught about the Pathogenesis of Periodontal Disease	Yes A	3	1	0	A-B: T=2.50 DF: 5.83 P=0.05	4
	No B	1	7	1		9
Mean		1.25	1.88	2.00		
Total		4	8	1		13

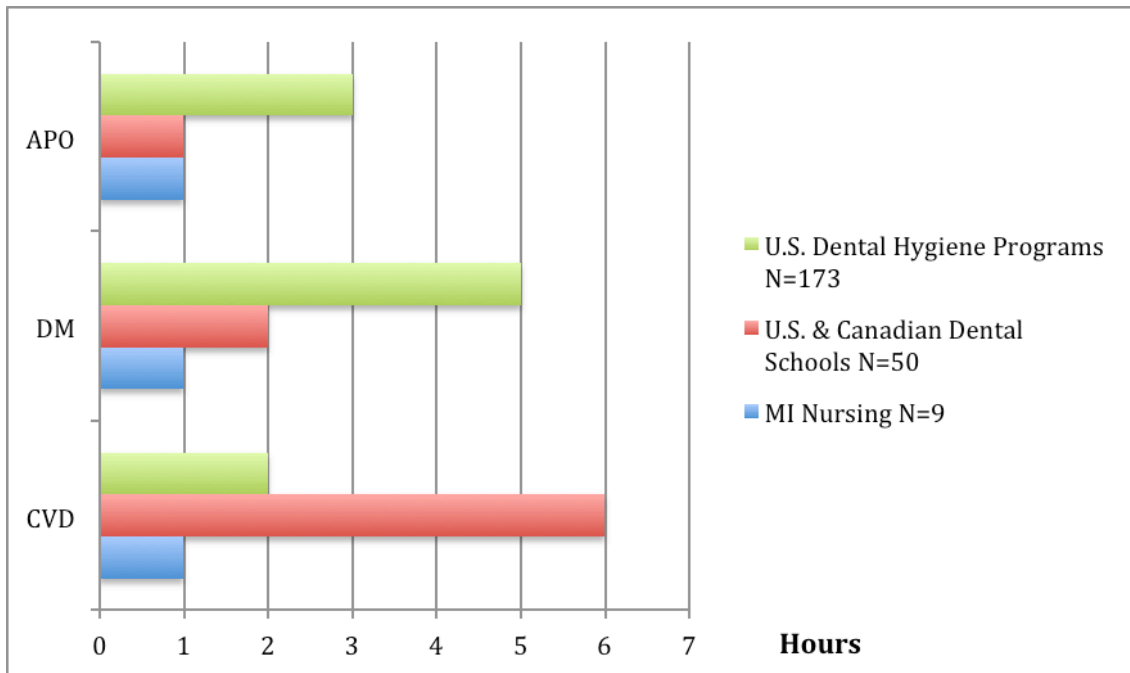
<b>TABLE 22</b>						
Chi-Square Analysis Comparing Nursing Degree Granted with Nursing Program Curriculum Includes the Pathogenesis of Periodontal Disease						
		Type of Degree Granted			T-Test	Total
		Diploma	Associate	Baccalaureate		
Nursing Students are Taught about the Pathogenesis of Periodontal Disease	Yes A	0	1	3	A-B: T=2.38 DF: 9.05 P=0.04	4
	No B	1	7	1		9
Mean		2.00	1.88	1.25		
Total		1	8	4		13

