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ORAL HEALTH AND INTERPROFESSIONAL EDUCATION EXPERIENCES IN
FAMILY MEDICINE AND PEDIATRIC RESIDENCY PROGRAMS

by

Angela D. Bailey

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Science in Dental Hygiene

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Committee Approval

To the Graduate Faculty:

The members of the committee appointed to examine the thesis defense of
Angela Bailey find it satisfactory and recommend that it be accepted.

Jacque Freudenthal, RDH, MHE
Major Co-Advisor

Denise M. Bowen, RDH, MS
Major Co-Advisor

Karen Neill, PhD, RN SANE-A
Graduate Faculty Representative

Human Subjects Committee Approval Page

Idaho State UNIVERSITY

Office for Research Integrity
921 South 8th Avenue, Stop 8026 • Pocatello, Idaho 83203-8026

February 6, 2014

Angela Bailey
7102 S. Widgi Ave.
Boise, ID 83709

RE: Your application dated 2/6/2014 regarding study number 4046: Self-Reported Experiences of Oral Health Training and Interprofessional Education in Family Medicine and Pediatric Residency Programs

Dear Ms. Bailey:

I agree that this study qualifies as exempt from review under the following guideline: 1. Research on educational practices in educational settings. This letter is your approval, please, keep this document in a safe place.

Notify the HSC of any adverse events. Serious, unexpected adverse events must be reported in writing within 10 business days.

You are granted permission to conduct your study effective immediately. The study is not subject to renewal.

Please note that any changes to the study as approved must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. Contact Tom Bailey (208-282-2179; fax 208-282-4529; email: humsubj@isu.edu) if you have any questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

Dedication

This thesis document is dedicated to:

My husband, Tom. Thank you for your continued support and love throughout this entire process. I never would have been able to get through all of this without you.

My daughter, Avery. You bring sunshine into my life every day. I love you to the moon and back.

And lastly, my parents. Thank you both for support and encouragement. You have both been there for me throughout my entire education.

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List of Abbreviations

AAFP	American Academy of Family Physicians
AAMC	Association of American Medical Colleges
AAP	American Academy of Pediatrics
AAPA	American Academy of Physicians Assistants
AAPD	American Academy of Pediatric Dentistry
AAPHD	American Association of Public Health Dentistry
ACGME	Accreditation Council for Graduate Medical Education
ADA	American Dental Association
ADEA	American Dental Education Association
ADHA	American Dental Hygienists' Association
ADS	Accreditation Data System
AFPNP	Association of Faculties of Pediatric Nurse Practitioners
APRN	Advanced Practice Registered Nurses
ARS	Audience Response System
CDC	Centers for Disease Control and Prevention
CME	Continuing Medical Education
ECC	Early Childhood Caries
ECU	East Carolina University
GAPNA	Gerontological Advanced Practice Nurses Association
HRSA	Health Resources and Services Administration
HSC	Human Subjects Committee
ICD-9	International Classification of Diseases

ICPC	Interprofessional Collaborative Practice Competencies
IPE	Interprofessional Education
NAPNP	National Association of Pediatric Nurse Practitioners
NASN	National Association of School Nurses
NCHS	National Center for Health Statistics
NIIOH	National Interprofessional Initiative on Oral Health
PA	Physician Assistants
PACT	Protecting All Children's Teeth Curriculum
PAEA	Physician Assistant Education Association
PCP	Primary Care Provider
PCSOM	Pikeville College School of Osteopathic Medicine
POHEK	Physicians' Oral Health Education in Kentucky
PPT	PowerPoint
RCT	Randomized Controlled Study
RN	Registered Nurses
RRC	Family Medicine Residency Review Committee
SFL	Smiles for Life: A National Oral Health Curriculum
STFM	Society of Teachers of Family Medicine
UKCD	University of Kentucky's College of Dentistry
UNC	University of North Carolina at Chapel Hill
WFU	Wake Forest University

Abstract

Early childhood caries requires care coordination between primary care providers (PCPs) and oral health professionals. This study assessed the extent of oral health and interprofessional education (IPE) in family medicine and pediatric residencies and its impact on preventive oral health services provided in residency. A two-stage cluster sample of 470 US family medicine and 205 pediatric residency programs was used. Initially, 30% (N=140) of family medicine and 29% (N=60) of pediatric residency programs were randomly selected. Participating programs (N=42, 21%) invited residents. Residents (N=95, 28%) completed an online questionnaire. Statistical analysis included frequencies and Spearman's correlations. Family medicine and pediatric residents (83%) reported receiving some oral health education. Clinical experiences involving oral healthcare were frequently reported (77%, n=75) but infrequently included IPE with an oral health professional. More effort is needed to meet national recommendations in the education of family medicine and pediatric residents regarding oral healthcare for children.

