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I, Carrie L. Janszen,

hereby submit this work as part of the requirements for the degree of:

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Cardiologists' And General Practitioners' Attitudes And Knowledge Regarding The Link Between Cardiovascular Disease And Periodontal Disease

This work and its defense approved by:

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CARDIOLOGISTS' AND GENERAL PRACTITIONERS' ATTITUDES AND KNOWLEDGE REGARDING THE LINK BETWEEN CARDIOVASCULAR DISEASE AND PERIODONTAL DISEASE

A thesis submitted to the

Division of Graduate Studies and Research
of the University of Cincinnati

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by

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Abstract

AN ABSTRACT OF THE THESIS FOR THE MASTER OF EDUCATION DEGREE IN HEALTH PROMOTION AND EDUCATION, PRESENTED ON August 12, 2004, AT THE UNVERSITY OF CINCINNATI, RAYMOND WALTERS COLLEGE, OHIO.

TITLE: Cardiologists and General Practitioners Attitudes and Knowledge Regarding the Link Between Cardiovascular Disease and Periodontal Disease

MASTERS COMMITTEE MEMBERS: Dr. Amy Bernard (Chair), Dr. Randall Cottrell, Ms. Amy Hopping, Ms. Elizabeth McClure and Ms. Cynthia Stegeman

The purpose of the study was to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health issues. More specifically, knowledge of cardiovascular disease risk factors and periodontal disease risk factors and signs and symptoms of periodontal disease were examined. Also, attitudes regarding the relationship between cardiovascular disease and periodontal disease, whether dental health is component of overall health, and the number of hours of dental health that should be included in medical school were examined. Stratified by training all cardiologists and general practitioners (N=274, 114 cardiologists and 160 general practitioners) were surveyed with Greater Cincinnati (inside the I-275 loop) were identified by cross-referencing from the Cincinnati Bell Yellow Pages, Anthem Blue Cross/Blue Shield, Humana and United Health Care. Research was gathered to test the research hypotheses and a questionnaire was developed after conducting a thorough review of the literature. The 18-item survey, developed by the researcher, was found valid and reliable using a panel of experts and the test-retest method. The survey was broken down by 5 subcategories: Inclusion

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of Dental Health in Medical Practice (5 questions – 3yes/no, 2 multiple choice), Dental Health Practices (4 questions – 3 multiple choice, 1 fill-in), Knowledge of Cardiovascular Disease and Periodontal Disease (3 questions – all multiple choice), Relationship Between Dental Health and Overall Health (2 questions (1 yes/no, 1 multiple choice), and Inclusion of Dental Health Education in Medical School (1 question – fill-in). The procedures for collecting that data for the research occurred in 5 steps. First a pre-notification postcard was mailed to the physicians, which introduce the research to the physician, the purpose of the study and to notify the physician that a survey would be arriving in their office. Two weeks later the survey instrument was mailed along with the cover letter, informed consent and a self addressed stamped envelope. Following the initial mailing of the survey a follow-up postcard was sent out to the physicians for whom the completed survey had not been received by the researcher. In this postcard the physician was reminder to complete the survey and return it. After another 2 weeks a second mailing, which consisted of the same materials as the initial mailing was sent out to those cardiologists and general practitioners who had not yet mailed the survey back to the researcher. Lastly, the researcher made telephone calls to the physicians' offices and talked to the office manager requesting that they ask the physicians to complete the survey and mail it back. The research made sure to inform the office managers that this survey was needed in order to complete thesis research. Seventy-five of the 274 participants (20 cardiologists and 55 general practitioners) responded (response rate = 27.5). Of those 20 (17 male, 3 female, 5 practiced medicine less than 10 years and 13

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practiced medicine 11 or more years) were cardiologists and 51 (33 male, 18 female, 14 practiced medicine less than 10 years and 36 practiced medicine 11 or more years) were general practitioners. Thirty-five surveys were returned as "undeliverable" (12 cardiologists and 23 general practitioners). Correct/new addresses were found for 18 (6 cardiologists and 12 general practitioners) of the 35 and the survey was mailed out again. The remaining 17 physicians for whom addresses were not found were excluded from the survey. Out of the 114 cardiologists surveyed only 20 (18.5%) completed the survey and returned it. On the other hand, general practitioners completed and returned 55 (34.5%) surveys. A total number of 75 (27.5%) surveys were received. Approximately 90% of general practitioners and all of the cardiologists participating in the study indicated that they believe there may be a link between cardiovascular disease and periodontal disease. There was no difference between male and female participants and those physicians practicing medicine 10 or fewer years were more likely to believe there is a link. The majority of physicians 78.7% (59) stated that dental health is a component to overall health. When comparing all physicians who completed the survey and the number of dental health education hours provided in medical school, 42.7% felt that between 1-5 hours of education should be offered and 30% felt 6-10 hours of medical school training should pertain to dental health education. But there was no difference in opinions between male and female physicians or how long the physicians had practiced medicine. Physicians were also asked their opinions regarding the inclusion of dental health questions on a health history. There was no difference of opinions

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among the various demographic groups. Along that same line there was no difference of opinions between the different demographic groups in regards to including dental health education as part of the medical practice. Finally cardiologists and general practitioners were compared when looking at risk factors for periodontal disease and cardiovascular disease along with the signs and symptoms of periodontal disease. Among all of the demographic groups there was no difference. More research should be done in this area but it should be said that physicians should incorporate dental health into their practices.

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Thank you to Dr. Amy Bernard, Dr. Randall Cottrell, Ms. Elizabeth McClure, Ms. Cynthia Stegeman and Ms. Amy Hopping for your leadership, patience, confidence, friendship and encouragement. Your expertise was crucial to this important research.

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CHAPTER ONE
The Problem

Recent studies have suggested a link between periodontal disease and cardiovascular disease suggesting that those with periodontal disease are more at risk of developing cardiovascular disease (Genco, Offenbacher & Beck, 2002). "The public health community was alerted to the need to promote oral health by the first Surgeon General's report on oral health" (Rose, Mealey, Minsk & Cohen, 2002, p. 37S). Observing the link between periodontal disease and cardiovascular disease, Rose and colleagues (2002) commented that, "These observations are leading dentists and physicians to interact more closely in caring for patients. In addition, a greater burden has been placed on the dental community to become more familiar with oral microbiology and the pharmacological approaches available to treat oral diseases that may have systemic implications" (p. 37S)

According to the American Heart Association (AHA), "it is estimated that in 2000 61,800,000 Americans have had one or more forms of Cardiovascular Disease" (2002a, ¶ 1). Coronary Heart Disease (CHD) and cerebrovascular disease (stroke) have been reported as the first and third leading causes of death respectively among Americans, with coronary heart disease reported as the number one killer among the elderly (Abou-Raya, Naeem, Abou-El & El Betagy, 2002). These diseases have been considered the dominant components of cardiovascular disease (Centers for Disease Control and Prevention [CDC], 2002a). Nine hundred and fifty thousand people have died annually (CDC, 2002a); 2,600 daily; and one person every 33 seconds has died from

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cardiovascular disease in our country (CDC, 2002c). About one fourth of Americans have lived with the aftermath of heart disease or stroke (CDC, 2002a). Cardiovascular disease has not discriminated, it has struck both men and women from all racial and ethnic groups, while the majority of deaths have affected women (CDC, 2002c).

Lifestyle characteristics such as obesity, physical inactivity, hypertension, diabetes and smoking have all been risk factors associated with cardiovascular disease (CVD) but recent studies have discussed the possibility of periodontal disease also being a link to CVD (Hahn, Heath & Chang, 1998). The Centers for Disease Control and Prevention has estimated that the cost of CVD to the United States in 2002 will be $329.2 billion dollars. This number reflects not only lost productivity but also health care costs (CDC, 2002a).

Healthy People 2010 has stated, that "oral health is an essential and integral component of health throughout life" (U.S. Department of Health and Human Services [HHS], 2000 p. 2), but quality of life can also be impacted by poor oral health and untreated dental diseases and conditions (HHS, 2000). Access to health care has not only been a problem for Americans seeking medical care but dental care as well. Forty-five percent of Americans have reported no dental insurance while the other 55% of the population have reported some form of dental insurance whether it be private (44%), public (9%) or other (2%) (HHS, 2000).

Periodontal disease has been one of the most common human infections (Wu, et.al, 2000). It is brought about by gram-negative bacteria found in the oral

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flora (Howell, Ridker, Ajani, Hennekens, & Christen, 2001) that produces swelling, redness, bleeding and recession of the gingival tissue, tooth loss, pocketing along the gingival margin and destruction of the soft tissue and bones that support the teeth (Genco, 1998). Dental caries (Meyer & Fives-Taylor, 1998) and periodontal disease have been chronic diseases and, left untreated can persist (Abou-Raya, et al. 2002). "However, causative organisms for both of these disease are able to produce infection in other parts of the body" (Meyer, & Fives-Taylor, 1998, p. 88). "Over time, the bacterial endotoxins in the mouth may enter the systemic circulation through gingival connective tissue and produce vascular injury. In view of the common occurrence of the condition, the demonstration of a role for periodontal disease in cardiovascular disease would have important public health implications" (Howell, et al., 2001, p. 445).

The National Institute of Dental and Craniofacial Research (NIDCR) a division of the National Institutes of Health (NIH), has stated that 80% of the U.S. population has some form of periodontal disease (NICDR, 2002). The NIDCR further explained that periodontal disease has many different forms, ranging from the acute, simple form of gingivitis to the chronic, more severe form of the disease that can eventually lead to bone and tooth loss.

There have been 5 different stages of periodontal disease. Gingivitis has been the mildest and only reversible form of periodontal disease (American Academy of Periodontology [AAP], 2002). Gingivitis has appeared clinically by color changes, position and form of the gingival tissue and the presence of bleeding and/or exudate (pus). The second stage of periodontal disease has

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been called early periodontitis. During this stage the clinician has seen a progression of inflamed gingival tissue that begins to attack the bone. Moderate periodontitis has been a more advanced type of early periodontitis has been characterized by more destruction of the gum and noticeable bone loss. During this stage of the disease the teeth have become more mobile (Wilkens, 1994).

During the fourth (advanced periodontitis) and fifth (refractory periodontitis) stages of periodontal disease, the extent of destruction to the gum tissue and bone has been severe, and progression of the disease continues no matter how often treatment is administered (Wilkens, 1994). Periodontitis has been the leading cause of tooth loss in adults (Abou-Raya, et al., 2002) and patients will more than likely lose their teeth during these two later stages of periodontal disease (NIDCR, 2002).

Plaque has been a microbial/bacteria that can lead to gingival or periodontal infections (Wilkens,1994). Plaque has been a soft removable deposit that forms on the teeth. It has contained microorganisms, such as bacteria, mycoplasmas, yeasts, protozoa and viruses, along with food debris. When plaque has not been removed from the teeth for a long period of time it forms hard calcified deposits called dental calculus or tartar (Wilkens,1994) and can only be removed by a dental professional during an oral prophlylaxis (NIDCR, 2002).

Along with bacteria, there have been other possible risk factors associated with periodontal disease. They have been stress (grinding and clenching teeth), poor diet/nutrition, smoking, viral infections, age, poor dental health, genetic

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predisposition and the hormonal changes. Other medical complications such as diabetes, osteoporosis, inflammatory bowel disease, Down's sydrome, and AIDS have also been linked to periodontal disease. Certain medications, including steroids, cyclosporins, and oral contraceptives, have also been shown to increase the risk of periodontal disease or enhance the severity of existing periodontal disease (AAP, 2002; NIDCR, 2002).

Prevention of periodontal disease has been accomplished by using an American Dental Association (ADA) approved toothpaste, appropriate brushing technique, flossing daily, refraining from tobacco products, eating a well balanced diet and professional oral prophylaxis treatment and examination by a dentist and dental hygienist twice annually (NIDCR, 2002). To control the progression of periodontal disease and prevent recurrence, maintenance therapy has been necessary at a 2 to 3 month interval (Page, 1998).

Periodontal disease and heart disease have both been widespread within the population, so determining their connection is significant to public health (Hujoel, Drangsholt, Spiekerman & DeRouen, 2000). "It is increasingly difficult to ignore the possibility that infection and, in particular, periodontal disease, may be a novel cardiovascular risk factor. If so, then dental health becomes an important parameter of medical health" (Abou-Raya, et al., 2002, p. 146). If a link is found between cardiovascular disease and periodontal disease, then the medical community, and especially cardiologists and general practitioners, will need to be informed about dental health education and every aspect of dental health. Medical institutions will need to develop a curriculum that covers dental health for

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the medical students who are enrolled. Dental health has become a bigger component of total health care than ever before. The medical community will need to implement dental health into their medical practice to ensure that their patients are receiving the most comprehensive medical care possible. Abou-Raya and colleagues (2002) summarize the importance of this issue,

> It is thus high time that physicians, in particular cardiologists and dentists, develop heightened awareness of the increasing evidence that has come to the surface linking periodontal disease to CAD. The public should be enlightened about the association between periodontal disease and CAD and should be motivated to maintain good dental health, to be prompt with dental checkups, and to maintain good oral hygiene through regular brushing, flossing and use of oral antiseptics (p. 146).

Purpose of the Study

The purpose of this study was to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health issues. More specifically, knowledge of cardiovascular disease risk factors and periodontal disease risk factors and signs and symptoms were examined. Also, attitudes regarding the relationship between cardiovascular disease and periodontal disease, whether dental health is a component of overall health, and the number of hours of dental health that should be included in medical school were examined.