## FIGURES

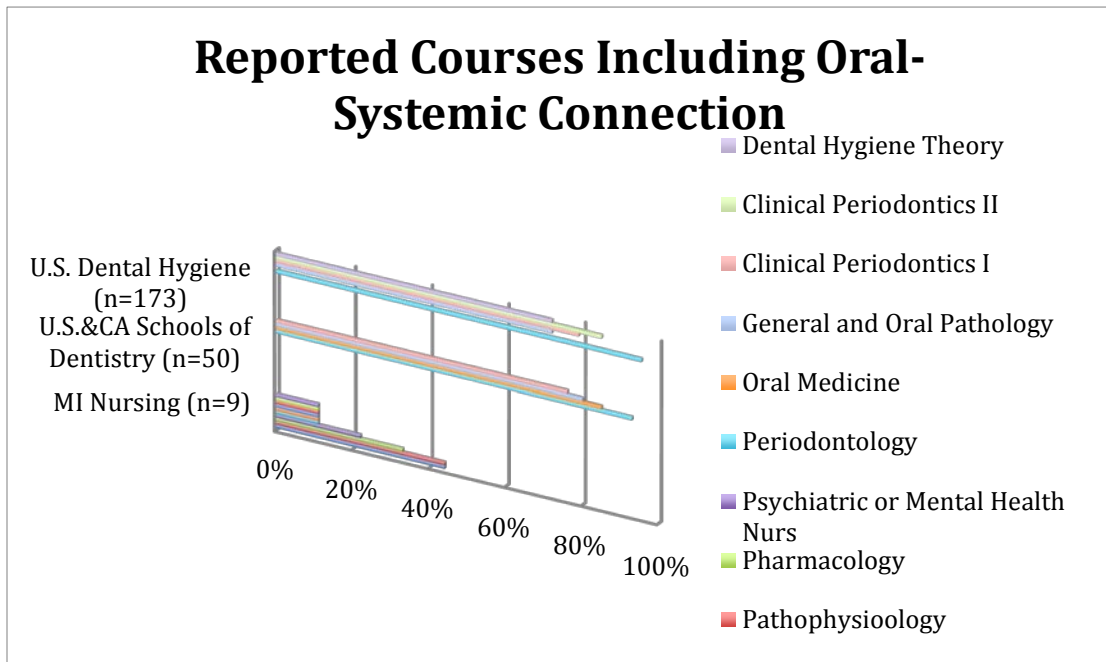
**Figure 1: Comparison of education regarding CVD, DM, and APO among Michigan Nursing Programs, U.S. and Canadian Schools of Dentistry, and U.S. Dental Hygiene Programs**



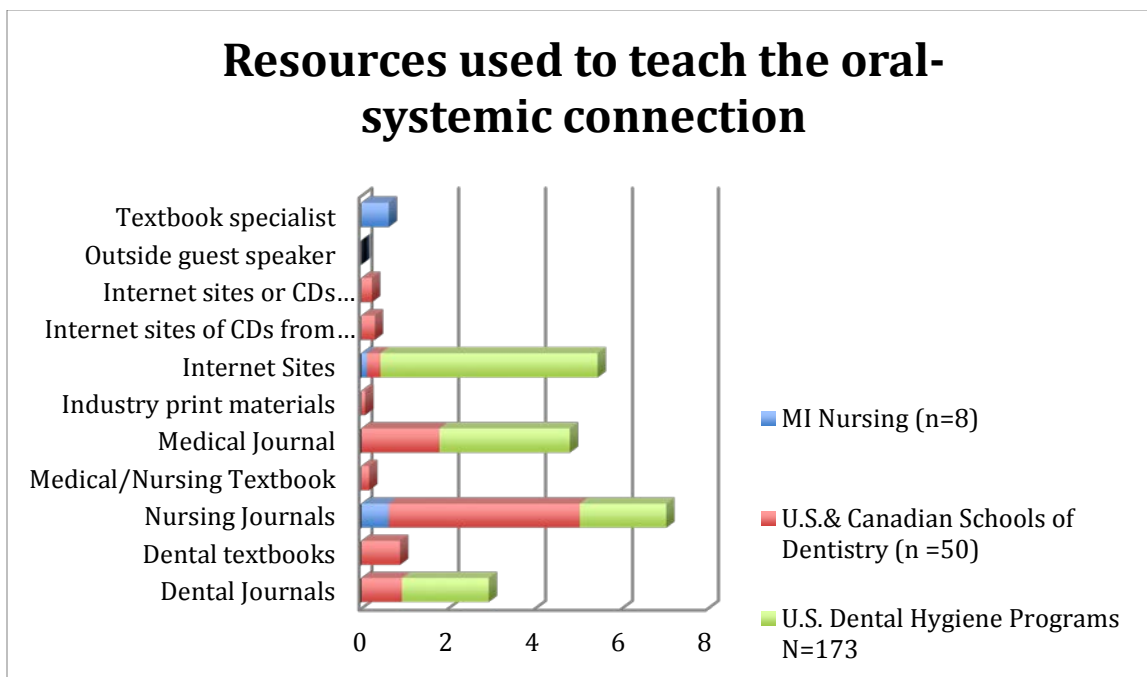
**Figure 2: Amount of time (hours) devoted to CVD, DM, and APO among Michigan Nursing Programs, U.S. and Canadian Schools of Dentistry, and U.S. Dental Hygiene Programs**