Chapter I Introduction

The American Academy of Pediatrics (AAP) has made a critical recommendation stating primary care providers (PCP) should play an integral role in children's oral health (American Academy of Pediatrics, 2003 & American Academy of Pediatrics, 2014). Several recommendations by professional organizations dedicated to quality have proposed the need for healthcare providers, including physicians, to deliver oral health anticipatory guidance, oral health screenings and assessments, and the application of fluoride varnish during well-child visits (National Interprofessional Initiative on Oral Health, 2011). In fact, the U.S. Preventive Services Task Force (USPSTF) recently made the recommendation that PCP should prescribe fluoride supplementation to children beginning at 6 months of age when they live in an area with water considered to have suboptimal fluoride concentration. The recommendation also was made for PCP to apply fluoride varnish to all children after their first tooth has erupted (U.S. Preventive Services Task Force, 2014). In support of these recommendations, medical insurers are now required to provide coverage and reimburse providers under the Affordable Care Act (ACA) for services assigned a grade A or B by the USPSTF. This includes coverage and reimbursement for the application of fluoride varnish to children ages 0-5 years (Kaiser Family Foundation, 2014).

To begin addressing these recommendations, healthcare professional educational programs are integrating components of oral health training into the curricula. Efforts to integrate oral health training into healthcare professional education programs have included Interprofessional Education (IPE) activities which involve an oral health professional such as a dental hygienist or dentist. The IPE component occurs through

integration of principles into the curriculum, delivery of content, emphasizing a team approach to care, or through procedural demonstrations of clinical services such as applying fluoride varnish or providing oral health screenings and assessments during the well-child visit. Another aspect of IPE involves healthcare professional students participating in collaborative activities with dental residents, dentists, or dental hygiene students. In addition to IPE learning strategies, Interprofessional Collaborative Practice Competencies (ICPC), have also been recommended for implementation into healthcare professional education programs in an effort to prepare healthcare professionals to collaborate effectively in clinical practice (Interprofessional Education Collaborative Expert Panel, 2011).

In May 2000, the importance of oral health escalated to a new level when Surgeon General David Satcher released the landmark report, *Oral Health in America*. In this report, the Surgeon General awakened the public and healthcare professionals nationwide regarding the burden of oral disease. A substantial disparity between racial and socioeconomic groups related to oral health and overall health issues were revealed in the report. The report emphasized the importance of preventing oral and systemic diseases and raised awareness of oral health and its association with several systemic diseases and conditions. More importantly, it emphasized the importance of preventing oral and systemic disease (U.S. Department of Health and Human Services, 2000) across the life span.

The prevention of oral disease, particularly dental caries, is critical for supporting health status in individuals and groups at highest risk, which include primarily children and adolescents (Centers for Disease Control and Prevention, 2011). According to a

2015 data brief on dental caries and sealants prevalence in children and adolescents by the National Center for Health Statistics (NCHS), “Approximately 37% of children aged 2–8 years had experienced dental caries in primary teeth in 2011–2012” (pg. 1). The report also concluded children from disparate populations are more likely to have caries experience in comparison to non-Hispanic white children (Dye, Thornton-Evans, Li, & Lafolla, 2015). Rates of tooth decay in children ages 2-5 years have continued to rise despite increased community water fluoridation and other preventive oral health measures (Dye et al., 2007).

Shortly after the Surgeon General’s Report was released, the American Academy of Pediatric Dentistry (AAPD) developed a policy statement recommending all children have a dental home by the age of one in order to address the rise of tooth decay (American Academy of Pediatric Dentistry, 2001). As previously mentioned, the AAP also has developed policies intended to prevent dental caries in children. In 2003, the AAP recommended pediatricians begin providing oral health assessments for children at six months of age (American Academy of Pediatrics, 2003).

Family medicine is another specialty of medicine considering the importance of oral health. The accreditation standards for family medicine residency programs require programs provide for “hands-on educational experiences in the following subspecialty areas: otorhinolaryngology, to include oral health,...” (Accreditation Council for Graduate Medical Education, 2007, p. 30). Studies in the existing literature have indicated limited oral health curricula components or training and few have reported information related to IPE learning experiences in family medicine and pediatric residency programs.

Several movements to improve oral health and its delivery have occurred within state oral health programs, public health settings, dental practices, and healthcare professional educational programs. In fact, in 2008, the Association of American Medical Colleges (AAMC) developed competencies and objectives for both dental and medical students to accomplish prior to graduation. The overall topics of these competencies included public health and the prevention of dental caries, periodontal disease, oral cancer, and oral-systemic health inter-actions (Association of American Medical Colleges, 2008). Despite the AAP's policy statement and the ACGME's oral health educational requirement, results of the following surveys of residents, pediatricians and family physicians indicated a lack or shortage of oral health training as a barrier to performing oral health assessments.

Casparly et al. (2008) published one of the limited studies conducted to directly identify levels of oral health training in pediatric residency programs. Utilizing the AAP's Survey of Graduating Residents and a random sample of 1000 participants, the authors found that 35% of pediatric residents perceived they had received no oral health training during the program, and those who had received oral health training (65%) experienced less than three hours. A majority (61%) of those who had received less than three hours of training were not satisfied with it. Subsequently, Lewis et al. (2009) published results of a survey of 1618 post-residency fellows indicating 41% reported a lack of training as a barrier to performing oral health screenings and providing oral health education for children in practice. Both studies indicated only a small amount of oral health training is provided in pediatric residency programs and this in turn affects the delivery of preventive oral health services in practice.