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Research Questions and Hypothesis

Relationship Between Dental Health and Overall Health

Research question 1. What are the cardiologists and general practitioners' attitudes towards dental health being a component to overall total health?

Hypothesis 1. There will be a difference in the opinions of cardiologists and general practitioners regarding the link between periodontal disease and cardiovascular disease.

Null Hypothesis 1. There will be no difference in the opinions of cardiologists and general practitioners regarding the link between periodontal disease and cardiovascular disease.

Hypothesis 2. There will be a difference in the opinions of male and female physicians regarding the link between periodontal disease and cardiovascular disease.

Null Hypothesis 2. There will be no difference in the opinions of male and female physicians regarding the link between periodontal disease and cardiovascular disease.

Hypothesis 3. There will be a relationship between the number of years a physician has practiced medicine and opinions regarding the link between periodontal disease and cardiovascular disease.

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Null Hypothesis 3. There will be no relationship between the number of years a physician has practiced medicine and opinions regarding the link between periodontal disease and cardiovascular disease.

Hypothesis 4. There will be a difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of risk factors for periodontal disease.

Null Hypothesis 4. There will be no difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of risk factors for periodontal disease.

Hypothesis 5. There will be a difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of signs and symptoms of periodontal disease.

Null Hypothesis 5. There will be no difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of signs and symptoms of periodontal disease.

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Inclusion of Dental Health Education in Medical School Curriculum.

Research question 2. What are cardiologists and general practitioners' attitudes towards including dental health in the medical school curriculum?

Hypothesis 6. There will be a difference in the opinions of cardiologists and general practitioners regarding the number of classroom hours that should be spent on dental health education in medical school.

Null Hypothesis 6. There will be no difference in the opinions of cardiologists and general practitioners regarding the number of classroom hours that should be spent on dental health education in medical school.

Hypothesis 7. There will be a difference in the opinions of male and female physicians regarding the number of classroom hours that should be spent on dental health education in medical school.

Null Hypothesis 7. There will be no difference in the opinions of male and female physicians regarding the number of classroom hours that should be spent on dental health education in medical school.

Hypothesis 8. There will be a difference in the opinions of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the number of classroom hours that should be spent on dental health education in medical school.

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Null Hypothesis 8. There will be no difference in the opinions of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the number of classroom hours that should be spent on dental health education in medical school.

Inclusion of Dental Health in Medical Practice.

Research question 3. What are cardiologists and general practitioners' attitudes towards including dental health information questions on medical health histories?

Hypothesis 9. There will be a difference in the opinions of cardiologists and general practitioners regarding the inclusion of dental health information questions on a health history.

Null Hypothesis 9. There will be no difference in the opinions of cardiologists and general practitioners regarding the inclusion of dental health information questions on a health history.

Hypothesis 10. There will be a difference in the opinions of males and female physicians regarding the inclusion of dental health information questions on a health history.

Null Hypothesis 10. There will be no difference in the opinions of males and female physicians regarding the inclusion of dental health information questions on a health history.

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Hypothesis 11. There will be a difference in the opinions of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the inclusion of dental health questions on a health history.

Null Hypothesis 11. There will be no difference in the opinions of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the inclusion of dental health questions on a health history.

Research questions 4. What are cardiologists and general practitioners' attitudes towards providing dental health education to their patients?

Hypothesis 12. There will be a difference in the opinions of cardiologists and general practitioners regarding whether or not dental health education should be part of their medical practice.

Null Hypothesis 12. There will be no difference in the opinions of cardiologists and general practitioners regarding whether or not dental health education should be part of their medical practice.

Hypothesis 13. There will be a difference in the opinions of male and female physicians regarding whether or not dental health education should be part of their medical practice.

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Null Hypothesis 13. There will be no difference in the opinions of male and female physicians regarding whether or not dental health education should be part of their medical practice.

Hypothesis 14. There will be a relationship between the number of years physicians' have been practicing medicine and their opinions regarding the inclusion of dental health education as part of their medical practice.

Null Hypothesis 14. There will be no relationship between the number of years physicians' have been practicing medicine and their opinions regarding the inclusion of dental health education as part of their medical practice.

Cardiovascular Disease and Periodontal Disease Knowledge.

Research question 5. What are the cardiologists and general practitioners' knowledge of periodontal disease?

Research question 6. What are the cardiologists and general practitioners' knowledge of cardiovascular disease?

Hypothesis 15. There will be a difference in the knowledge of periodontal disease risk factors between cardiologists and general practitioners.

Null Hypothesis 15. There will be no difference in the knowledge of periodontal disease risk factors between cardiologists and general practitioners.

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Hypothesis 16. There will be a difference in the knowledge of periodontal disease signs and symptoms between cardiologists and general practitioners.

Null Hypothesis 16. There will be no difference in the knowledge of periodontal disease signs and symptoms between cardiologists and general practitioners.

Hypothesis 17. There will be a difference in the knowledge of cardiovascular disease risk factors between cardiologists and general practitioners.

Null Hypothesis 17. There will be no difference in the knowledge of cardiovascular disease risk factors between cardiologists and general practitioners.

Hypothesis 18. There will be a difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of periodontal disease risk factors.

Null Hypothesis 18. There will be no difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of periodontal disease risk factors.

Hypothesis 19. There will be a difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of periodontal disease signs and symptoms.

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Null Hypothesis 19. There will be no difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of periodontal disease signs and symptoms.

Hypothesis 20. There will be a difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of cardiovascular disease risk factors.

Null Hypothesis 20. There will be no difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of cardiovascular disease risk factors.

Hypothesis 21. There will be a difference in knowledge of periodontal disease risk factors between male and female physicians.

Null Hypothesis 21. There will be no difference in knowledge of periodontal disease risk factors between male and female physicians.

Hypothesis 22. There will be a difference in knowledge of periodontal disease signs and symptoms between male and female physicians.

Null Hypothesis 22. There will be no difference in knowledge of periodontal disease signs and symptoms between male and female physicians.

Hypothesis 23. There will be a difference in knowledge of cardiovascular disease risk factors between male and female physicians.

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Null Hypothesis 23. There will be no difference in knowledge of cardiovascular disease risk factors between male and female physicians.

Dental Health Practices.

Research question 7. What are the personal dental health practices of cardiologists and general practitioners'?

Delimitations

This study was delimited to all cardiologists and general practitioners who have offices within the I-275 loop. This would include practices in Cincinnati, Northern Kentucky and Southwest Ohio.

Limitations

Two possible limitations were noted in this study: 1) the honesty of the participants in responding to the questions, and 2) the willingness of participants to carefully read, understand and complete the questions on the survey pertaining to periodontal disease.

Assumptions

It was assumed that participants would respond honestly to the questions and participants would be willing to carefully read, understand and complete the questions on the survey pertaining to periodontal disease.

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Definitions

- *Periodontal disease (also called gum disease).* An irreversible disease is brought about by bacteria in the oral cavity (mouth), and produces swelling, redness, bleeding and recession of the gingival tissue, tooth loss, pocketing along the gingival margin and destruction of the soft tissue and bones that support the teeth (Genco, 1998).

- *Gingivitis. L*ocalized inflammation, swelling, and bleeding gingival tissues without a loss of connective tissue or bone support. Usually reversible with daily brushing, flossing and regular dental visits (Wilkens, 2005).

Operational Definitions

- *Dental Health Knowledge*. In this study participants responded to two questions pertaining to dental health knowledge. The questions dealt with risk factors of periodontal disease and the signs and symptoms of periodontal disease.

- *Link Between Periodontal Disease and Cardiovascular Disease*. In the study participants responded to a question that asked if they believed there was a link between periodontal disease and cardiovascular disease. The reason why the study looked at the link between periodontal disease and cardiovascular disease is because both share many of the same risk factors. Some risk factors that are shared include: socioeconomic status, stress, poor

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diet/unhealthy eating, genetics/family history, increasing age, diabetes, smoking, and obesity/body fat content.

- *Attitudes Towards Dental Health Questions Being Added to a Health History.* Participants were asked about dental health questions being added to the health history in their office. Three questions on the survey were asked of the physicians in the study.

- *Opinions Regarding Dental Health as Part of the Medical Practice.* Physicians were asked questions pertaining to whether or not they think dental health should be part of their medical practice. One question on the survey was asked of the physicians in the study.

- *Personal Dental Health Practices.* Questions were asked of the participants dealing with their brushing and flossing techniques, how long it has been since they have last visited a dentist office and if the physician has not been to see a dentist/dental hygienist in the past year how long it had been.

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CHAPTER TWO
Literature Review

The presumptive relationship between cardiovascular disease and periodontal disease has caused practitioners in various health fields to place more emphasis on dental health as a component of overall health (Geerts, Nys, De Mol, Charpentier, Albert, Legrand, et al., 2002). If a link between cardiovascular disease and periodontal disease is found, then the medical community, especially cardiologists and general practitioners, will need to be informed about dental health education and every aspect of dental health. Medical training institutions will need to develop a curriculum that focuses on information pertaining to dental health. Dental health has become a bigger component of complete health care then ever before. The medical community will need to implement dental health into the standard medical practice to ensure that their patients are receiving the most thorough and comprehensive medical care possible (Abou-Raya, Naeem, Abou-El Kheir & El Betagy, 2002).

The purpose of this study was to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health issues. More specifically, knowledge of cardiovascular disease risk factors and periodontal disease risk factors and signs and symptoms were examined. Also, attitudes regarding the relationship between cardiovascular disease and periodontal disease, whether dental health is a component of overall health, and the number of hours of dental health that should be included in medical school were examined.

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Cardiovascular Disease in the United States

Cardiovascular Disease (CVD) has been a disease of the heart and blood vessels. There have been 9 conditions associated with CVD: Coronary Heart Disease (CHD), Cerebrovascular disease (stroke), arrhythmias, high blood pressure, congestive heart failure, diseases of the arteries, rheumatic fever/rheumatic heart disease, valvular heart disease, and congenital heart defects (American Heart Association [AHA], 2002a, 2002b).

The leading causes of death for more than 50 years among Americans have been Cardiovascular Disease or Heart Disease with Coronary Heart Disease being the number one killer (AHA, 2002a). Coronary Heart Disease (CHD) and cerebrovascular disease (stroke) have been the first and third leading causes of death in the United States and are considered the dominant components of cardiovascular disease (Centers for Disease Control and Prevention, 2002c). The main pathological process of Cardiovascular and Cerebrovascular disease has been atherosclerosis (Fong, 2000). Atherosclerosis has been described as the "build up of plaque (deposits of fat-like substances), the plaque can eventually burst, tear or rupture, creating a "snag" where a blood clot forms and blocks the artery" (American Heart Association [AHA], 2000a, ¶ 1). Heart disease has not only been the leading cause of death in the United States but it has also been the chief cause of disability among working adults (CDC, 2002b).

In our country 950,000 people have died annually (CDC, 2002a); 2,600 daily; and one person has died every 33 seconds from cardiovascular disease.

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Cardiovascular disease has not discriminated, it has struck both men and women (CDC, 2002c), and all racial and ethnic groups (CDC, 2002c).

Heart disease is a non-communicable, chronic disease that has been related to unhealthy behaviors and lifestyle. Lifestyle characteristics such as being overweight, stress, physical inactivity, hypertension (high blood pressure), diabetes, unhealthy eating and smoking are all behavioral risk factors that have been associated with CVD (CDC, 2002c; McKenzie, Pinger, & Kotecki, 2002).

The Centers for Disease Control and Prevention estimated that the cost of CVD to the United States was 329.2 billion dollars in 2002. This number reflects not only lost productivity but also health care costs (CDC, 2002c). To prevent CVD, the American Heart Association has recommended "no exposure to smoke, normal fasting glucose level (70-120mg/dl) (American Heart Association [AHA], 2002a), normal blood pressure of 120/80 (AHA, 2002a), overall healthy eating habits, moderate intensity physical activity for at least 30 minutes on most days of the week, maintain health body weight for individual person, and cholesterol level appropriate for individual person" (Pearson, et al., 2002, p. 390).

Coronary Heart/Artery Disease in the United States

In 2000, 515,204 deaths occurred from the single leading cause of death among Americans, which is Coronary Heart Disease (CHD). "Coronary Heart Disease is caused by atherosclerosis, the narrowing of the coronary arteries due to fatty build ups of plaque" (American Heart Association [AHA], 2002a, ¶ 1).

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This build up of plaque has been shown to be able to create angina pectoris, heart attack or both (AHA, 2002a, ¶ 1). In 2002, 6.3 million males and 6.6 million females had a history of heart attack, angina pectoris or both. It was estimated that in the 2002 year alone 1.1 million Americans had a new or recurrent coronary event (AHA, 2002a).

According to the American Heart Association, "Atherosclerosis of the major arteries is present universally in young adults at autopsy and appears to start early in childhood" (Fong, 2000, p. 49). "The more risk factors you have, the greater your chance of developing coronary heart disease" (2002a, ¶ 1)

To prevent CHD, an individual must have modified the behavioral factors that cause CHD. This would include changing dietary habits (decrease fat, increase fruits and vegetable intake), exercising on a daily basis and refraining from smoking (McKenzie, et al., 2002).