**Figure 1: Representation of courses including oral-systemic connection for Michigan Nursing Programs, U.S. and Canadian Schools of Dentistry, and U.S. Dental Hygiene Programs**



**Figure 4: Resources used to teach the oral-systemic connection for Michigan Nursing Programs, U.S. and Canadian Schools of Dentistry, and U.S. Dental Hygiene Programs**



## APPENDICES

### Appendix 1: E-Mail sent by PI for Recruitment Purposes

The University of Michigan School of Dentistry

1-11-2014

Dear Nursing Program Director,

I am a graduate student in the Dental Hygiene Masters Program at the University of Michigan School of Dentistry. I am writing to ask your cooperation in responding to this survey investigating nursing curricular content relating to the oral health systemic connection for the diabetic, cardiovascular disease and pre-term low birth weight patient.

The intent is to use the information provided from this survey to create a descriptive analysis of nursing curricula in the state of Michigan regarding the relationship between oral health and systemic health pertaining to the diabetic, cardiovascular disease and pre-term low birth weight patient.

A number of questions regarding nursing curriculum content, how the material is covered, and nursing directors' opinions about the level of education their students receive pertaining to oral health care, any expected changes and satisfaction with the curricula concerning systemic-periodontal oral health education.

Information provided will remain confidential. No attempt will be made to correlate survey answers with specific programs. This survey is completely voluntary. All responses will be kept completely confidential. Information from the survey will be analyzed collectively and anonymously. Results will be reported in group form only. If you have any questions please feel free to call me at (517) 612-9884 or the Dental Hygiene Department at the University of Michigan at (734) 615-5452.

**Please complete the enclosed electronic questionnaire and return it by March 1, 2014.** The survey should take you less than 10 minutes to complete. Please respond to every item honestly and completely. Please feel free to forward this survey to a faculty member who teaches content related to this subject. Please click on the following URL to go to the survey:

[http://umichdentistry.qualtrics.com/SE/?SID=SV\\_e5a5gXG8kffk8iF](http://umichdentistry.qualtrics.com/SE/?SID=SV_e5a5gXG8kffk8iF)

Thank you for your assistance with this thesis project.

Sincerely,

Heather Messenger, RDH, BAS  
Graduate Dental Hygiene Student  
University of Michigan, Rackham Graduate School

**APPENDIX 2:**  
**Oral – Systemic Connection:**  
**A Survey of the Curriculum in Michigan Nursing Schools**  
**Questionnaire**

The purpose of this study is to determine if nursing programs in the State of Michigan are teaching the oral-systemic connection between periodontal disease, diabetes, cardiovascular disease and pre-term low birth weight.

Directions: Please complete each question to the best of your ability. All answers will be held in strict confidence.

*First we'd like to ask a few questions about your nursing program. Please check the appropriate box.*

1. Which of the following educational settings best describes where your nursing program is located?

- University or 4 year college
- Community or Junior college
- Technical college
- School of Allied Health Sciences
- Medical School
- Separate Nursing Department
- Other (please specify)

2. Indicate the type of degree granted at the completion of your basic nursing program.

- Diploma
- Certificate
- Associate
- Baccalaureate

3. Does your nursing program have a part of the curriculum dedicated to teaching oral health care?

- Yes (if possible please attach a copy of your protocol when you submit the questionnaire)
- No



4. Does the curriculum include a method of instruction in oral health?

- Yes
- No

*This section addresses how the oral health material is taught.*

5. What faculty are involved as presenters regarding oral health care? (Please, check all that apply)

- Physician(s)
- Nurse(s)
- Dentist(s)
- Dental hygienist(s)
- Social worker(s)
- Psychologist(s)
- Other (please specify): \_\_\_\_\_
- None