Similar to pediatric residency programs, there have been limited studies conducted on oral health training in family medicine residency programs. One study conducted by Douglass et al. (2009) surveyed family medicine program directors and inquired if family medicine residency programs were aware of and utilizing the Smiles for Life: A National Oral Health Curriculum (SFL). The response rate was 41% (183 of 450). The authors concluded, “Smiles for Life has had a substantial impact on oral health education within family medicine residency education” (Douglass, et al., 2009, p. 159). Recommendations were made for further study regarding how family physicians utilize the oral health training and skills later in daily practice. This study indicated a portion of family medicine program directors are aware of the SFL curriculum, but the question still remains on how the family physician might utilize the training in practice, and what the impact of the training would be.

IPE is an emerging approach to consider when discussing oral health training in family medicine and pediatric residency programs. IPE is on the rise in several healthcare professional education programs, as an emphasis of providing comprehensive care for patients and removing silos among healthcare professionals. The report, *Interprofessional Education in U.S. and Canadian Dental Schools: An ADEA Team Study Group Report* found that, of 51 U.S. dental schools, approximately 30% collaborate with a medical school. The report also found interprofessional healthcare education programs in dental schools collaborating with dental hygiene programs (Formicola, et al., 2012).

Other healthcare professions collaborating through IPE are dental hygiene and nursing. The New York University Colleges of Dentistry and Nursing have proposed a Center for Oral Health Promotion where both dental hygiene and nursing students would

collaborate and deliver patient care in an IPE setting (Duley, Fitzpatrick, Zornosa, & Barnes, 2012). An additional component of this proposed center includes the involvement of healthcare management students. Duley et al. (2012) stated, “the proposed center, therefore, has two basic underpinnings: the need to have student practitioners and managers learn in an inter-professional practice setting, and further understanding of the relationship between oral and systemic health issues” (p. 64).

Physician assistants (PA) also are embracing IPE. Anderson, Smith, and Maseman (2011) evaluated the inclusion of an interdisciplinary oral health curriculum within a PA program. More specifically, this study evaluated components of the oral health curriculum which may have affected the oral health knowledge of the PA students. The IPE or interdisciplinary key components of the curriculum included the dental hygiene faculty delivering content related to twenty-four identified oral health competencies to the PA students. Two of the items identified by the PA students as having the greatest change in competency from the pre- and post-questionnaire were “monitoring the impact of medications on oral tissues” (87% increase) and “recognizing caries and oral lesions that require referral” (84 to 95% perceived competence) (Anderson et al., 2011, p. 21). The application of fluoride varnish, patients’ perceived dental health, PA students’ awareness of the relationship between diabetes and oral health, and others were identified as having had a “moderate change in perceived competency” (Anderson et al., 2011, p. 22).

Oral health is closely linked to health status and has been recognized as an important component of the curricula across the health professions to influence the health of the nation. The literature documents a need for additional curricular components

particularly in clinical application, and IPE opportunities for oral health professional's involvement in the education and training of family medicine and pediatric residents as well as other PCP.

Statement of the Problem

The need to assess the amount and type of oral health training received in family medicine and pediatric residency programs was based on the documented importance of oral health in relation to overall health (U.S. Department of Health and Human Services, 2000) and a national drive to foster interprofessional approaches to healthcare. The need for collaborative approaches to healthcare delivery has been recognized by the Institute of Medicine (2010) as well as other national professional organizations to improve effectiveness of healthcare delivery including dental and related oral care services. Therefore, a need was identified to determine if a relationship exists between the experience of IPE in training and educational programs of family medicine and pediatric residencies, and participation in IPE activities after graduation. Assessment of the inclusion of preventive oral health services in the educational preparation of both family medicine and pediatric residents is important to identify opportunities for enhanced learning focused on oral care, which will promote the health of the nation given the established link between oral health and overall health status.

Purpose of the Study

The purpose of the study was to determine family medicine and pediatric residents' self-reported experiences including: 1) oral health training and education in residency, 2) type of instruction, such as the use of IPE activities with oral health professionals, and 3) to determine if there's a relationship between the delivery of preventive oral health

services during well-child visits and total number of hours spent in oral health training and education.

Professional Significance

Dental caries is a significant problem in children, especially those with low socioeconomic status placing children at risk for a disease that is entirely preventable. Solutions to improving the quality of care and health outcomes in the pediatric population include a need to engage healthcare professionals from a variety of backgrounds and settings in comprehensive care. The National Interprofessional Initiative on Oral Health (NIIOH) is a consortium of funders and health professionals that developed a national initiative addressing the need for IPE and a team approach to the problem of early childhood caries (ECC) in low-income children. The NIIOH believes physicians will see the importance of oral health, identify signs of early dental disease, and play an active role in the care coordination of patients with oral health professionals, if appropriate training is provided in educational programs (National Interprofessional Initiative on Oral Health, 2011). The NIIOH utilizes the theory of change in an interprofessional model with the belief that healthcare professionals will collaborate with one another as a healthcare team if this type of training is instilled in students during their educational program setting (Evans, Garland, Glicker, & Haber, 2012).