Cerebrovascular Disease in the United States

Cerebrovascular disease has been defined as a type of cardiovascular disease and has been the third leading cause of death in the United States (AHA, 2002b). More than 1 million Americans have recorded stroke as the cause of their disability (CDC, 2002a). Every 53 seconds someone in the United States has suffered a stroke and every 3.3 seconds a death has occurred from a stroke. Twenty eight percent of people who endured a stroke have been younger than 65 years of age (Stroke Association, 2002).

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A stroke, has been defined by the Stroke Association as the obstruction of blood flow to the brain which causes the brain to lose its energy resulting in injury. Lack of blood flow to the brain after a few minutes has caused permanent brain injury and the tissue death (The Stroke Association, 2002). The cost to the United States from strokes is about $30 to $40 billion per year (The Stroke Association, 2002).

Risk factors for developing a stroke have been identified as similar to those of CHD and include family history, race, diabetes, smoking, prior stroke, and behavioral and environmental factors (The Stroke Association, 2002 & McKenzie, et al., 2002). The Stroke Association has listed the following signs of stroke: "sudden numbness or weakness of the face, arm or leg on one side of the body, sudden confusion, trouble speaking or understanding, sudden trouble seeing in one or both eyes, sudden trouble walking, dizziness, loss of balance or coordination and sudden headache with no known cause" (The Stroke Association, 2002, ¶ 1).

The Link Between Periodontal Disease and Cardiovascular Disease

Periodontal disease has been common in the United States and may be an infection-associated risk for cardiovascular disease. Seventy-five percent of adults in the United States have had a mild form of periodontal disease and 20 to 30 percent of adults have had severe forms of periodontal disease (Genco, et.al, 2002).

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Slavkin (1999) stated that "since 1989, a number of case studies and epidemiological reports have observed a strong relationship between oral infections (including periodontal disease) and cardiovascular disease, suggesting that periodontal disease may be a risk factor for cardiovascular disease" (p. 110-111). One study stated that the association between periodontal disease and cardiovascular disease strengthens because these diseases both share many of the same risk factors (Slavkin, 1999). Beck, Offenbacher, Williams, Gibbs and Garcia (1998) wrote, "available evidence does allow an interpretation of periodontitis being a risk factor for atherosclerosis/CHD, although it is a close call" (p. 139). Some risk factors that are shared include: socioeconomic status (Buhlin, Gustafsson, Hakansson & Klinge, 2002; Hujoel, et al., 2000), stress (American Academy of Periodontology[AAP], 2002; Hujoel, et al., 2000; McKenzie, et al., 2002), poor diet/unhealthy eating (APA, 2002; CDC, 2003a), genetics/family history (APA, 2002; CDC, 2003a), increasing age (Hujoel, et al., 2000), diabetes (APA, 2002; Buhlin, et al., 2002; CDC, 2003a), smoking (APA, 2002; Buhlin, et al., 2002; CDC, 2003a; Hujoel, et al., 2000), and obesity/body fat content (APA, 2002; CDC, 2003a; Hujoel, et al., 2000).

Tooth loss has played a vital role in the research that is being conducted related to periodontal disease and cardiovascular disease. One study, conducted with Native Americans, found that Pima Indians under the age of 60 who had periodontal disease were 2.7 times more likely than men without periodontal disease to develop cardiovascular disease (Genco, et al., 1997).

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The Link Between Periodontal Disease and Cerebrovascular Disease

"The studies that focused on stroke appear to demonstrate stronger relationships with periodontal disease than do studies that used coronary heart disease as an outcome" (Genco, et al., 2002, p.18S). The link between periodontal disease and cerebrovascular disease has not been studied as much as the relationship between periodontal disease and cardiovascular disease (Wu, et al., 2000).

A study conducted by Wu and colleagues found that "Periodontitis is a significant risk factor for total cerebrovascular accidents and, in particular, nonhemorrhagic stroke" (Wu, et al., 2000, p. 2749). This study also showed that relative risk increased for periodontal disease and nonhemmorrhagic strokes in white men, white women and African Americans (Wu, et al., 2000).

Loesche and collegues conducted a study looking at the connection between dental disease and cerebrovascular accidents in elderly veterans in the United States. The researchers determined that dental health is a modifiable risk factor for cerebrovascular disease accidents (Loesche, et al., 1998). Loesche and collegues discussed how more studies need to be done on whether poor dental health and/or poor dental hygiene is a valid risk factor for cerebralvascular accidents (Loesche, et al., 1998).

The Link Between Periodontal Disease and Coronary Heart Disease

Periodontal disease and coronary heart disease (atherosclerosis) have been a public health concern because they share many common characteristics

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(Hujoel, et al., 2000). These diseases have been more likely to occur in males who are older with a lower educational background and who have decreased economic resources; who smoke, have hypertension, stress and isolation from society (Beck, et al., 1998).

DeStephano, Anda, Kahn, Williamson and Russell (1993) found that periodontal disease was associated with a small increased risk factor of coronary heart disease. In the same study the authors found,

> "In men under 50, however, periodontal disease was a stronger risk factor; men with periodontitis had a nearly twofold higher risk of coronary heart disease than men who had little or no periodontal disease. In the total population the degree of dental debris and calculus, as reflected in the oral hygiene index, was a stronger risk factor for coronary heart disease than was the severity of periodontal disease. In both the total population and among younger men periodontal disease and oral hygiene were more strongly associated with total morality than with the incidence of coronary heart disease" (p. 690).

The National Health and Nutrition Examination Study I, which was conducted by DeStephano and colleagues (1993) was done over a 14 year period that investigated mortality and coronary heart disease. They found that out the of the nearly 10,000 subjects studied there was a 25% increased risk of coronary heart disease in those with periodontitis than to those with minimal periodontal disease (DeStephano, et al., 1993).

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One study evaluated the connection between periodontal disease, CHD and tooth loss (Joshipura, et al., 1996). The authors "observed an increased risk of CHD among men with 10 or fewer teeth compared with men with 25 or more teeth; however, they observed no overall association between periodontal disease and CHD" (p. 1634). As pointed out by Joshipura, et al. (1996) observing tooth loss and periodontal disease is essential because a third of the adult population in the United States had moderate periodontal disease and a third of the aged population had severe periodontal disease with 40% being edentulous (no teeth present).

Along with missing teeth being an issue, individuals with diabetes have had an increased risk for CHD compared to those without diabetes (Morrison, Ellison, & Taylor, 1999). Diabetes has been a risk factor for both periodontal disease and cardiovascular disease (CDC, 2002b; AAP, 2002). Morrison and collegues explained that, "Relative risks may be higher among diabetics because periodontal disease also reflects glyceminc control which is an independent predictor of CHD" (Morrison, et al., 1999, p. 10).

A study conducted by Hujoel and collegues (2000) did not provide enough information to associate CHD with periodontitis and gingivitis. The researchers study stated that "Gingivitis was not associated with CHD. Periodontitis was associated with a nonsignificant increased risk for CHD" (p. 1409). They went on to say that there is no evidence "to support the hypothesis of a causal relationship between periodontal disease an CHD" (p. 1409).

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Even though Hujoel and collegues stated that "this study did provide convincing evidence regarding the absence of a moderate-to-large association between periodontitis and CHD, a small causal association could not be ruled out" (Hujoel, et al., 2000, p. 1410). That association had to do with the size of the sample. "The true association between periodontitis and CHD is either absent or so small that even larger studies are required" (Hujoel, et al., 2000, p. 1409).

On the other hand, Fong (2000) stated that, "A substantial proportion of patients with coronary artery disease (CAD) do not have traditional risk factors. Infectious disease may play a role in these cases, or they may intensify the effect of other risk factors" (p. 49). Epidemiological, pathological and microbiological are 3 main sets of evidence that needed to be looked at when linking CAD and infectious diseases together (Fong, 2000). "The conditions or infectious agents most frequently studied are *Chlamydia pneumoniae*, cytomegalocirus (CMV), herpes simplex virus (HSV), *Helicobacter pylori* and periodontitis (Fong, 2000, p. 49).

Tooth Loss and Cardiovascular Disease

"Associations between dental disease and cardiovascular disease including coronary heart disease and stroke have been observed" (Joshipura, Douglass, & Willett, 1998, p. 175). The question has been does the number of teeth a person has in the oral cavity also play a part in cardiovascular disease.

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Joshipura and collegues suggest that there could be a possible relationship between CVD and tooth loss, but it is likely connected to previous periodontal disease and maybe dental caries (Joshipura, et al., 1998). The researchers stated that diet could play a role in the relationship between tooth loss and CVD but it needs to be explored more thoroughly along with the process of extracting teeth as an additional factor in increasing a person's risk for CVD (Joshipura, et al., 1998).

A patient with tooth loss may have had difficulty masticating properly which could lead to a diet that may damage one's health (Joshipura, 2002). "As a result, dietary factors such as reduced fiber and fruit intake or increase in saturated fat intake could be mediators in the tooth loss-CVD associations" (Joshipura, 2002, p. 29S). In addition to modifying the diet of a patient with tooth loss, an impaired dentition, and periodontal disease there could possibly be a change in weight that may lead to CVD (Joshipura, 2002).

DeStefano and colleagues (1993) reported that "men with periodontitis or who were edentulous had higher risks of developing coronary heart disease (CHD) than those with no periodontitis" (p. 690). Joshipura and collegues also found that the number of teeth a person has may play a part in increasing the risk of coronary heart disease and periodontal disease (Joshipura, et al., 1998). They stated that among men with 10 or fewer teeth than those with 25 or more teeth had an increased risk for CHD (Joshipura, et al., 1998). In a Canadian study conducted by Morrison and colleagues it showed that there was a

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significant association between both edentulousness and gingivitis and fatal coronary heart disease (Morrison, et al., 1999).

Joshipura and collegues (1998) wrote that they recommended better oral home care with regular professional care that would include the retention of teeth in the oral cavity. If extractions are needed, then proper well-fitting prostheses and counseling on diet are needed (Joshipura, et al., 1998 & Joshipura, 2002). Joshipura, et al. (2002) explained that "Clinicians are recommended to provide nutrition counseling to help patients maintain a healthy diet before and after extractions, even if their masticatory efficiency is slightly reduced" (p. 29S).

Bacteremia and Toothbrushing

"A considerable amount of circumstantial evidence in the literature strongly implicates bacteria that enter the circulating blood from the oral cavity as important causes of bacterial endocarditis" (Sconyers, Crawford, & Moriarty, 1973, p. 616). Sconyers and collegues went on to state that it is possible that the bacteremia caused by toothbrushing could also cause failure of intracardiac or vascular prostheses (Sconyers, et al., 1973).

Little information has been available about bacteremias and toothbrushing although patients, after extraction of teeth, periodontal therapy and mastication have reported transient bacteremias (Sconyers, et al., 1973).

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Bacteremia and Dental Flossing

Many periodontal procedures have been linked with creating a bacteremia and the incidence varies widely (Carroll & Sebor, 1980). Dental flossing has been associated with a variable incidence of bacteremia" (Carroll, et al., 1980).

Carroll and collegues addressed this by stating that "evidence that flossing alone, when doen every second day, or less frequently is highly likely to induce a bacteremia. However, when flossing was done daily, no bacteremia was found" (Carroll, et al., 1980, p. 692). The authors went on to say that "the need for antibiotic prophylaxis in patients for whom a bacteremia poses a special hazard" (Carroll, et al., 1980, p. 692).

Bacteria In The Oral Cavity

"*Actinobacillus actinomycetemcomitans, Porphyromonas gingivalis* and *Treponema denticola*, all late colonizers, have been associated with periodontal disease. Both *A. actinomycetemcomitans* and *P. gingivalis* can also invade epithelial cells, a mechanism probably involved in migration to deeper tissues where host cell damage occurs. Whereas invasion by *Treponema denticola* may not actually occur, this organism does introduce a chymotrypsin-like protease into cells" (Meyer & Fives-Taylor, 1998, p. 88).

The initiation of periodontal disease has taken place when microorganisms of dental plaque (*P. gingivalis, A. actinomycetemcomitans*, and *T. denticola*) colonize in the gingival sulcus followed by the periodontal pocket (Meyer, & Fives-Taylor, 1998). " The marked and continual inflammatory

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response by the host results in destruction of periodontal tissues, alveolar bone loss, and in severe cases loss of teeth" (Meyer, & Fives-Taylor, 1998, p. 88).

Porphyromonas gingivalis, Periodontal Disease and Heart Disease

"Interactions of the periodontal pathogen *Porphyromonas gingivalis* with the host immune system are believed to be the basis for the destructive inflammatory response which is characteristic of the disease, and the intimate interaction of *P. gingivalis* with the host has become the subject of intense investigation" (Deshpande, Khan, Attardo Genco, 1998, p. 5337).

Meyer and Fives-Taylor explained that "*P. gingivalis* exhibits the ability to interact with and bind to all components of the oral cavity including other bacteria (intrageneric and intergeneric coaggregration), host cells (epithelial, erythrocytes, and moncyetes), salivary components, and extracellular matrix proteins (fibrinogen, fibronectic, and collagen)" (Meyer, & Fives-Taylor, 1998, p. 89). This organism has coaggregated with actinomycetes and strepococci. Fimbriae, proteases and vesicles has been mechanisms which intercede adherence to *P. gingivalis* (Meyer, & Fives-Taylor, 1998).