6. Are nursing students taught about the pathogenesis of periodontal disease?

- Yes
- No

7. Which of the following systemic health links with periodontal disease does your curriculum include? (Please, check all that apply)

- Diabetes
- Cardiovascular disease
- Preterm low birth weight
- All of the above
- None of the above

8. If oral health education is a part of your curriculum, in which of the following setting(s) is oral health education taught? (Please, check all that apply)

- Classroom
- Clinical practical application
- Both
- Neither
- Other (please specify): \_\_\_\_\_

9. If oral health education is taught in the classroom, in which of the following course(s) is oral health included? (Please, check all that apply)

- Cardiology
- Community health nursing
- Endocrinology
- General nursing studies
- Geriatric nursing
- Medical-surgical nursing
- Obstetrics gynecology nursing
- Pathophysiology
- Pharmacology
- Psychiatric or mental health nursing

10. Which of the following resource materials are used to teach your students about the correlation between periodontal disease and systemic disease education? (Check all that apply)

- Dental Journal(s)
- Nursing Journal(s)
- Medical Journal(s)
- Internet site(s)
- Outside guest speaker(s)
- Textbook specialist(s)
- None
- Other(s) please specify: \_\_\_\_\_

11. How are student outcomes measured regarding the oral-systemic health relationships? (Please, check all that apply)

- Multiple choice testing
- Assignments
- Case-studies
- Faculty supervised patient care
- Simulation exercises
- Other (please specify): \_\_\_\_\_

12. How many hours are devoted to teaching content material regarding the association between oral health and diabetes?

- 0
- 0 - 1
- 1 - 3
- 4 - 6
- 7 - 9
- > 9

13. How many hours are devoted to teaching content material regarding the association between oral health and cardiovascular disease?

- 0
- 0 - 1
- 1 - 3
- 4 - 6
- 7 - 9
- > 9

14. How many hours are devoted to teaching content material regarding the association between oral health and preterm low birth weight?

- 0
- 0 - 1
- 1 - 3
- 4 - 6
- 7 - 9
- > 9

15. Do you expect any changes in your nursing curricula, which would incorporate periodontal disease education and systemic health relationship education related to the **diabetic** patient?

- Yes
- No

16. Do you expect any changes in your nursing curricula, which would incorporate periodontal disease education and systemic health relationship education related to the **cardiovascular disease** patient?

- Yes  
 No

17. Do you expect any changes in your nursing curricula, which would incorporate periodontal disease education and systemic health relationship education related to the **preterm low birth weight** infant?

- Yes  
 No

*This final section aims to gather opinions regarding perceived best practices.*

For the next few questions, on a scale from 1= “not at all” to 5= “very much”, indicate how much you agree with that statement.

18. Faculty who teach about the oral-systemic associations know how to critically evaluate the literature and determine the levels of evidence for associations between them.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

19. We need more experts at our school who can teach this subject to our nursing students.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

20. Nurses will play a more important role in the future in assessing patients’ risk for systemic complications due to oral health status.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1	2	3	4	5

**If you have any additional comments that you feel are pertinent to this study, please indicate at the end of the survey.**

**Thank you for your time.**

eResearch ID # HUM00072453

**APPENDIX 3:**

Recruitment email sent by thesis committee chair, University of Michigan, Dental Hygiene Program, School of Dentistry

March 25, 2014

Directors of Nursing Programs  
State of Michigan.

Re: Thesis survey for Heather Messenger  
Dear Nursing Program Director

The purpose of this letter is to encourage you to participate in a graduate student research project looking at oral health curriculum in nursing education. We are all aware of studies that show a significant correlation between diabetes and periodontal disease, cardiovascular disease and periodontal disease, oral hygiene and ventilator-assisted pneumonia and to a lesser extent premature birth and oral hygiene.