The professional significance of this study is its potential impact on preventive oral health services provided for children ages 0-5 years by PCP. This study has interprofessional implications given the need to update earlier research findings regarding education and training related to oral health in family medicine and pediatric residents, and given the known contribution of effective oral care to improved health status. A

potential benefit of IPE is integrating preventive oral health measures for young children into these curriculums. This study will identify the extent of oral health-related curricular content received by residents in these specialties, instructional methods, including IPE, and the delivery of preventive oral health services during well-child visits. The results of this study has the potential to inform governmental agencies such as the U.S. Health and Human Services, professional associations such as the American Dental Education Association (ADEA) and the AAMC, and other healthcare organizations on the current status of oral health curriculum or training being delivered in two specialties of medicine that commonly treat children. Lastly, the results of this study may be used to advance IPE education in the healthcare professions supporting improved oral healthcare of children.

A key player within the healthcare professional team is the dental hygienist. In fact, in 2011, interprofessional collaboration was included as a part of the competencies for graduate dental hygiene programs developed by the American Dental Hygienists' Association (ADHA) (American Dental Hygienists' Association, 2011). IPE is presently occurring between dental hygienists and PCP. With more healthcare education programs embracing IPE related to preventive oral healthcare, the dental hygienist's role as a member of the healthcare professional team will continue to expand. In addition to contributing to the current body of knowledge regarding an oral health curriculum or training within a family medicine or pediatric residency program, this study can build the knowledge base related to current interprofessional practice focused on oral healthcare preparation and delivery. It will also help to inform the disciplines of dental hygiene and family and pediatric medicine as partners in improving the health of children.

Research Questions

1. What self-reported types of oral health training received by family medicine and pediatric residents included any type of IPE activities involving an oral health professional or oral health professional student within its curricular components?
2. Is there any relationship between the self-reported frequency of family medicine and pediatric residents delivering preventive oral health services to pediatric patients to the total number of hours spent in oral health training and education?

Definitions

Conceptual definitions.

Interprofessional education (IPE). An educational setting where “students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes” (World Health Organization, 2010, p. 10). The various settings where interprofessional education can occur include either pre- or post-educational programs, continuing education opportunities or other training programs (World Health Organization, 2010).

Operational definitions.

The following terms are defined in relation to this study.

Interprofessional education (IPE) activities. In relation to this study, this term refers to any educational activities or curriculum components involving pediatric or family medicine residents interacting with oral health professionals or oral health

professional students. A desired result of IPE activities is healthcare professional students learning and collaborating with one another through the various activities.

Family medicine residency programs. The family medicine residency programs include 470 family medicine residency programs in the United States accredited by the ACGME as of May 1, 2014 (Accreditation Council for Graduate Medical Education, 2012).

Oral health professional. Oral health professional refers to a dentist or dental hygienist that has received a degree from an accredited educational institution.

Oral health professional student. Oral health professional student refers to a student in the process of completing a dental or dental hygiene degree program from an accredited educational institution.

Oral health curriculum or training. This term refers to any type of training with a specific emphasis on oral health. The curriculum or training can be delivered through various means, for example, videos, didactic lectures, case presentations, online learning methods, and also IPE activities. The curriculum or training can be on one oral health topic or several.

Preventive oral health services. This term refers to oral health anticipatory guidance, oral health screening and assessment, and the application of fluoride varnish.

Primary Care Provider. This term refers to a physician or nurse practitioner that delivers comprehensive medical care. They provide physicals, manage chronic illnesses such as hypertension or diabetes mellitus, and also provide care for more acute illnesses such as the common cold, rash, or flu (University of Washington, 2015).

Pediatric residency programs. The pediatric residency programs include all 205 pediatric residency programs in the United States accredited by the ACGME as of May 2, 2014 (Accreditation Council for Graduate Medical Education, 2012).

Summary

A strong emphasis has been placed on both pediatricians and family physicians to play a role in children's oral health and the prevention of oral diseases, especially dental caries (American Academy of Pediatrics, 2014). This role has been stressed by Surgeon General David Satcher, professional medical and dental associations, and government entities. In order to achieve a shift in the tradition of only oral health professionals providing preventive oral health services, other healthcare education programs have begun to include some type of oral health training or curriculum in their programs. Limited evidence indicates family medicine and pediatric residency programs have incorporated some degree of oral health content; however, more information is needed on specific instructional strategies employed and the possible relationship of the total hours spent in oral health training or education to the delivery of preventive oral health services in practice to children during well-child visits.

IPE is currently the recommended approach for training healthcare professionals to treat patients in a comprehensive manner. Although graduate level medical provider programs, including but not limited to family medicine and pediatric residency programs, are beginning to provide oral health training, information on IPE methods utilized is very limited. Even more limited is knowledge about the role oral health professionals serve in preventive oral health educational experiences of medical residents who are required to deliver related services in practice. If IPE is being incorporated into curricula, it is

unknown what role IPE potentially plays in pediatricians' and family physicians' patient care practices. This study was designed to survey third-year family medicine and pediatric residents to determine the total number of hours of any type of oral health training or education in their residency program, if the training and education included any type of IPE activities, and lastly, to determine if the total number of hours of oral health education correlates with the PCP providing preventive oral health services to children.