In a study conducted by Deshpande, et al. (1998), "*P. gingivalis* was also able to invade fetal bovine heart endothelial, bovine aortic endothelial, and human umbilical vein endothelial cells" (p. 5337). So continuing the research Dorn, Dunn & Progulske-Fox (1999) stated that their study "demonstrates that certain pathogenic periodontal bacterial strains invade human coronary artery cells in vitro" (p. 5796). They went on to say that in vivo chronic infections by

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pathogens *P. gingivalis* and *Prevotella intermedia* possibly will be an aspect in coronary heart disease (Dorn, et al., 1999). In limiting the spread of *P. gingivalis* within the periodontal pocket by maintaining an intact epithelial cell barrier the innate host defense system has been postulated to function in this way (Deshpande, et al., 1998).

In the periodontium, the connective tissues are particularly vascularized, which allows for the invading microorganisms to readily cross the threshold into the bloodstream (Deshpande, et al., 1998). "*P. gingivalis* infection can cause local inflammation which leads to ulceration of the gingivae and local vascular changes which increase the incidence and the severity of transient bacteremias when the gingivae are traumatized" (Deshpande, et al., 1998, p. 5342). Tooth debridement, tooth brushing, periodontal surgery, and dental extractions can direct the oral bacteria into circulating blood (Deshpande, et al., 1998).

The most likely area of entry for the oral bacteria to enter into the blood stream has been believed to be the gingival sulcus. In order to protect the patients at risk for cardiovascular disease it has been imperative that the integrity of the basement membrane of the oral mucosa, particularly the gingival sulcus, remains healthy (Deshpande, et al., 1998).

Deshpande and colleagues (1998) went on to say that "Invasion of vascular and heart endothelial cells by *P. gingivalis* after entry into the bloodstream may contribute to the pathology of cardiovascular disease" (p. 5343).

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Actinobacillus actinomycetemcomitans in the Oral Cavity

Similar to *Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans* "can interact with and adhere to all components of the oral cavity" (Meyer, & Fives-Taylor, 1998, p. 89). This bacteria has been able to raid connective tissue and epithelial cells which causes bleeding and inflammation. This bleeding and inflammations "enables entry of oral flora (including non-invasive organisms) into systemic locales where they may produce disease" (Meyer, & Fives-Taylor, 1998, p. 91). Tooth scaling, tooth brushing, periodontal surgery, and dental extractions can direct the oral bacteria into circulating blood (Deshpande, et al., 1998). Meyer and colleague (1998) also stated that bacteremias that are associated with periodontitis are factors that could put patients at risk for coronary heart disease and stroke.

A. actinomycetemcomitans and Streptococci together in blood have been known to cause infectious endocarditis by adhering to damaged heart valves (Meyer & Fives-Taylor, 1998).

Helicobacter pylori Infection, Periodontal Disease and Heart Disease

The *Helicobacter pylori* bacteria has infected a third of the total population of the United States. This spiral shaped, gram-negative bacteria has mainly been associated with socioeconomic indicators, but the transmission of *H. pylori* bacteria has been reduced in the developing world due to improvements in sanitary conditions (Dye, Kruszon-Moran & McQuillan, 2002).

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Duodenal ulcer disease has been caused by *H. pylori* and has been implicated in the development of gastric ulcers along with increasing a persons risk for gastric cancer (Dye, et al., 2002). According to Nabwera & Logan (1999) "the primary extragastric reservoir for *H. pylori* is the oral cavity" (Nabwera & Logan, 1999, p. 711). "Because human infection by this pathogen appears to involve an oral route, it seems biologically plausible that oral health status directly or indirectly influences the process of *H. pylori* infection or reinfection" (Dye, et al., 2002, p. 1809).

Dye and colleague (2002) went on to state that "some attributes indicative of poor periodontal health are associated with *H. pylori* infection. "The microbial ecology of the oral cavity is highly complex, richly diverse, and not well understood" (Dye, et al., 2002, p. 1814). The study that Dye and colleagues (2002) conducted found that "only moderate to severe periodontal pockets may be associated with *H. pylori* infection" (Dye, et al., 2002, p. 1814).

Prevotella intermedia, Periodontal Disease and Heart Disease

Prevotella intermedia, an anaerobe which is gram-negative, "has been implicated as a putative periodontal pathogen due to its isolation from lesions of patients with early periodontitis, advanced periodontitis and acute necrotizing ulcerative gingivitis" (Dorn, Leung & Progulske-Fox, 1998, p. 6054). Dorn, Dunn & Progulske-Fox (1999) went on to say that in vivo chronic infections by pathogens *P. gingivalis* and *Prevotella intermedia* possibly will be an aspect in coronary heart disease (Dorn, et al., 1999).

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Dental Questions on Medical Health Histories

After extensive searching, via Academic Search Premier, CINHAL and MEDLINE, no literature was found on the inclusion of dental health questions on medical health histories.

Summary

Upon review of the literature, it appears that Periodontal Disease and Cardiovascular Disease are linked in two very different ways. The first being by bacteria and the second by shared risk factors.

The bacteria presented in this chapter represents a small number of bacteria that have been studied. The oral cavity has over 300 different species of bacteria and it should be no surprise that some of them may pose a risk to the development of Cardiovascular Disease. The bacteria that were included in literature review were ones that are readily found in the oral cavity.

On the other hand if we look at the risk factors that both Periodontal Disease and Cardiovascular Disease share we can come to the conclusion that these to diseases are linked in some way. Both of these diseases are preventable with education and changing one's lifestyle.

The prevention of Periodontal Disease can be easily conquered by visiting a dentist/dental hygienist twice a year and incorporating flossing once a day into the patients daily dental hygiene routine after brushing. Cardiovascular disease can be avoided by exercising daily and maintaining a healthy low fat diet.

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There is some link between Periodontal Disease and Cardiovascular but the medical community needs to be educated more on the shared risk factors and bacteria that can cause these two diseases. By providing dental health education in medical school our community will be empowered with knowledge that can prevent these diseases by changing their lifestyle.

Finally more long term studies need to be conducted in order for the link between Periodontal Disease and Cardiovascular Disease to be taken seriously.

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CHAPTER THREE
Methods

The presumptive relationship between cardiovascular disease and periodontal disease has caused practitioners in various health fields to place more emphasis on dental health as a component of overall health (Geerts, Nys, De Mol, Charpentier, Albert, Legrand, et al., 2002). If a link between cardiovascular disease and periodontal disease is confirmed, then the medical community, especially cardiologists and general practitioners, will need to be informed about dental health education and every aspect of dental health. Medical training institutions will need to develop a curriculum that focuses on information pertaining to dental health. Dental health has become a bigger component of complete health care then ever before. The medical community will need to implement dental health into standard medical practice to ensure that their patients are receiving the most thorough and comprehensive medical care possible (Abou-Raya, Naeem, Abou-El Kheir & El Betagy, 2002).

The purpose of this study was to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health issues. More specifically, knowledge of cardiovascular disease risk factors and periodontal disease risk factors and signs and symptoms of periodontal disease were examined. Also, attitudes regarding the relationship between cardiovascular disease and periodontal disease, whether dental health is a component of overall health, and the number of hours of dental health that should be included in medical school were examined.

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Participants

A census of 291 physicians, stratified by specialty and located inside the I-275 loop of Greater Cincinnati were used in this study. Two physician specialty groups were utilized. These include 120 cardiologists and 171 general practitioners. Cardiologists and general practitioners with offices in the Greater Cincinnati area were identified from the Cincinnati Bell Yellow Pages. To confirm that all physicians were included the researcher cross-referenced the Yellow Pages list with a list of physicians who currently accept Anthem Blue Cross and Blue Shield, Humana and United Health Care plans. Names, addresses and telephone numbers were recorded for all physicians

Instrumentation

Survey research was used to gather information to test the research hypothesis. A questionnaire was developed after conducting a thorough review of the literature, which included searches of Academic Search Premier, CINHAL and MEDLINE. To establish content validity the survey was reviewed by a panel of experts composed of 2 General Dentists, 1 Periodontist, 2 full-time professors at the University of Cincinnati (one from Dental Hygiene and one from Health Promotion and Education). Stability reliability was assessed with a group of physicians in Dayton and Columbus, Ohio using the test-retest procedure two weeks apart and the instrument had a test-retest reliability coefficient of .86.

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The survey instrument was created using 5 subcategories. The subcategories are as follows: the Relationship Between Dental Health and Overall Health, Inclusion of Dental Health Education in Medical School Curriculum, Inclusion of Dental Health in Medical Practice, Cardiovascular Disease and Periodontal Disease Knowledge and Dental Health Practices. The instrument contained 18 total questions, which consisted of 5 check all that apply, 3 fill-in, 6 multiple choice and 4 yes/no. Refer to Appendix A for a copy of the survey.

Two questions (1 yes/no and 1 multiple choice) looked at the Relationship Between Dental Health and Overall Health. The researcher wanted to know if physicians felt that dental health was part of overall health. The other question pertained to whether or not the physicians felt that there was a link between cardiovascular disease and periodontal disease.

The Inclusion of Dental Health Education in Medical School was examined. One question (fill-in) concerned how many classroom hours should be spent on dental health education in medical school.

Four questions (3 yes/no and 1 multiple choice) on the survey instrument dealt with the Inclusion of Dental Health in the Medical Practice. These questions consisted of: to whether or not dental health should be on a health history, if there is a question on the health history that asks the patients if they have seen a dental health professional within the past year, how the physicians feels about providing dental health education in their office and who should provide the dental health education in the office.

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Of the 18 questions, 3 questions (multiple choice) dealt with the Knowledge of Cardiovascular Disease and Periodontal Disease. The physicians were asked to choose the risk factors of periodontal disease and cardiovascular disease and the signs and symptoms of periodontal disease.

The participants had 28 possible risk factors to choose from for cardiovascular disease and periodontal disease each. There were 11 correct and 17 incorrect answers for cardiovascular disease and 17 correct and 11 incorrect risk factors for periodontal disease. Finally the physicians were asked to identify signs and symptoms of periodontal disease. They had 12 possible answers with 9 being correct and 3 being incorrect.

Risk factors for cardiovascular disease and periodontal disease along with signs and symptoms of periodontal disease were scored consistently meaning that if a risk factor was check marked 1 point was given. If there was no check mark then a score of 0 was given to that risk factor.

Dental Health Practices of the physicians was also assessed in the survey. Four questions (3 multiple choice, 1 fill-in) pertaining to Dental Health Practices were asked of the physicians related to their frequency of brushing and flossing, how often the physicians actually visit the dental office for cleanings and if they had not been seen by a dentist/dental hygienist in the past year, how long it had been since last visiting the dentist.

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Procedure

A pre-notification postcard was sent to all of the cardiologists and general practitioners in the targeted geographic area. This postcard was sent to inform the doctors that the survey would arrive the following week via mail and provided a brief overview of the researcher's background and purpose of the study. (Appendix B)

One week following the mailing of the initial postcard, participants were mailed a cover letter (Appendix C), the informed consent form (Appendix D), a hard copy of the survey (Appendix A), and a postage-paid return envelope. The cover letter explained the purpose of the study and included informed consent information, including an explanation of confidentiality of survey responses. The cover letter was signed by the researcher as well as a local periodontist, Dr. Illmar Ezis. Dr. Ezis, reputation in the field, was hoped to add credibility and increase response rate. The participants were asked to complete the survey within 10 days and return the survey via the postage paid return envelope. ,

After 2 weeks, a follow-up postcard was mailed to those who had not yet sent in their completed survey (Appendix E). After 2 more weeks, a packet identical to the first complete mailing, included a second cover letter, informed consent and hard copy of the survey was mailed again to those who had still not returned the survey.

The researcher tracked the physicians who returned the surveys by placing a "C" (for Cardiologists) or a "GP" for general practitioner in the lower right hand corner of the returned envelope. Along with the letters symbolizing

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physician type the envelopes were numbered. Each number corresponded to the name of a physician in the study. An alphabetical listing of physicians was developed so that when an envelope was returned, that physicians name could be checked off the list. In so doing, the researcher knew who had returned the completed survey and who had not.

If an entire packet was returned due to incorrect mailing address, then the researcher would telephone the physician's office and try and retrieve the correct mailing address. If a correct mailing address was found then the entire packet was re-mailed to the physician. If no correct address was established then the physician was dropped from the study.

As a final follow-up for those who had not responded within two week of the second survey mailing then the researcher called the offices of those physician's who had not yet responded to the survey. The researcher phoned the offices and asked to speak with the office managers. The office managers were asked to remind the physician's to complete and return the survey in the postage paid envelope provided. All physician offices were called within one week of the final mailing.

Data Analysis

The data was entered into MS Excel and then transferred to the Statistics Package for the Social Science version 11.1 (SPSS). The alpha level of .05 was selected a priore to determine significance.

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Descriptive statistics were calculated to answer research questions 1-7. Chi-Square analyses were used to test hypotheses 1, 2, 3, 9, 10, 11, 12, 13 and 14. The t-test procedure was used to analyze hypotheses 4, 5, 6, 7, 8, 15, 16, 17, 18, 19, 20, 21, 22 and 23.

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CHAPTER FOUR
Results and Discussion

The presumptive relationship between cardiovascular disease and periodontal disease has caused practitioners in various health fields to place more emphasis on dental health as a component of overall health (Geerts, Nys, De Mol, Charpentier, Albert, Legrand, et al., 2002). If a link between cardiovascular disease and periodontal disease is found, then the medical community, especially cardiologists and general practitioners, will need to be informed about dental health education and every aspect of dental health. Medical training institutions will need to develop a curriculum that focuses on information pertaining to dental health. Dental health has become a bigger component of complete health care then ever before. The medical community will need to implement dental health into the standard medical practice to ensure that their patients are receiving the most thorough and comprehensive medical care possible (Abou-Raya, Naeem, Abou-El Kheir & El Betagy, 2002).