In this study, the student is attempting to learn the extent to which oral health has been integrated into undergraduate nursing curricula, methods being used and teaching materials, which might be helpful for nursing educators. This is an ambitious study and one, which I believe, will provide important information for nursing program faculty. As dental hygienists we greatly respect the role nurses play in providing care, including oral care, for their patients.

So far, only 13 responses to the survey have been received. Won't you please take a moment to complete the survey or pass it on to a faculty member who might teach oral health content in your curriculum. Your efforts will assist this graduate student in receiving information necessary for completion of her Master's Thesis.

Thank you for generously sharing your time and answering this survey.

Sincerely,

Karen Ridley, MS  
Assistant Prof. Dental Hygiene  
Thesis Chair for Heather Messenger

# APPENDIX 4: MICHIGAN BOARD OF NURSING APPROVED EDUCATION PROGRAMS

LARA/LNR-300 (11/12)



STATE OF MICHIGAN

RICK SNYDER  
GOVERNOR

DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS  
BUREAU OF HEALTH CARE SERVICES  
HEALTH PROFESSIONS DIVISION

STEVE HILFINGER  
DIRECTOR

## MICHIGAN BOARD OF NURSING APPROVED EDUCATION PROGRAMS

### REGISTERED NURSE PROGRAMS BACCALAUREATE DEGREE

Andrews University, Department of Nursing	Berrien Springs 49104
Calvin College, Department of Nursing	3201 Burton Street, SE, Grand Rapids 49546
Davenport University, Mable Engle School of Nursing	415 East Fulton, Grand Rapids 49503
Davenport University, School of Nursing	3555 East Patrick Road, Midland 48642
Davenport University, School of Nursing	27650 Dequindre Road, Warren 48092
Eastern Michigan University, School of Nursing	311 Marshall, Ypsilanti 48197
Ferris State University, Department of Nursing	200 Ferris Drive, Big Rapids 49307
Finlandia University, Department of Nursing	601 Quincy Street, Hancock, 49930
Grand Valley State University, Kirchof School of Nursing	1 Campus Drive, Allendale 49401
Hope College, Department of Nursing	35 E. 12th Street, Holland 49423
Lake Superior State University, Department of Nursing	650 Easterday Avenue, Sault Ste. Marie 49783
Madonna University, Department of Nursing	36600 Schoolcraft Road, Livonia 48150
Michigan State University, School of Nursing	A230 Life Sciences Bldg., East Lansing 48824
Northern Michigan University, School of Nursing	New Science Facility, Room 2301, Marquette 49855
Oakland University, School of Nursing	428 O'Dowd Hall, Rochester 48063
Rochester College, School of Nursing	800 West Avon Road, Rochester Hills 48307
Saginaw Valley State University, Crystal M. Lange College of Nursing and Health Ser.	7400 Bay Road, University Center 48710
Siena Heights University, School of Nursing	1247 E. Siena Heights Drive, Adrian 49221
South University, School of Nursing	41555 Twelve Mile Road, Novi, 48377
University of Detroit-Mercy, McAuley School of Nursing	4100 West McNichols Road, Detroit 48221
University of Michigan-Flint, School of Nursing	303 E. Kearsley, Rm 516 CROB, Flint 48502
University of Michigan, School of Nursing	400 N. Ingalls, #1320, Ann Arbor 48103
Wayne State University, College of Nursing	5557 Cass Avenue, Detroit 48202
Western Michigan University, Bronson School of Nursing	Kalamazoo 49008