Chapter II Literature Review

This literature provides a platform for research on investigating oral health training in family medicine and pediatric residency programs, and the role of oral health professionals and oral health professional students in IPE. It begins with a section on physicians' and program directors' self-reported perceptions of oral health training in healthcare education programs and then moves into a discussion of various studies conducted on actual oral health trainings or curriculums in healthcare education programs. In addition, a specific section highlighting studies on oral health training in family medicine and pediatric residency programs follows. The literature review concludes with a section presenting studies on the effectiveness of IPE.

Self-Reported Perceptions of Oral Health Training in Healthcare Education Programs

Despite the AAP's adoption of oral health policies (American Academy of Pediatrics, 2003; American Academy of Pediatrics, 2014) and an accreditation standard requiring family medicine residency programs to provide oral health training (Accreditation Council for Graduate Medical Education, 2007), family physicians and pediatricians have reported receiving little oral health training (Caspary, Krol, Boulter, Keels, & Romano-Clarke, 2008; Herndon, Tomar, Lossius, & Catalanotto, 2010). Studies on family medicine residency program directors' perceptions of oral health training have been conducted (Douglass et al., 2009; Gonsalves, Skelton, Heaton, Smith, Feretti, & Hardison, 2005) as well as studies on other healthcare education program directors' perceptions on oral health training (Hein et al., 2011).

Caspary et al. (2008) conducted a study of 611 randomly sampled graduating pediatricians from programs throughout the United States. The purpose of the study was to survey the residents' ($N=1000$) oral health training perceptions and daily practices in providing oral health screenings during well-child visits. Over one-third of the residents ($n=214$, 35%) revealed oral health training was not a residency component. Twenty-one percent ($n=126$) of the residents who did receive oral health training commented on its inadequate quality. A large percentage of the graduating pediatricians ($n=372$, 61%) perceived an insufficient amount of time was dedicated to oral health training in the residency program. The residents reported less than three total hours dedicated to the entire oral health training were provided, which consisted of lectures, seminars and clinical observations (Caspary et al., 2008).

A large number of residents ($n=483$, 79%) also reported inadequacy in learning how to complete an oral health risk assessment. Only a limited number of residents ($n=86$, 14%) reported spending time actually observing a dentist provide an oral health risk assessment. By contrast, over three fourths of the residents ($n=501$, 82%) had confidence in the content area of educating parents and caregivers on oral health effects of letting a baby take a bottle to bed. Almost the entire sample of residents ($n=605$, 99%) reported oral health anticipatory guidance should be a responsibility of pediatricians. Two content areas perceived by a limited number of residents ($n=85$, 14% and $n=92$, 15% respectively) as areas of confidence were assessing parents/caregivers' general oral health and being able to identify demineralized tooth structure. Similar numbers of residents ($n=391$, 64%) agreed pediatricians should have the responsibility of identifying plaque, and 67% ($n=409$) reported pediatricians should identify demineralized tooth structure. In

addition to agreeing to pediatricians' responsibility and role in childrens' oral health, a correlation ($p = 0.01$) was found between pediatricians providing oral health screenings and receiving greater than three hours total of oral health training (Casparry et al., 2008).

Casparry et al. (2008) reported two major limitations of this study. The first was regarding the residents' perceptions of oral health training being self-reported. The second was in relation to the question on the reported amount of time spent on oral health training in the residency program. Instead of the question being open-ended, residents were only allowed to select from specific answers, which could have limited the reported number of total hours spent in the program on oral health training. Despite these limitations, conclusions were made based on graduating pediatric residents' perceptions of their oral health knowledge, role in childrens' oral health, and confidence in conducting oral health assessments in relation to time spent on oral health training in residency programs. Overall, the findings indicated that quality and duration of oral health training affects the confidence levels of pediatricians providing preventive oral health services, assessing and addressing parents/caregivers' oral health, and even using oral health knowledge and skills in future daily practice. No suggestions for future research were discussed.

Another study on oral health training within family medicine and pediatric residency programs was conducted by Douglass et al. (2005). The overall purpose of the study was to determine the effects of oral health training on the oral health knowledge and practices of the residents. The study also aimed to determine if the training could affect the rate of physicians recommending children see a dentist by the age of one. Another component of the study included revising the existing well-child forms with

prompts on topics of oral health. The purpose of making these revisions to the well-child forms was to see if the new prompts could help physicians utilize information learned from the oral health training.