The purpose of this study was to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health issues. More specifically, knowledge of cardiovascular disease risk factors and periodontal disease risk factors and signs and symptoms were examined. Also, attitudes regarding the relationship between cardiovascular disease and periodontal disease, whether dental health is a component of overall health, and the number of hours of dental health that should be included in medical school were examined.

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Response Rate

Surveys were mailed to 120 cardiologists and 171 general practitioners (n=291). Thirty-five surveys were returned undelivered (12 cardiologists and 23 general practitioners) due to incorrect addresses. Attempts were made to locate correct current addresses by calling the phone number provided from the health insurance printouts from which the original mailing list was obtained. The researcher was able to locate correct addresses for 18 (6 cardiologists and 12 general practitioners) of the 35 returned surveys. These were mailed again to the correct addresses. The final total of surveys mailed out equaled 274 (114 cardiologists and 160 general practitioners).

The return rates for general practitioners and cardiologists were quite different. Out of the 114 total cardiologists surveyed only 20 (18.5%) completed the survey and returned it. On the other hand, general practitioners completed and returned 55 (34.5%) surveys. A total number of 75 (27.5%) surveys were received.

Demographics of Participants

Questions on gender and the number of years practicing medicine were asked to provide a better description of the responding physicians. When looking at male versus female respondents, of the 51 general practitioners, 33 (64.7%) were male and 18 (35.3%) were females. Of the cardiologists, 17 (85.0%) were male and 3 (15.0%) were female. (Table 4.1)

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Table 4.1 also provides data for the number of years the participants have been practicing medicine. For illustrative purposes, years are presented in this table in 5-year increments. For the statistical analyses presented later in the chapter, years of experience was divided into those with 10 or fewer years of experience versus those with 11 or more years. Of the 50 general practitioners that responded to this question, 14 (28%) have practiced 10 or fewer years and the remaining 36 (72%) have practiced 11 or more years. Similarly, of the 18 cardiologists that responded to this question, 5 (27.8%) have practiced 10 or fewer years and 13 (72.2%) have been practicing medicine for 11 or more years.

Research Questions & Hypotheses

Relationship Between Dental Health and Overall Health.

Research question 1. What are the cardiologists and general practitioners' attitudes towards dental health as being a component to overall total health?

Dental health being included in the list of components for overall total health was completed by 74 of the 75 participants in the study. The majority of participating physicians, 78.7% (n= 59), stated that dental health is a component of overall health. When breaking this down by physician type, of the general practitioners who responded to this question, 39 (78.0%) felt that dental health is a component of overall health compared to 17 (85%) of the responding cardiologists.

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Table 4.1

Demographics and Years Practicing Medicine

		General Practitioners Percent (Number)	Cardiologists Percent (Number)	Total
Gender				
	Male	65% (33)	85% (17)	50
	Female	35% (18)	15% (3)	21
	Total	100% (51)	100% (20)	71
Years of Experience				
	0-5	12% (6)	5.5% (1)	7
	6-10	16% (8)	22.2% (4)	12
	11-15	18% (9)	11.1% (2)	11
	16-20	24% (12)	16.6% (3)	15
	21-25	18% (9)	27.7% (5)	14
	26+	12% (6)	16.6% (3)	9
Total		100% (50)	100.1% (18)	68

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Hypothesis 1. There will be a difference in the opinions of cardiologists and general practitioners regarding the link between periodontal disease and cardiovascular disease.

Of the 68 participants that answered the question regarding the link between periodontal and cardiovascular disease, 56 (82.4%) agreed that there may be a link between the two diseases. A total of 48 general practitioners responded to this question. Of these, 36 (75%) indicated they felt there may be a link between cardiovascular and periodontal disease. All 20 (100.0%) of the responding cardiologists indicated that they felt there may be a link between the two diseases.

A Chi-square analysis showed a statistically significant relationship between practitioner type (General Practitioner versus Cardiologists) and belief regarding the link between periodontal disease and cardiovascular disease. Null Hypothesis #1, which stated that there will be no difference in the opinions of cardiologists and general practitioners regarding the link between periodontal disease and cardiovascular disease, was rejected ($X^2 = 6.07$, $df=1$, $p= .014$). Cardiologists were more likely to perceive a link between cardiovascular disease and periodontal disease. However, these results should be interpreted cautiously. Due to the small sample size, 25% of cells in the frequency table had cell counts less than 5, which is more than the allowable limit of 20% required for a valid chi-square test.

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Hypothesis 2. There will be a difference in the opinions of male and female physicians regarding the link between periodontal disease and cardiovascular disease.

Forty male physicians (80%) and 18 female physicians (81.8%) agreed that there is a link between cardiovascular disease and periodontal disease. Based on a chi-square analysis the difference between male and female physicians was not significant. Null Hypothesis #2, which stated that there will be no difference in the opinions of male and female physicians regarding the link between periodontal disease and cardiovascular disease, was not rejected (X^2=.032, *df*=1, *p*= .857). Thus, according to this study, males and females do not have differing opinions regarding the link between periodontal and cardiovascular disease. These results, however, must be interpreted with caution. Due to the small sample size, 25% of cells in the frequency table had cell counts less than 5, which is more than the 20% allowed for a valid chi-square test.

Hypothesis 3. There will be a relationship between the number of years a physician has practiced medicine and opinions regarding the link between periodontal disease and cardiovascular disease.

To test this hypothesis, physicians were categorized into two groups: those who have practiced 10 or fewer years, and those who have practiced 11 or more years. Of the 21 physicians with 10 or fewer years practicing medicine

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whom responded to this question, 20 (95.2%) felt there may be a connection between the two diseases, compared to 35 (72.9%) of the 48 with 11 or more years practicing medicine.

A Chi-square analysis was conducted comparing years of physician experience with opinions regarding the link between periodontal disease and cardiovascular disease (X^2=4.501, *df*=1, *p*= .034). Based on the respondents in this study, Null Hypothesis #3, which stated that there will be no relationship between the number of years a physician has practiced medicine and opinions regarding the link between periodontal disease and cardiovascular disease, was rejected. However, due to the small sample size, 25% of cells in the frequency table had cell counts less than 5, which is more than the 20% allowed for a valid chi-square test. These results should be interpreted with caution, but based on the respondents in this study, physicians who have been practicing 10 or fewer years are more likely to believe there may be a link between cardiovascular disease and periodontal disease than physicians who have been practicing 11 or more years.

Hypothesis 4. There will be a difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of risk factors for periodontal disease.

The mean periodontal disease risk factor knowledge score for those who believed there was a connection between cardiovascular disease and periodontal

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disease was 19 (out of 28) (*SD*=2.98), or a 67.9%. For those who did not believe there was a link between the two diseases, the mean knowledge score for risk factors of periodontal disease was17.7 (out of 28) (*SD*=3.24), 63.2%. A t-test was performed to determine if the mean knowledge score regarding risk factors for periodontal disease differed between those who believed there is a link between cardiovascular disease and those who don't (*t*=1.425, *df*=70, *p*= .159). Null Hypothesis #4, which stated that there will be no difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of risk factors for periodontal disease, was not rejected. Thus, knowledge of risk factors for periodontal disease was at similar levels for those who believe there is a link between cardiovascular and periodontal disease and those who do not.

Hypothesis 5. There will be a difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of signs and symptoms of periodontal disease.

In regard to knowledge of the signs and symptoms of periodontal disease, the mean score for physicians who believed there was a connection between cardiovascular disease and periodontal disease was 9.3 (out of 12) (*SD*=1.79), or 77.5%, compared to a mean score of 9.1 (out of 12 (*SD*= 2.43), or 75.8%, for those who did not. A t-test was performed to determine if the mean knowledge score regarding signs and symptoms of periodontal disease differed between

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those who believed there is a link between cardiovascular disease and those who don't (t=.476, df=70, p= .635). Null Hypothesis #5, which stated that there will be no difference between those who think there is a connection and those who don't think there is a connection between cardiovascular disease and periodontal disease and the knowledge of the signs and symptoms of periodontal disease, was not rejected. Thus, knowledge of the signs and symptoms of periodontal disease was at similar levels for those who believe there is a link between cardiovascular and periodontal disease and those who do not.

Inclusion of Dental Health Education in Medical School Curriculum.

Research question 2. What are cardiologists and general practitioners' attitudes towards including dental health in the medical school curriculum?

Of the physicians surveyed, most felt that between 1 and 10 hours of dental health education should occur in medical school (46.3% felt that between 1-5 hours of education should be offered and 34.3% felt that 6-10 hours of medical school training should pertain to dental health education). Only 6.0% indicated that no time should be spent on dental health in medical school. On the other extreme, only 13.5% felt that 11 or more hours of dental health education is needed (refer to Table 4.2).

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Table 4.2

Number Of Classroom Hours Spent on Dental Health Education and Physician Type

Hours	General Practitioners	Cardiologists	Total
0	2 (4.1%)	2 (11.1%)	4 (6.0%)
1-5	23 (46.9%)	8 (44.4%)	31 (46.3%)
6-10	17 (34.7%)	6 (33.3%)	23 (34.3%)
11-15	3 (6.1%)	0 (0.0%)	3 (4.5%)
16-20	3 (6.1%)	2 (11.1%)	5 (7.5%)
21-25	1 (2.0%)	0 (0.0%)	1 (1.5%)
Total	49	18	67

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Hypothesis 6. There will be a difference in the opinions of cardiologists and general practitioners regarding the number of classroom hours that should be spent on dental health education in medical school.

For illustrative purposes, Table 4.2 breaks down the number of hours physicians feel that dental health should be covered in medical school into categories. However, to test this hypothesis mean numbers of years were calculated and a t-test was conducted. The average number of hours needed for dental health education in medical school reported by general practitioners was 6.7 (SD=5.3) and by cardiologists was 6.6 (SD=6.0). There was not a statistically significant difference between cardiologists and general practitioners in regard to their opinion of the number of classroom hours that should be spent on dental health education in medical school (t=.078, df=65, p= .938). Based on the results of this study, Null Hypothesis #6, which states the there will be no difference in the opinions of cardiologists and general practitioners regarding the number of classroom hours that should be spent on dental health education in medical school, was not rejected. Cardiologists and general practitioners had similar opinions regarding the number of hours that should be spent on dental health in medical school.

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Hypothesis 7. There will be a difference in the opinions of male and female physicians regarding the number of classroom hours that should be spent on dental health education in medical school.

When posed with the question of how many classroom hours should be spent on dental health education in medical school, 48 male physicians responded with a mean of 7.04 hours (*SD*= 5.97) and 20 females responded with a mean of 5.50 hours (*SD*= 3.74).

A t-test analysis was performed to look at the opinions of male and female physicians regarding the number of classroom hours that should be spent on dental health education in medical school (t=1.069, df=66, p= .289). Based on the results of this study, Null Hypothesis #7, which stated that there will be no difference in the opinions of male and female physicians regarding the number of classroom hours that should be spent on dental health education in medical school, was not rejected. Male and female physicians had similar opinions regarding the number of hours that should be spent on dental health in medical school.

Hypothesis 8. There will be a difference in the opinions of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the number of classroom hours that should be spent on dental health education in medical school.

The researcher divided the physicians into two groups by the number of years they practiced medicine; those with 10 or fewer years of experience, and

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those with 11 or more years of experience. When posing the question of how many classroom hours should be spent on dental health education in medical school, the 18 physicians who practiced 10 or fewer years reported a mean of 7.69 hours (*SD*= 7.156) and the 48 physicians who practiced 11 or more years reported a mean of 6.24 hours (*SD*= 4.762).

A t-test analysis was performed to examine the difference in the opinions of those with 10 or fewer years of experience and those with 11 or more years of experience regarding the number of classroom hours that should be spent on dental health education in medical school (t=.957, df=64, p= .342). Based on the results of this study, Null Hypothesis #8, which stated that there will be no difference in the opinions of physicians with 10 or fewer years of experience and physicians with 11 or more years of experience regarding the number of classroom hours that should be spent on dental health education in medical school, was not rejected. Physicians with less experience and those with more experience had similar opinions regarding the number of hours that should be spent on dental health in medical school.

Inclusion of Dental Health in Medical Practice.

Research question 3. What are cardiologists and general practitioners' attitudes towards including dental health information questions on medical health histories?

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When asked whether or not they think that questions pertaining to dental health should be included on a health history, 66 (88%) of the 75 participating physicians indicated in the affirmative (Table 4.3). Nine of the 75 physicians felt that no question pertaining to dental health should be included on a health history.

The physicians were asked a follow-up question which asked them to describe their position concerning the addition of dental health questions to the health history they use in their office. Four answer choices were provided, and several physicians either checked more than one or wrote in an answer. Table 4.4 presents this information. Almost one-quarter (24%) of the physicians stated that a dental health question should be added to the health history but indicated that they do not make the decisions in the office but would suggest a change be made. Some indicated that they would add the question to their health history (21.3%). However, almost one-third answered negatively, with 13.3% indicating that they do not feel it is necessary to add a question at this time and 17.3% indicating that they do not plan to add a question to their health history now, but will consider it in the future.

Hypothesis 9. There will be a difference in the opinions of cardiologists and general practitioners regarding the inclusion of dental health information questions on a health history.