### ASSOCIATE DEGREE

Alpena Community College, Department of Nursing	665 Johnson Street, Alpena 49707
Baker College Allen Park, Nursing Department	4500 Enterprise Drive, Allen Park 48101
Baker College Auburn Hills, Nursing Department	1500 University Drive, Auburn Hills 48326
Baker College Cadillac, Nursing Department	9600 13 <sup>th</sup> Street, Cadillac 49601
Baker College Clinton Township, Nursing Department	34950 Little Mack Avenue, Clinton Township 48035
Baker College Muskegon, Nursing Department	1903 Marquette Avenue, Muskegon 49442-1490
Baker College Owosso, Nursing Department	1020 South Washington, Owosso 48867-4400
Baker College Flint, Nursing Department	1050 West Bristol Road, Flint 48507-5508
Bay de Noc Community College, ADN Program	2001 N. Lincoln Road, Escanaba 49829
Delta College, Division of Nursing	University Center 48710
Glen Oaks Community College, Division of Nursing Education	62249 Shimmel Road, Centreville 49032
Gogebic Community College, Department of Nursing	E4946 Jackson Road, Ironwood 49938
Grand Rapids Community College, Department of Nursing	143 Bostwick Avenue, NE, Grand Rapids 49503
Henry Ford Community College, Department of Nursing	5101 Evergreen Road, Dearborn 48128
ITT - Canton, Nursing Department	1905 South Haggerty Road, Canton 48188
Jackson Community College, Nursing Department	2111 Emmons Road, Jackson 49201
Kalamazoo Valley Community College, Division of Health Sciences	6767 West O Avenue, Kalamazoo 49009
Kellogg Community College, Nursing Education	450 North Avenue, Battle Creek 49017
Kirtland Community College, Department of Nursing	10775 N. St. Helen Road, Roscommon 48653
Lake Michigan College, Division of Health Sciences	2755 E. Napier Avenue, Benton Harbor 49022
Lansing Community College, Department of Nursing & Health Careers	422 N. Washington Square, Lansing 48933
Macomb County Community College, Nursing Program	44575 Garfield Road, Mt. Clemens 48044
Mid Michigan Community College, Department of Nursing	1375 South Clare Avenue, Harrison 48625
Monroe County Community College, Division of Health Sciences	1555 Raisinville Road, Monroe 48161
Montcalm Community College, Department of Nursing	2800 College Drive, Sidney 48885
Mott Community College, Division of Nursing	1401 East Court Street, Flint 48503
Muskegon Community College, Nursing Program	221 South Quarterline Road, Muskegon 49442
North Central Michigan College, Department of Nursing	1515 Howard Street, Petoskey 49770
Northwestern Michigan College, Health Occupations Division	1701 East Front Street, Traverse City 49686
Oakland Community College, Nursing Department	7350 Cooley Lake Road, Waterford 48327

**MICHIGAN BOARD OF NURSING APPROVED EDUCATION PROGRAMS CONTINUED**

**REGISTERED NURSE PROGRAMS  
ASSOCIATE DEGREE**

St. Clair County Community College, Department of Nursing	323 Erie Street, Port Huron 48061
Schoolcraft College, Nursing Education	18600 Haggerty Road, Livonia 48152
Southwestern Michigan College, Department of Health Careers	58900 Cherry Grove Road, Dowagiac 49047
Washtenaw Community College, Department of Nursing	4800 E. Huron River Drive, Ann Arbor 48105
Wayne County Community College, Nursing Education	8200 W. Outer Drive, Detroit 48219
West Shore Community College, Nursing Education	3000 N. Stiles Road, Scottville 49454