The participants of the study consisted of four Connecticut family medicine and pediatric residency programs with a total of 245 individuals who actually participated in the oral health training. In addition to family medicine and pediatric residents, faculty of both programs, medical students, advanced practice registered nurses (APRN), registered nurses (RN), and PA students also completed the oral health training. A total of 214 participants ($n=40$ faculty, $n=78$ residents, $n=49$ medical students, $n=39$ APRN/RN/PA, and $n=9$ unidentified) completed the baseline questionnaire to determine oral health knowledge and behaviors prior to completing the oral health training. A post-questionnaire was completed by 192 participants and then one year after the oral health training a follow-up questionnaire was completed by 97 participants. The faculty and family medicine residents were the participants primarily targeted for completing the one year follow-up questionnaire (Douglass et al., 2005). Participants of the study completed the oral health training in a slide presentation format either in person or via the Web. However, a majority ($n=191$, 78%) completed the oral health training in person. An additional resource, the State of Connecticut's OPENWIDE program, was utilized in developing the oral health training. Chart audits were completed after the training to determine if the oral health prompts on the well-child forms made any differences in the physicians' behaviors (Douglass et al., 2005). There was no mention of any IPE components within the oral health training or demonstrations of oral health screening techniques by oral health professionals.

After analyzing results from the baseline questionnaire, a limited number of participants ($n=44$, 28%) indicated referring children to the dentist by age one. In contrast, a majority of participants ($n=142$, 91%) reported referring a child to a dentist when the child was healthy, not when the child has a dental problem. A large number of participants ($n=95$, 61%) also indicated not delivering detailed toothbrushing instructions to parents. Several statistically significant results ($p < 0.05$) occurred between the pre-questionnaire and follow-up questionnaire in regards to the residents' oral health practices. These oral health practices included referring children to a dentist by the age of one, problems with locating dentists for children under two years of age, discussing nutrition related to oral health and tooth-brushing instructions, and lastly, prescribing fluoride supplements. In analyzing the results on the section of the pre- and post-questionnaire specifically on oral health knowledge, Douglass et al. (2005) also reported statistically significant results ($p < .05$) in the participants' mean score. At baseline, participants had a mean score of 28.5 ± 3.7 ($N=214$) of a possible 39. After the oral health training participants had a mean score of 34.5 ± 3.0 ($N=192$). The participants' mean score in oral health knowledge on the one year follow-up questionnaire was 32.2 ± 3.1 . Lastly, a statistically significant difference ($p < .01$) was reported on the use of two specific oral health prompts on forms for well-child visits between participants who received oral health training and those who did not. The two specific oral health prompts were related to the topics of referring children to the dentist by age one and nutrition.

Douglass et al. (2005) reported a few possible limitations of this study. These limitations included a lack of identical delivery methods and testing for all of the oral health trainings and not having any control group. Another limitation was that not all of

the oral health prompts on the forms for well-child visits were the same across clinic locations. Despite these limitations, Douglass et al. (2005) concluded family medicine and pediatric residents' oral health knowledge and practices can increase after completing oral health training either in person, or via the Web. Areas needing further study include physicians prescribing fluoride supplementation as well as effective behavior change methods.

In 2009, Lewis et al. conducted a study to determine pediatricians' attitudes and perceptions of providing preventive oral health services to children ages 0-3 years. The survey utilized for this study was the AAP Survey of Fellows. From a randomized sample of post-residency pediatricians ($n=1618$) a total of 698 surveys (43%) were analyzed. Less than half of the pediatricians who completed the survey ($n=251$, 36%) reported having received any type of oral health training either in medical school, residency, or from continuing medical education (CME) courses. A majority of the pediatricians perceived it is their responsibility to look for dental caries (91.4%, $n=638$), educate parents/caregivers on the oral health effects of a child taking a bottle to bed (99.3%, $n=693$), and to provide oral health education in relation to nutritional effects (97.3%, $n=679$). Limited percentages (19.2% and 32.5%) perceived pediatricians should apply fluoride varnish to a child's teeth or talk to parents/caregivers about their oral health (Lewis, et al., 2009).

Pediatricians were also asked how often they provide these services on 50% or more of their patients ages 0-3 years. In comparison to other services, higher percentages of pediatricians (82.1% and 77.1%) reported educating parents/caregivers on the oral health effects of a child taking a bottle to bed and providing oral health education in

relation to nutritional effects. Pediatricians (89.0% and 83.3%) perceived themselves as being confident to perform these same two services. Only 41.5% ($n=290$) of pediatricians perceived confidence in being able to examine for dental caries and an even lower percentage of 22.9% ($n=160$) had perceived confidence in identifying plaque on their patient's teeth (Lewis et al., 2009).

While the post-residency pediatricians surveyed by Lewis et al reported believing that they should play a role in children's oral health, only a low percentage of them were actually providing preventive oral health services such as screenings and assessments for children. The authors of this study also concluded that confidence levels seem to factor into whether or not a pediatrician would provide these preventive oral health services. Similar to other studies presented in this literature review, the amount of oral health training also contributed to a pediatrician providing preventive oral health services. Limitations of this study were the pediatrician's self-reported attitudes and perceptions on providing preventive oral health services to children versus a study of the actual services provided to children. There were no recommendations made for areas needing further study (Lewis et al., 2009).

Schaff-Blass et al. (2006) completed a study to determine the effects of oral health training on the oral health knowledge of pediatric residents. The study involved pediatric residents ($N=143$) from three different residency programs: the University of North Carolina at Chapel Hill (UNC), East Carolina University (ECU), and Wake Forest University (WFU). The oral health training delivered to UNC pediatric residents ($n=56$) included hands-on training with pediatric dentists, didactic courses, and strategies to incorporating oral health knowledge and skills into daily practice. The oral health

training delivered to ECU pediatric residents ($n=50$) was not extensive and delivered by a pediatrician trained in oral health. The pediatric residents from WFU ($n=37$) did not receive any oral health training intervention.