Of the general practitioners, 46 (90.2%) felt that questions pertaining to dental health should be included on a health history. Of the cardiologists, 18 (90.0%) felt the same way.

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Table 4.3

Dental Health Questions as an Addition to the Health History by Physician Type

Physician Type	No	Yes	Total
General Practitioner	4	28	32
Cardiologist	2	18	20
Total	9	66	75
Percentage %	12%	88%	100%

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Table 4.4

Position of Including Dental Health Questions to the Health History in the Office

	Percent (Number)
Yes, I don't make the decisions in my office but I will make the suggestion	24.0% (18)
Yes, I will add the question to my health history	21.3% (16)
No, I don't feel it is necessary to add a question at this time	13.3% (10)
No, but I will consider it in the future	17.3% (13)
Write-in Answers:	
Yes, I don't make the decisions in my office but I will make the suggestions and Yes, I will add the question to my health history.	2.7% (2)
Already ask pertinent patients	1.3% (1)
Always do ask	2.7% (2)
Already have a question pertaining to dental health on the health history	1.3% (1)
We have dental health questions on our health history	4% (3)

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No, I don't feel it is necessary to add a question at this time and No, I will consider it in the future	1.3% (1)
We don't use a written health history	1.3% (1)
Total	100% (68)

Note. 4 possible answers were provided on the survey instrument. Many of the physicians chose 2 answers of wrote in their answer. No additional space was provided for additional answers. The table includes all answers that were provided by the participants

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A Chi square analysis was conducted and it demonstrated that differences concerning the opinions of cardiologists and general practitioners regarding the inclusion of dental health information questions on a health history were not significant (X^2=.001, *df*=1, *p*=.980). Based on the results of this study, Null Hypothesis #9, which stated that there will be no difference in the opinions of cardiologists and general practitioners regarding the inclusion of dental health information questions on a health history, was not rejected. Due to the small sample size, 25% of cells in the frequency table had cell counts less than 5, which is more than the limit of 20% allowed for a valid chi-square test. Therefore, these results should be interpreted with caution.

Hypothesis 10. There will be a difference in the opinions of male and female physicians regarding the inclusion of dental health information questions on a health history.

Of the male physicians, 43 (84.3%) felt that questions pertaining to dental health should be included on the health history form. Of the female physicians, 23 (95.8%) agreed that dental health questions should be included. A Chi-square analysis was performed and no statistical significance was found (X^2=2.051, *df*=1, *p*=.152). Based on the results of the study, Null Hypothesis #10, which stated that there will be no difference in the opinions of male and female physicians regarding the inclusion of dental health information questions on a health history, was not rejected. For the participants of this study there were not differences between male and female physicians concerning the inclusion of

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dental health information questions on a health history. Due to the small sample size, 25% of the cells in the frequency table had cell counts less than 5, which is more than the limit of 20% allowed for the valid chi-square test. Therefore, these results should be interpreted with caution.

Hypothesis 11. There will be a difference in the opinions of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the inclusion of dental health questions on a health history.

The physician respondents were divided into two groups: those that have practiced 10 or fewer years and those that have practiced 11 or more years. Eighteen (85.7%) physicians who have practiced medicine 10 years or less and 45 (88.2%) of physicians who have practiced medicine for 11 or more years believe that questions pertaining to dental health should be on a health history.

A Chi-square analysis revealed no differences between physicians with less experience versus those with more experience on their opinion regarding the inclusion of dental health questions on a health history (X^2=.086, *df*=1, *p*=.769). Based on the results of the study, Null Hypothesis #11, which stated that there will be no difference in the opinion of physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding the inclusion of dental health questions on a health history, was not rejected. Most physicians, regardless of years of experience, agreed that dental health questions should be included on a health history. Due to the small sample size, 25% of cells in the frequency table had cell counts less than 5, which is more

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than the limit of 20% allowed for a valid chi-square test. Therefore, these results should be interpreted with caution.

Research question 4. What are cardiologists and general practitioners' attitudes towards providing dental health education to their patients?

Sixty-eight of the respondents completed this question on the survey and only 5 (7.4%), all of whom were general practitioners, stated that dental health education should be provided in their offices.

Hypothesis 12. There will be a difference in the opinions of cardiologists and general practitioners regarding whether or not dental health education should be part of their medical practice.

Of the general practitioners, 5 (10%) indicated that they believe dental health education should be a part of their medical practice. None of the cardiologists felt that dental health education should be part of their medical practice. A Chi-square analysis showed that there was no statistical significance relating to the opinions of cardiologists and general practitioners regarding whether or not dental health education should be part of their medical practice (X^2=1.943, *df*=1, *p*=.163). Based on the results of this study, Null Hypothesis #12, which stated that there will be no difference in the opinions of cardiologists and general practitioners regarding whether or not dental health education should be part of their medical practice was not rejected. Both cardiologists and general practitioners reject the idea of offering dental health education in their

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offices. Due to the small sample size, 25% of the cells in the frequency table had cell counts of less that 5, which is more than the limit of 20% allowed for a valid chi-square test.

Hypothesis 13. There will be a difference in the opinions of male and female physicians regarding whether or not dental health education should be part of their medical practice.

Four male physicians (8.3%) and one female physician (4.3%) felt that dental health education should be part of their medical practice. No statistical significance was shown when a Chi-squared analysis was performed looking at the opinions of male and female physicians regarding whether or not dental health education should be part of their medical practice (X^2=.377, *df*=1, *p*=.539). Based on the results of the study, Null Hypothesis #13, which stated that there will be no difference in the opinions of male and female physicians regarding whether or not dental health education should be part of their medical practice, was not rejected. Both genders reject the idea of including dental health education in their practices. Due to the small sample size, 50% of cells in the frequency table had cell counts less than 5, which is slightly more than the limit of 20% required for a valid chi-square test. Therefore, these results should be interpreted with caution.

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Hypothesis 14. There will be a relationship between the number of years physicians' have been practicing medicine and their opinions regarding the inclusion of dental health education as part of their medical practice.

The physician respondents were divided into two groups: those that have practiced 10 or fewer years and those that have practiced 11 or more years. Two (11.1%) physicians with 10 or fewer years of experience and 3 (6.0%) physicians with 11 or more years of experience felt that dental health education should be included in their medical practices. A Chi-square analysis was conducted with no statistical significance when looking at number of years physicians have been practicing medicine and their opinions regarding the inclusion of dental health education as part of their medical practice (X^2=.508, *df*=1, *p*=.476). Based on the results of this study, Null Hypothesis #14, which stated that there will be a relationship between the number of years physicians have been practicing medicine and their opinions regarding the inclusion of dental health education as part of their medical practice, was not rejected. Years of practice was not a factor in the willingness to include dental health education into a medical practice. Due to the small sample size, 25% of cells in the frequency table had cell counts less than 5, which is more than the limit of 20% allowed for a valid chi-square test. Therefore, these results should be interpreted with caution.

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Cardiovascular Disease and Periodontal Disease Knowledge.

Research question 5. What are the cardiologists and general practitioners' knowledge of periodontal disease?

All of the general practitioners and cardiologists completed these questions on the survey. To assess knowledge of periodontal disease, two questions were asked; one regarding the risk factors and one regarding the signs and symptoms of the disease. For the first question, the physicians were asked to identify which of the 28 potential risk factors listed in the question were actually risk factors for periodontal disease. A point was awarded for a correct response to each of the risk factors listed, so the potential scores ranged from 0 to 28. The mean number of correct responses was 18.7 (*SD*=3.04), which is 67%. The question regarding the signs and symptoms of periodontal disease was similar. Physicians were asked to check the correct signs and symptoms of periodontal disease out of a list of 12 potential signs and symptoms, thus potential scores ranged from 1-12. The mean score was 9.31 (*SD*=1.90), which is 77.6%.

Research questions 6. What are the cardiologists and general practitioners' knowledge of cardiovascular disease?

Seventy-four general practitioners and cardiologists completed this question on the survey. To assess cardiovascular disease knowledge, the physicians were asked to identify which of the 28 risk factors listed in the question were actually risk factors for cardiovascular disease. A point was awarded for a correct response to each of the risk factors listed, so the potential

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scores ranged from 0 to 28. The mean number of correct responses was 22 (*SD*=2.09), which is 75%.

Hypothesis 15. There will be a difference in the knowledge of periodontal disease risk factors between cardiologists and general practitioners.

The general practitioners (n=51) who answered the questions pertaining to the risk factors of periodontal disease had a mean score of 19.18 (out of 28) (*SD*=2.73), or 68.5%. Cardiologists (n=20) the same question had a mean score of 17.9 (out of 28) (*SD*= 3.39), or 63.9%. When looking at knowledge of risk factors for periodontal disease, there was no statistically significant difference between cardiologists and general practitioners (t=1.653, df=68, p= .103). Based on the results of this study, Null Hypothesis #15, which stated that there will be no difference in the knowledge of periodontal disease risk factors between cardiologists and general practitioners, was not rejected. Thus, general practitioners and cardiologists were able to identify risk factors with the same level of accuracy.

Hypothesis 16. There will be a difference in the knowledge of periodontal disease signs and symptoms between cardiologists and general practitioners.

The general practitioners (n=51) who answered the questions pertaining to the knowledge of signs and symptoms of periodontal disease had a mean score

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of 9.37 (out of 12) (*SD*=1.77), or 78.1%. Cardiologists (n=20) the same question has a mean score of 9.45 (out of 12)(*SD*= 1.79), or 78.8%. Likewise, knowledge of the signs and symptoms of periodontal disease was not significantly different between cardiologists and general practitioners (*t*=.380, *df*=50, *p*=.705). Based on the results of this study, Null Hypothesis #16, which stated that there will be no difference in the knowledge of periodontal disease signs and symptoms between cardiologists and general practitioners, was not rejected. The general practitioners and cardiologists in this study were able to identify signs and symptoms of periodontal disease with the same level of accuracy.

Hypothesis 17. There will be a difference in the knowledge of cardiovascular disease risk factors between cardiologists and general practitioners.

The general practitioners (n=51) who answered the questions pertaining to the knowledge of cardiovascular disease had a mean score of 21.9 (out of 28) (*SD*=1.98), or 78.2%. Cardiologists (n=19) who answered the same question had a mean score of 20.79 (out of 28) (*SD*= 1.72), or 74.3%. There was a statistically significant difference between cardiologists and general practitioners when looking at the knowledge of risk factors associated with cardiovascular disease (t=2.202, df=68. p=.031). Based on the results of this study, Null Hypothesis #17, which stated that there will be no difference in the cardiovascular disease knowledge of cardiologists and general practitioners, was rejected. General

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practitioners were able to correctly identify risk factors for cardiovascular disease with a higher degree of accuracy than cardiologists.

Hypothesis 18. There will be a difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of periodontal disease risk factors.

Those physicians who have practiced medicine for less than 10 years who answered the question pertaining to risk factors of periodontal disease had a mean score of 19.05 (*SD*=2.75), or 68.0%, and those who have practiced medicine for 11 or more year had a mean score of 18.49 (*SD*=3.18), or 66.0%. There was no statistically significant difference between those with 10 or fewer years of experience and those with 11 or more years of experience for knowledge of risk factors associated with periodontal (t=.701, df=70. p=.485). Based on the results of these statistical tests, Null Hypothesis #18, which states that there will be a difference in knowledge of periodontal disease risk factors between physicians with 10 or fewer years of experience and those with 11 or more years of experience, was not rejected. Therefore, physicians at both experience levels were able to identify risk factors for periodontal disease with similar accuracy.

Hypothesis 19. There will be a difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of periodontal disease signs and symptoms.

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Those physicians who have practiced medicine for less than 10 years who answer the question pertaining to knowledge of the signs and symptoms of periodontal disease had a mean score of 9.00 (*SD*=1.48), or 75.0%, and those who have practiced medicine for 11 or more year had a mean score of 9.35 (*SD*=2.05), or 77.9%. There was no statistically significant difference between those with 10 or fewer years of experience and those with 11 or more years of experience for knowledge of risk factors associated with periodontal (t=-.715, df=70. p=.477). Based on the results of these statistical tests, Null Hypothesis #19, which states that there will be a difference in knowledge of periodontal disease signs and symptoms between physicians with 10 or fewer years of experience and those with 11 or more years of experience, was not rejected. Therefore, physicians at both experience levels were able to identify signs and symptoms of periodontal disease with similar accuracy.

Hypothesis 20. There will be a difference between physicians with 10 or fewer years of experience and those with 11 or more years of experience regarding knowledge of cardiovascular disease risk factors.

Those physicians who have practiced medicine for less than 10 years who answered the question pertaining to knowledge of cardiovascular disease had a mean score of 21.90 (*SD*=1.45), or 78.2%, and those who have practiced medicine for 11 or more year had a mean score of 21.41 (*SD*=2.19), or 76.5%. A t-test was conducted with no statistical significance when looking at number of years physicians have been practicing medicine and their knowledge of the risk

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factors for cardiovascular disease (*t*=-.147, *df*=71, *p*=.217). Based on the results of these statistical tests, Null Hypothesis #20, which states that there will be a difference in knowledge of cardiovascular disease risk factors between physicians with 10 or fewer years of experience and those with 11 or more years of experience, was not rejected. Therefore, physicians at both experience levels were able to identify risk factors for cardiovascular disease with similar accuracy.

Hypothesis 21. There will be a difference in knowledge of periodontal disease risk factors between male and female physicians.