**PRACTICAL NURSING PROGRAMS  
COLLEGES GRANTING CERTIFICATES**

Alpena Community College, Department of Nursing	666 Johnson Street, Alpena 49707
Baker College Auburn Hills, Practical Nurse Program	1500 University Drive, Auburn Hills 48326
Bay de Noc Community College, School of Practical Nursing	2001 N. Lincoln Road, Escanaba 49829
Davenport University, Department of Nursing	3555 East Patrick Road, Midland 48642
Davenport University, Department of Nursing	27650 Dequindre Road, Warren 48092
Delta College, Division of Nursing	University Center 48710
Glen Oaks Community College, Division of Nursing Education	62249 Shimmel Road, Centreville 49032
Gogebic Community College, Department of Nursing	E4946 Jackson Road, Ironwood 49938
Grand Rapids Community College, Department of Nursing	143 Bostwick Avenue, NE, Grand Rapids 49503
Jackson Community College, Nursing Department	2111 Emmons Road, Jackson 49201
Kalamazoo Valley Community College, Division of Health Sciences	6767 West O Avenue, Kalamazoo 49009
Kellogg Community College, Nursing Education	450 North Avenue, Battle Creek 49017
Kirtland Community College, Department of Nursing	10775 N. St. Helen Road, Roscommon 48653
Lake Michigan College, Division of Health Sciences	2755 E. Napier Avenue, Benton Harbor 49022
Lake Superior State University, Department of Nursing	650 Easterday Avenue, Sault Ste. Marie 49783
Lansing Community College, Department of Nursing & Health Careers	422 N. Washington Square, Lansing 48933
Mid Michigan Community College, Department of Nursing	1375 South Clare Avenue, Harrison 48625
Monroe County Community College, Division of Health Science	1555 Raisinville Road, Monroe 48161
Montcalm Community College, Department of Nursing	2800 College Drive, Sidney 48885
Mott Community College, Division of Nursing	1401 East Court Street, Flint 48503
Muskegon Community College	221 South Quarterline Road, Muskegon 49442
Northern Michigan University, Division of Practical Nursing	New Science Facility, Room 2301, Marquette 49855
Northwestern Michigan College, Health Occupations Division	1701 East Front Street, Traverse City 49686
Oakland Community College, Nursing Department	7350 Cooley Lake Road, Waterford 48327
Oakland University, School of Nursing	428 O'Dowd Hall, Rochester 48309
St. Clair County Community College, Department of Nursing	323 Erie Street, Port Huron 48061
Schoolcraft College, Nursing Education	18600 Haggerty Road, Livonia 48152
Southwestern Michigan College, Department of Health Careers	58900 Cherry Grove Road, Dowagiac 49047
West Shore Community College, Nursing Department	3000 N. Stiles Road, Scottville 49454

**TECHNICAL/VOCATIONAL SCHOOLS GRANTING CERTIFICATES**

Detroit Business Institute-Downriver	19100 Fort Street, Riverview, MI 48193
Dorsey Schools	30821 Barrington Avenue, Madison Heights 48071
Everest Institute, Practical Nurse Program	1750 Woodworth Street, NE, Grand Rapids 49505
Everest Institute, Practical Nurse Program	26111 Evergreen Road, Suite 303, Southfield 48076
Latoya's Health Education, Practical Nurse Program	1000 Brockway, Saginaw 48933
NexCare Health Care Training Institute, Practical Nurse Program	28349 Joy Road, Westland 48185

FOR FURTHER INFORMATION WRITE TO THE DIRECTOR OF THE PROGRAM IN WHICH YOU ARE INTERESTED, WELL IN ADVANCE OF INTENDED DATE OF ADMISSION OR THE MICHIGAN LEAGUE FOR NURSING, 2410 WOODLAKE DRIVE, OKEMOS, MI 48864, 517-347-8091, FAX 517-347-4096.

**APPENDIX 5:  
SECOND RECRUITMENT COVER LETTER SENT BY THE PI**

February 16, 2014

Dear Nursing Directors,

A few weeks ago you were sent a copy of the “Study on Oral – Systemic Health Education in Michigan Nursing Schools” questionnaire. We have not yet received a reply from your program. Please take moment to complete the electronic survey. A second copy is enclosed for your convenience. Analysis of the data obtained from the questionnaires will begin soon so please return to us by (date) so that your programs input is recognized.

If you have any questions or concerns please feel free to call me at (517) 612-9884. Or you may contact Mrs. Karen Ridley, Graduate Director of the University of Michigan Dental Hygiene Program at (734) 763-3369.

We thank you kindly in advance for your prompt attention to this matter.

Sincerely,

Heather Messenger, RDH, BAS  
Project Investigator



**APPENDIX 6:**

Open-ended responses (Table 11): RESOURCES USED WHEN TEACHING THE ORAL-SYSTEMIC HEALTH CONNECTION

**Appendix 6: Resources used when Teaching the Oral-Systemic Health Connection**

texts  
Nursing Textbooks

## APPENDIX 7:

Open-ended responses (Table 12): ASSESSMENT METHODS USED FOR ORAL-SYSTEMIC HEALTH EDUCATIONAL COMPETENCIES

### Appendix 7: Assessment Methods Used for Oral-Systemic Health Educational Competencies

no formal outcomes

Skill practice by brushing another students teeth and maintenance of oral care on patients

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