Schaff-Blass et al. (2006) completed the study over a period of one year with the pediatric residents completing pre- and post-questionnaires. The questionnaire was adapted from previous studies on oral health training for healthcare providers. A total of 79 residents (55% response rate) completed the questionnaires ($n=20$, 40% from ECU, $n=16$, 43% from WFU, and $n=43$, 76% from UNC). Questionnaire results were compared for all pediatric residents from the three residency programs. Overall, in comparing the questionnaire scores of the UNC versus the WFU pediatric residents, higher scores were only reported on eleven out of 18 total questions. There were no reported differences in comparing the oral health knowledge of the UNC and ECU pediatric residents. A majority of the pediatric residents (approximately 80%) indicated confidence in providing preventive oral health services and counseling. The only difference between the three pediatric programs in the area of confidence was demonstrated by UNC in providing oral health counseling. Among the three pediatric residency programs and the different oral health trainings provided, only UNC demonstrated statistically significant changes in oral health knowledge (17.8%, $p=.002$) and practices (65.1%, $p<.001$).

Conclusions of the study indicated oral health training consisting of various educational methods improved the oral health knowledge of pediatric residents. It also improved pediatric residents delivering preventive oral health services and counseling in daily practice. The study had three major limitations, including the small number of

pediatric residents who completed the post-questionnaire, a lack of randomization, and the residents' self-reported outcomes. Schaff-Blass et al. (2006) mentioned further studies are needed on oral health training with a specific focus on prescription fluoride supplementation and oral health assessments.

Similar to Caspary et al. (2008), Herndon et al. (2010) conducted a study with the purpose of identifying relationships between confidence in providing preventive oral health services, oral health training, and how this knowledge is used in the daily practice of pediatricians and family physicians. The main differences between these two studies were the physicians had already graduated, and the sample consisted of both pediatricians and family physicians. A total of 421 Florida physicians ($n=264$ pediatricians and $n=157$ family physicians) were surveyed with a 31% response rate. A majority of the physicians ($n=333$, 79%) indicated receiving oral health training during medical school or residency training. However, 44% ($n=69$) of family physicians, a significant difference in comparison to 32% ($n=84$) of pediatricians, reported receiving oral health training during medical school ($p = 0.01$). More than half of the pediatricians ($n=140$, 53%) reported receiving oral health training during residency ($p = 0.04$; Herndon et al., 2010).

Several statistically significant ($p < 0.01$) differences were reported between pediatricians' and family physicians' confidence levels (very confident versus somewhat confident respectively) on topics of delivering oral health anticipatory guidance, providing oral health screenings and risk assessments, and knowing what oral conditions in children warrant a dental referral. The only area between the two subgroups of physicians where no statistically significant difference in confidence levels was experienced was in recognizing oral lesions. Pediatricians who reported greater

confidence provided more preventive oral health services in comparison to family physicians ($p < 0.01$), except in two areas. These two areas were educating parents/caregivers on when a child should be taken to a dentist for the first time ($p = 0.07$) and asking parents/caregivers about their own oral health ($p = 0.47$; Herndon et al., 2010).

Through a multivariate analysis, Herndon et al. (2010) determined oral health training did not affect physicians' daily oral health practices ($p = 0.336$). However, results indicated oral health training did have an effect on physicians' confidence in performing oral health screenings and assessments ($p < 0.01$). This, in turn, resulted in the oral health training having an indirect effect on physicians' daily practices and providing preventive oral health services.

One of the limitations of this study, like those in the study by Casper et al. (2008), was the physicians' self-reported perceptions on oral health training. However, Herndon et al. (2010) concluded oral health training indirectly affects physicians' providing oral health screenings and assessments and inquiring about parents/caregivers' oral health. This conclusion is an important reminder of the role oral health training has in PCP carrying out the AAP recommendations on physicians' role in oral health. Lastly, Herndon et al. (2010) concluded physicians should utilize existing oral health trainings available such as Smiles for Life: A National Oral Health Curriculum (SFL), and residency programs should ensure residents receive adequate oral health training in order to successfully play a role in childrens' oral health.

Salama et al. (2010) conducted a study to determine if oral health training specifically on the topic of infant oral health could improve the oral health knowledge of

family medicine residents from the University of Nebraska Medical Center. This study was very similar to one conducted by Kebriaei et al. in 2008 and utilized the same infant oral health training and questionnaire. A written questionnaire was completed by all of the residents ($N=37$) prior to and after the infant oral health training. Results of the pre- and post-questionnaire demonstrated a significant difference ($p < .001$) in the residents' oral health knowledge. The residents had a mean score of 10.03 on the pre-questionnaire prior to receiving training. After the training, residents had a mean score of 13.08 on the post-questionnaire for the sections on oral health knowledge. All of the residents ($n=37$, 100%) perceived the oral health training useful while a majority ($n=34$, 92%) perceived the training to be satisfactory. A majority of the residents ($n=34$, 92%) reported they were very likely to incorporate oral health knowledge gained into their daily practice (Salama et al., 2010).