Fifty-one males answered the question of identifying the risk factors of periodontal disease with a mean score of 18.65 (out of 28) (*SD*=3.30) and 24 female physicians answered the question identifying the risk factors of periodontal disease with a mean score of 18.89 (out of 28) (*SD*=2.48).

A t-test was performed with no statistical significance being shown when analyzing the dental health knowledge between male and female physicians. When looking at knowledge dental health we took a look at risk factors of periodontal disease (t=.246, df=73, p= .807). Based on the results of this study, Null Hypothesis #21, which stated that there will be no difference in the knowledge of periodontal disease risk factors between male and female physicians, was not rejected. Thus, male and female physicians were able to identify the risk factors of periodontal disease with a similar degree of accuracy.

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Hypothesis 22. There will be a difference in knowledge of periodontal disease signs and symptoms between male and female physicians.

Fifty-one males answered the question of identifying the signs and symptoms of periodontal disease with a mean score of 9.18 (out of 12) (*SD*=2.02) and 24 female physicians answered the question identifying the risk factors of periodontal disease with a mean score of 9.58 (out of 12) (*SD*=1.61).

Gender and the knowledge of the signs and symptoms of periodontal disease was tested and no statistical significance (t=.866, df=73, p= .390). Based on the results of this study, Null Hypothesis #22, which stated that there will be no difference in the knowledge of periodontal disease risk factors between male and female physicians, was not rejected. Thus, male and female physicians were able to identify the signs and symptoms of periodontal disease with a similar degree of accuracy.

Hypothesis 23. There will be a difference in knowledge of cardiovascular disease risk factors between male and female physicians.

Fifty-one males answered the question of identifying the risk factors of cardiovascular disease with a mean score of 21.45 (out of 28) (*SD*=1.90) and 23 female physicians answered the question identifying the risk factors of periodontal disease with a mean score of 21.48 (out of 28) (*SD*=2.50).

The risk factors of cardiovascular disease and knowledge between males and females was tested with no statistical significance (t=.052, df=72. p= .959). Based on the results of this study, Null Hypothesis #23, which stated that there

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will be no difference in knowledge of cardiovascular disease risk factors between male and female physicians, was not rejected. Male and female physicians were able to identify the risk factors of cardiovascular disease with a similar degree of accuracy.

Dental Health Practices.

Research question 7. What are the personal dental health practices of cardiologists and general practitioners'?

When physicians, both general practitioners and cardiologists were asked how often do you visiting dental office for cleanings all 75 participants responded with the majority 72% (42 general practitioners and 12 cardiologists) stating that they visit a dental office at least every 6 months (Table 4.5). Thirteen (17.3%) of physicians explained that they went to the dentist one time a year and 3 (4%) visited the dentist only when a problem arose.

As a whole when asked how often do they brush and floss their teeth once again the majority stated that they brushed at least 2 times a day (78.6%) and flossed at least 1 time a day (42.7%). Breaking the data down by physician type general practitioners brushed at least 2 times a day (28 general practitioners, 16 cardiologists) and floss 1 times a day (11 general practitioners, 8 cardiologists). However, 6 (5 general practitioner and 1 cardiologist) of the physicians stated that they never floss their teeth. (Table 4.6)

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Table 4.5

Visiting the Dental Office by Physician Type

	General Practitioner	Cardiologist	Total
Every 3 months	1	1	2
Every 4 months	4	1	5
Every 6 months	37	10	47
1 time per year	8	5	13
Only when a problem arises	1	2	3
One time a year and whenever I can get an appointment		1	1
Total	51	20	71

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Table 4.6

Frequency of Brushing and Flossing by Physician Type

	General Practitioners	Cardiologists	Total
Brushing			
At a Minimum After Every Meal	10		10
At Least 2 Times per Day	32	17	49
At Least 1 Time per Day	1	3	4
Total	43	20	63
Flossing			
At a Minimum After Every Meal	2		2
At Least 2 Times per Day	7	4	11
At Least 1 Time per Day	11	8	19
At Least 2 Times per Week	14	3	17

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At Least 1 Time per Week	5		5
At Least 2 Times per Month			0
At Least 1 Time per Month	1	2	3
Less Than Once per Month	8	1	9
Total	48	18	62

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Physicians who participated in the study were asked if they had not been to see a dentist/dental hygienist in the past year to specify how long it had been. Four general practitioners and 3 cardiologists responded to this question with 2 of the physicians stating that they had not seen a dentist/dental hygienist between 6-10 years. The majority of physicians responding to this question had not been to a dentist/dental hygienist in between 1-5 years. (Table 4.7)

Summary

Two hundred and seventy-four surveys were mailed to general practitioners (n= 160) and cardiologists (n= 114), with total returns being 27.5%. Males and general practitioners made up the majority of the respondents and cardiologists practiced a longer amount of time in medicine than general practitioners.

Twenty of the 23 null hypotheses failed to be rejected. Interesting enough was the fact that those null hypotheses dealing with dental health education being included in the medical practice and the number of classroom hours that should include dental health education all failed to be rejected. These hypotheses failed to reject the null no matter if the researcher looked at gender, physician type or years of practicing medicine. This is very surprising because it was the researchers assumption that there would be a difference or relationship between those practicing medicine longer. You would assume that those practicing a shorter amount of time in their medical practice would be for including dental health in their medical practice and that they would feel that it is

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Table 4.7

Years Not Seen by a Dentist/Dental Hygienist by Physician Type

	General Practitioner	Cardiologist	Total
Number of Years			
1	1		1
2	1	1	2
3	1		1
5	1		1
6		1	1
10		1	1
Total	4	3	7

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important to include dental health education in the curriculum or medical school. Due to the small sample size the analysis needs to be looked upon cautiously.

After the analysis, 3 of the 23 hypotheses rejected the null hypothesis. Each one of these hypotheses has different aspects of the study that were looked at. Two of the hypothesis looked at the link between cardiovascular disease and periodontal disease and there relationship to cardiologists and general practitioner's and the relationship with the number of years practicing medicine.

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CHAPTER FIVE
Conclusion and Recommendations

The presumptive relationship between cardiovascular disease and periodontal disease has caused practitioners in various health fields to place more emphasis on dental health as a component of overall health (Geerts, Nys, De Mol, Charpentier, Albert, Legrand, et al., 2002). If a link between cardiovascular disease and periodontal disease is found, then the medical community, especially cardiologists and general practitioners, will need to be informed about dental health education and every aspect of dental health. Medical training institutions will need to develop a curriculum that focuses on information pertaining to dental health. Dental health has become a bigger component of complete health care then ever before. The medical community will need to implement dental health in the standard medical practice to ensure that their patients are receiving the most thorough and comprehensive medical care possible (Abou-Raya, Naeem, Abou-El Kheir & El Betagy, 2002).

The purpose of this study was to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health issues. More specifically, knowledge of cardiovascular disease risk factors and periodontal disease risk factors and signs and symptoms were examined. Also, attitudes regarding the relationship between cardiovascular disease and periodontal disease, whether dental health is a component of overall health, and the number of hours of dental health that should be included in medical school were examined.

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Conclusions

A survey instrument was used to gather information to test the research hypotheses. Surveys were mailed out to 274 valid addresses for cardiologists (n= 114) and general practitioners (n=160) in two Midwestern cities. The return rate was 75 (27.5%); 20 (18.5%) from the cardiologists and 55 (34.5%) from the general practitioners.

The researcher's main purpose for the study was to learn about the attitudes of both general practitioners and cardiologists regarding the link between cardiovascular disease and periodontal disease, and whether or not they feel that dental health education should be offered in medical school and, if so, how many hours. Finally the researcher wanted to know whether or not the physicians surveyed felt that dental health was a component of overall health and their knowledge of dental health both professionally and personally.

Relationship Between Dental Health and Overall Health.

Healthy People 2010 has stated that "oral health is an essential and integral component of health throughout life" (Health and Human Services [HHS], 2000, p. 2), but quality of life can also be impacted by poor oral health and untreated dental diseases and conditions (HHS, 2000). Dental health is becoming a bigger component of total health care than ever before (Abou-Raya, Maeem, Abou-El Kheir, & El Betagy, 2002).

The main focus of the study was to examine whether or not the participants felt that there is a link between cardiovascular disease and

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periodontal disease. This topic was looked at in 3 different ways. First physician type was examined to see if there was significance and there was. Approximately 91% of doctors felt that there may be a connection between periodontal disease and cardiovascular disease with all cardiologists stating "yes" to the question.

The fact that all cardiologists surveyed agreed that there may be connection between periodontal disease and cardiovascular disease is not surprising due to the fact that the research is supportive of a possible link. Slavkin (1999) stated that "since 1989, a number of case studies and epidemiological reports have observed a strong relationship between oral infections (including periodontal disease) and cardiovascular disease, suggesting that periodontal disease may be a risk factor for cardiovascular disease" (p. 110-111). One study stated that the association between periodontal disease and cardiovascular disease strengthens because these diseases both share many of the same risk factors (Slavkin, 1999).

The analysis was broken down even further by looking at the responses given by physicians who were males verses females. Both genders indicated that cardiovascular disease and periodontal disease may be linked and there was no statistically significant difference between the genders in regard to this belief.

Next the researcher wanted to see if there was any differences in the number of years a physician has practiced medicine and his or her belief regarding a link between cardiovascular disease and periodontal disease. There

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was no statistically significant difference between the physicians who have practiced medicine for less than 10 years and those who have been practicing medicine 11 or more years regarding the belief in a link between cardiovascular disease and periodontal disease. This surprised the researcher because the research hypothesis was that physicians who have practiced medicine for fewer years would be more inclined to feel that cardiovascular disease was indeed linked to periodontal disease. This hypothesis was based on the fact that the research regarding the link between the two diseases has been fairly recent. However, these research findings have not influenced the amount of time spent on dental health education in medical schools.

Lastly, knowledge of dental health was compared for those physicians who felt that there was a link between cardiovascular and periodontal disease and those who did not. There was no statistically significant difference. The relationship between the belief that cardiovascular disease and periodontal disease are linked and knowledge regarding dental health was also tested and was found insignificant. The overall knowledge scores were fairly high and there was little variability in the scores among this sample.

Finally, the researcher wanted to see if physicians both cardiologists and general practitioners felt that dental health was a component of overall health. Seventy-four physicians completed this question on the survey with the majority (78.7%) of doctors stating that dental health is a component of overall health.

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Inclusion of Dental Health Education in Medical School Curriculum.

Abou-Raya and colleagues (2002) stated that, if there is a link between cardiovascular disease and periodontal disease then the medical community, and the especially cardiologists and general practitioners need to be informed about dental health education and every aspect of dental health. Medical institutions need to develop a curriculum that covers dental health for the medical students who are enrolled.

The findings from this study support the inclusion of dental health in the medical school curriculum. The largest percentage of physicians surveyed, 42.7% felt that between 1-5 hours of dental health education should be offered in medical school.

Inclusion of Dental Health in Medical Practice.

The inclusion of dental health education in the medical school curriculum would hopefully translate into dental health education being provided in physicians' offices and the addition of dental health questions on the patient's medical health history. The medical community needs to implement dental health into their medical practice to ensure that their patients are receiving the most comprehensive medical care possible (Abou-Raya, et al., 2002).

Of the physicians surveyed the majority (88%) indicated that a dental health education question should be added to the health histories that they use in their medical practices. This opinion did not differ between physician specialties or gender. However, only 5 (all general practitioners) out of the 75 physicians

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surveyed reported that dental health education should be provided in their offices. This is interesting because the majority of physicians surveyed indicated a belief in a link between cardiovascular disease and periodontal disease, but seem to be unwilling to educate their patients on good dental health. This is especially surprising for the cardiologists because they specialize in cardiovascular disease and thus their patients are the most in need of dental health education based on the link between cardiovascular disease and periodontal disease.

Cardiovascular Disease and Periodontal Disease Knowledge.

The existing literature failed to provide information regarding the knowledge level of cardiologists and general practitioners in regard to cardiovascular disease and periodontal disease, so the researcher included knowledge questions on the survey instrument. The mean score regarding the risk factors associated with periodontal disease was47%. The mean score regarding the signs and symptoms of periodontal disease was 77.6%. For cardiovascular disease risk factors, the mean score was 75%. There was not a statistically significant difference between cardiologists and general practitioners for either question related to periodontal disease. However, the difference between cardiologists and general practitioners regarding knowledge of cardiovascular disease risk factors was statistically significant.

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Dental Health Practices.

The majority of physicians (72%) reported visiting the dentist at least every 6 months. The majority of respondents stated that they do indeed brush their teeth at least 2 times a day (78.6%) and floss at least once a day (42.7%). For the most part, the physicians are practicing good oral hygiene.

Recommendations

Recommendations for Practice for Cardiologists and General Practitioners

Research cited in this thesis suggests that there may be a link between cardiovascular disease and periodontal disease and most physicians surveyed agreed. Physicians of all types should educate themselves on the risk factors for periodontal disease and cardiovascular disease along with the signs and symptoms of periodontal disease. If physicians do not want to provide direct dental health education to their patients they should at least provide brochures and information in their waiting rooms for their patients to take home with them.

It is interesting to note that the cardiologists and general practitioners were willing to add a dental health question to their health history but they are not willing to give education to their patients. Reading through a patient's health history and noticing that they have not been regularly seeing a dental health professional should alert the physician to recommend to that patient that maintaining optimal oral health is essential to staying healthy and possibly

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reducing the risk of cardiovascular disease. Cardiologists who specialize in the diseases of the heart should be front and center and proactive in recommending proper dental health for their patients to achieve optimum oral and overall health.

Lastly, the medical community and the dental community need to begin to work more closely together. The dental community should help educate their medical colleagues on the problems associated with periodontal disease not only that there may be a link but encompassing the entire issue of dental health. Physicians need to be educated on the proper technique for brushing and flossing so they can pass this information on to their patients. They also need to know what to look for in the mouth when they are examining a patient's throat. This can be accomplished by offering continuing education credits on dental health to physicians. Physicians receive continuing education and make recommendations to their patients on other health topics that are not their specialty areas (e.g. nutrition, exercise, etc.).The same should be true of dental health.

Recommendations for Health Educators.

As with physicians, health educators need to be educated on dental health. Dental health education should be added to the health education curriculum, as are other aspects of overall health. Many of the professional organizations that health educators join (the American Public Health Association, the Society for Public Health Education and the American Association for Health Education) have members from a variety of health care disciplines including

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dentistry, medicine, nursing, dietetics, etc. Health educators should take advantage of the opportunities to network with health professionals in these other disciplines, including dental health, and to receive continuing education on topics such as dental health.

Recommendations for Dental Professionals.

More and more research is showing the importance of maintaining optimal oral health. Dental professionals need to commit themselves to further educating their patients on how to keep the oral cavity as healthy and bacteria free as possible. Teaching patients the importance of brushing and flossing on the daily basis is not enough. Some people see a dental health professional more regularly than they see their physician. Dental health professionals should use this opportunity to review the patient's health history and provide overall health education. They should specifically be on alert for patients with risk factors for cardiovascular disease so that these patients can be educated about the possible link between cardiovascular disease and periodontal disease.

Lastly, dental health professionals should work with the physicians of their patients to provide a team approach necessary to achieving overall optimal health. Dental health professionals can communicate to physicians the importance of recommending regular dental visits to their patients. They can also teach physicians about what to look for in the mouth of their patients to alert them that the patients may be suffering from periodontal disease.

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Recommendations for Further Research.

The main weakness of this study was the response rate. Although the research followed the appropriate protocol for survey research, including pre-notification, 2 full mailings, a reminder postcard and reminder phone calls, the response rate was still only approximately 28%. Two recommendations would be to get a well-respected local physician's signature on the cover letter or get the study officially supported by local medical society. This may enable future research to achieve higher response rates from these physicians. A monetary incentive may have also helped achieve higher response rates and should be explored in future research.

A variety of topics were addressed in this research because there has been so little research published in this area. It would be interesting to delve more deeply into some of these topics by doing more focused survey research. One topic that would be interesting to examine more closely would be to determine why physicians do not provide dental health education to their patients when they agree that dental health is a component of overall health. Is it due to lack of time, lack of confidence in their own dental health knowledge, or some other factor? Another topic to examine more closely would be their dental health knowledge. In this study physicians were only asked about risk factors and signs and symptoms of periodontal disease. It would be interesting to assess their overall knowledge of dental health.

There are several other avenues for research on dental health education. It would be interesting to explore medical school students beliefs on whether or

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not they feel that dental health education should be offered in medical school, and contrast them with the beliefs of dental school students on how many hours should be offered, and whether or not they intend to provide dental health education in their offices.

Another interesting study would be to examine patients at risk for cardiovascular disease or periodontal disease to see if they think that they is a link between the 2 diseases and if this would influence their behaviors. Finally, longitudinal studies need to be conducted to further substantiate the link between cardiovascular disease and periodontal disease.

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APPENDIX A
The Survey

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DENTAL HEALTH SURVEY

1. Please check one of the following
   _____ Male
   _____ Female

2. Please check one of the following.
   _____ General Practitioner
   _____ Cardiologist
   _____ Other Please specify:_____

3. How many years have you been practicing medicine _____?

4. Do you think there may be a connection between periodontal disease and heart disease?
   _____ Yes _____ No

5. Please check all of the following that are risk factors for periodontal disease?

_____ Stress	_____ Female hormones	_____ Poor diet/nutrition
_____ Clenching teeth	_____ Smoking	_____ Grinding teeth
_____ Hypertension	_____ Ketoacidosis	_____ Hepatitis
_____ Age	_____ Viral infection	_____ Poor dental health
_____ Diabetes	_____ Alcohol use	_____ Genetics/Family history
_____ Osteoporosis	_____ Headache/Migraine	_____ AIDS
_____ Blindness	_____ Kidney disease	_____ Down's Syndrome
_____ Obesity	_____ Deafness	_____ Physical inactivity
_____ Bleeding gingiva	_____ Chemical Imbalance	_____ Number of teeth present

   _____ Medications (steroids, cyclosporins, oral contraceptives)

6. Please check all of the following that are risk factors for cardiovascular disease?

_____ Stress	_____ Female hormones	_____ Poor diet/nutrition
_____ Clenching teeth	_____ Smoking	_____ Grinding teeth
_____ Hypertension	_____ Ketoacidosis	_____ Hepatitis
_____ Age	_____ Viral infection	_____ Poor dental health
_____ Diabetes	_____ Alcohol use	_____ Genetics/Family history
_____ Osteoporosis	_____ Headache/Migraine	_____ AIDS
_____ Blindness	_____ Kidney disease	_____ Down's Syndrome
_____ Obesity	_____ Deafness	_____ Physical inactivity
_____ Bleeding gingiva	_____ Chemical Imbalance	_____ Number of teeth present

   _____ Medications (steroids, cyclosporins, oral contraceptives)

7. Please check all of the following that are signs and symptoms of periodontal disease?

_____ Healthy pink gingiva	_____ Purplish gingiva
_____ Bad breathe	_____ Nice fresh breathe
_____ Mobility of teeth	_____ Bleeding gingiva
_____ Exudate present	_____ Stippling of gingiva
_____ Soreness	_____ Swelling of gingival
_____ Plaque present	_____ Calculus present

8. How many classroom hours do you feel should be spent on dental health in medical school?
   _____ (Be specific)

9. Do you think that questions pertaining to dental health should be on a health history?
   _____ Yes _____ No

10. Do you have a question on your health history asking your patients if they have seen a dental health professional within the past year?
    _____ Yes _____ No

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11. Which of the following best describes your position concerning the addition of dental health questions to the health history used in your office?
    _____ Yes. I don't make the decisions in the office but I will make the suggestion.
    _____ Yes. I will add the question to my health history
    _____ No. I don't feel it is necessary to add a question at this time
    _____ No, but I will consider it in the future.

12. Do you think Dental Health should be provided in your office?
    _____ Yes _____ No (if No go to question # 14)

13. In your office, whom would you prefer provide the dental health information to your patients (Please check all that apply)?
    _____ Nurse
    _____ Dental Hygienist on Staff
    _____ Brochure that are available
    _____ Health Educator on Staff
    _____ Other Please specify:_____

14. Which of the following would you include in the spectrum of total health? (check all that apply)

_____ Spiritual	_____ Holistic
_____ Dental	_____ Occupational
_____ Family	_____ Mental
_____ Physical	_____ Nutrition
_____ Economic	_____ Emotional
_____ Environmental	_____ Reproductive
_____ Social	_____ School

Please complete the following questions about your personal dental health.

15. How often do you actually visit the dental office for cleanings?
    _____ Every 3 months
    _____ Every 4 months
    _____ Every 6 months
    _____ 1 time a year
    _____ Only when a problem arises
    _____ Whenever I can get an appointment
    _____ Other Please specify: _____

16. If you have not seen a dentist/dental hygienist in the past year, please specify the number of years it has been since you were seen.
    _____ (Be specific)

17. How often do you brush your teeth?
    _____ After every meal
    _____ 2 times a day
    _____ 1 time a day
    _____ Other Please specify: _____

18. How often you floss your teeth?

_____ After every meal	_____ 2 times a week
_____ 2 times a day	_____ 1 time a week
_____ 1 time a day	_____ A couple days before visiting the dental hygienist
_____ Biweekly	_____Monthly
_____ Less than 1 time a month	_____ Never

    _____ Other Please specify: _____

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APPENDIX B
The Initial Postcard

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Initial Postcard

Date

Dear

My name is Carrie Janszen and I am currently a Graduate Student at the University of Cincinnati, studying Health Promotion and Education with an emphasis in Community Health. I have begun working on my thesis and would like your help in reaching my goal of completing this research project.

I have been a practicing Dental Hygienist for the past 7 years and the topic of my thesis deals with the link between periodontal disease and cardiovascular disease and whether or not dental health education should be offered in medical school.

Next week you will be receiving a cover letter, informed consent form, survey and postage paid envelope. The survey should take about 10 minutes to complete and you may discontinue participation at any time. If you do wish to participate in this research project, please complete the survey and mail it back in the postage paid envelop.

I thank you for your time and effort in helping me achieve my goal of completing my thesis. If you have any questions please do not hesitate to call me at _____ or you can email me at _____.

Sincerely,

Carrie L. Janszen, RDH, BSEd
Graduate Student – University of Cincinnati
Health Promotion and Education

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APPENDIX C
The Cover Letter

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Date

Dear

My name is Carrie Janszen and I am currently a Graduate Student at the University of Cincinnati, studying Health Promotion and Education with an emphasis in Community Health. I have begun working on my thesis and would like your help in reaching my goal of completing this research project.

I have been a practicing Dental Hygienist for the past 7 years and the topic of my thesis deals with the link between periodontal disease and cardiovascular disease and whether or not dental health education should be offered in medical school.

Enclosed is an informed consent notice, the survey instrument and a postage paid envelope. The survey should take about 10 minutes to complete and you may discontinue participation at any time. If you do wish to participate in this research project, please complete the survey and mail it back in the postage paid envelop by **October 7, 2003**.

I thank you for your time and effort in helping me achieve my goal of completing my thesis. If you have any questions please do not hesitate to call me at _____ or you can email me at _____.

Sincerely,

Carrie L. Janszen, RDH, BSEd
Graduate Student – University of Cincinnati
Health Promotion and Education

Ilmar Ezis, DDS, MS
Diplomate of the American Board of Periodontology

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APPENDIX D
The Informed Consent

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University of Cincinnati
Consent to Participate in a Research Study
College of Education/Health Promotion and Education
Carrie L. Janszen, R.D.H., B.S.Ed
513-922-5212 / CJANSZEN@aol.com

Title of Study:
An Examination of Physician Attitudes Towards Dental Health and Its Relationship with Overall Health.

Introduction:
In order to take part in this study, it is advised that you read and understand the explanation of the recommended procedures. This document describes the purpose, procedures, risks and benefits of the study. You, as the participant have the right to not participate in this study and you may withdrawal at any time.

Purpose:
The purpose of this study is to examine the knowledge and attitudes of cardiologists and general practitioners regarding dental health education. A primary issue to be explored is the participants' opinion on whether or not there is a link between periodontal disease and cardiovascular disease.

There will be 500 cardiologists and general practitioners participating in this study.

Duration:
The survey will take 10 minutes to complete.

Procedures:
To fill out the enclosed survey as accurately and completely as possible and mailing it back to Carrie L. Janszen, RDH, BSEd (2869 Country Woods Lane, Cincinnati, Ohio 45248) in the postage paid envelope.

Benefits:
As a participant in this study you will receive no direct benefit but if you would like to see the results of the study please send an email with you name, address and telephone to CJANSZEN@aol.com. The results will be sent at the end of the study.

Confidentiality:
Every effort will be made to maintain the confidentiality of your study records. Agents of the University of Cincinnati, will be allowed to inspect sections of the research records related to this study. The data from the study may be published; however, you will not be identified by name. Your identity will remain confidential. Surveys will be coded for tracking proposes to allow Carrie Janszen to follow up on those responses not received.

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The link between the research and participant and participant to survey will be maintained until all of the data collection has been complete. Anticipated date is the end of October, 2003.

Right to refuse or withdraw:
Your participation is voluntary and you may refuse to participate, or may discontinue participation AT ANY TIME, without penalty.

Offer to answer questions:
If you have any other questions about this study, you may call Carrie L. Janszen, R.D.H., B.S.Ed at 513-922-5212 or Dr. Amy Bernard, PhD, CHES at 513-556-2126. If you have any questions about your rights as a research participant, you may call Dr. Margaret Miller, Chair of the Institutional Review Board – Social and Behavioral Sciences, at 513-558-5784.

LEGAL RIGHTS:
Nothing in this consent form waives any legal right you may have nor does it release the investigator, the sponsor, the institution, or its agents from liability for negligence.

I HAVE READ THE INFORMATION PROVIDED ABOVE. I VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY. I WILL RECEIVE A COPY OF THIS CONSENT FORM FOR MY INFORMATION.

BY COMPLETING THE ENCLOSED SURVEY AND MAILING IT IN THE POSTAGE PAID ENVELOPE SUPPLIED YOU ARE PROVIDING CONSENT.

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ADDENDIX E
Follow-up Postcard

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Cardiovascular/Periodontal Disease Study

Date

Dear

Two weeks ago you received a cover letter and survey to fill out for the Cardiovascular/Periodontal Disease Study. If you still have the survey could you please take a few minutes to complete the survey and mail it back in the postage paid envelope that has been provided. If you have already taken the time to fill out the survey and return it to us I thank you for your time.

Sincerely,

Carrie L. Janszen, RDH, BSEd
Graduate Student – Health Promotion & Education
University of Cincinnati

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