Limitations of this study included a small participant sample size and the physicians self-reported outcomes on the questionnaire. Salama et al. (2010) concluded that a one-hour infant oral health training can improve the oral health knowledge of residents. Future studies are needed on this same topic with larger samples sizes as well as follow-up studies to determine how the information learned is still being used in daily practice. Additional study needed is to assess educational methods used to deliver the information and if these affect how physicians retain and utilize the knowledge (Salama et al., 2010).

In addition to pediatricians and family physicians, program directors of family medicine residency programs have been surveyed regarding oral health training. In 2009, Douglass et al. conducted a survey of family medicine residency program directors to

determine the status of oral health training in the programs. The study also aimed to determine if residency program directors were aware of the Family Medicine Residency Review Committee (RRC) requirement for programs to provide oral health training to residents. Lastly, the study surveyed program directors on utilizing the SFL curriculum.

A total of 183 out of 450 program directors responded to the survey for a 41% response rate. A large number of respondents ($n=143$, 84%) were aware of the RRC requirement to provide oral health training to residents, but results indicated a limited amount of oral health training was included in the curriculum. Fortunately, only a limited number ($n=18$, 10%) of program directors indicated not providing any type of oral health training for residents. Results indicated family medicine residency programs ($n=95$, 52%) provided one to two hours total of oral health training to residents. A few program directors ($n=9$, 5%) reported the greatest amount of oral health training was 12 total hours. A large number of program directors reported familiarity with SFL ($n=135$, 74%) and utilized it in the program ($n=119$, 65%; Douglass et al., 2009).

Douglass et al. (2009) concluded family medicine program directors understood oral health training as a program requirement, but the total hours reported for providing the training was minimal. This finding could be an indication of the family medicine residency program directors' priority to provide oral health training for residents. No limitations of the study were discussed, but further research was suggested on the SFL's impact and how family physicians utilize the oral health training and skills later in daily practices.

Along with determining the current status of oral health training in family medicine residency programs, Gonsalves et al. (2005) surveyed family medicine

residency program directors to identify current levels of the directors' knowledge on oral health preventive care and the potential of oral health training implementation. In addition, program directors were surveyed on opinions regarding what preventive oral health services residents should provide during well-child visits.

A total of 208 family medicine residency program directors returned the survey, resulting in a 45% response rate. Program directors were asked several questions on teaching residents specific oral health screening measures for children 0-5 years of age. Results indicated the most likely item ($n=176$, 84.6%) to be taught in the program was to inquire about a bottle being given at bedtime. The most unlikely item ($n=134$, 64.4%) to be taught in the program was discussing a mother's current oral health status, although nearly two thirds of the respondents indicated it was included in the curriculums. Program directors reported an average of four hours was spent providing oral health training to residents (Gonsalves et al., 2005).

Gonsalves et al. (2005) also surveyed program directors on what preventive oral health services residents should provide during a well-child visit. A limited proportion of program directors ($n=69$, 33%) agreed physicians should apply fluoride varnish during a well-child visit. Larger numbers of program directors agreed residents should provide parents/caregivers with education on oral health prevention ($n=182$, 87.4%) and assess for dental conditions ($n=184$, 88.3%). The number of program directors ($n=78$, 37.6%) who agreed residents should provide a dental home referral for children at one year of age was equal to the number who disagreed.

Gonsalves et al. (2005) reported one of the main limitations of the study was the low response rate. The self-reported perceptions of oral health training in family

medicine residency programs was also a limitation. Gonsalves et al. (2005) concluded a large majority of family medicine residency program directors believed oral health training should be provided to family medicine residents, but only a limited number of total hours are actually spent delivering oral health training to residents. Lastly, Gonsalves et al. (2005) concluded if residents are to adequately provide preventive oral health services and education, then more oral health training needs to be included in family medicine residency curriculums. Further areas of research mentioned included oral health training competencies, educational methods and activities utilized to teach the information, and the physicians' behaviors and utilization of knowledge and skills in daily practice.

Recently, Silk et al. (2012) conducted a survey of family medicine residency directors from across the United States. Similar to the studies by Douglass et al. (2009) and Gonsalves et al. (2005), this survey set out to determine the amount of oral health training included in family medicine residency programs. Additional goals of the study were to determine perceived barriers to including oral health training and identifying the topics included in the training. Questions regarding the utilization of SFL also were asked. Surveys were sent to 452 family medicine residency programs, and a total of 156 were returned, yielding a 35% response rate. Over half of the respondents ($n=123$, 72%) perceived oral health as something physicians should routinely assess. A smaller number of program directors ($n=70$, 45%) reported three or more hours were dedicated towards oral health training in the residency program. An even smaller number of program directors ($n=50$, 32%) were satisfied with residents' oral health knowledge. The same percentage of program directors ($n=50$, 32%) reported utilizing an oral health

professional as a part of the oral health training. Twenty-two percent ($n=28$) reported using one of the eight SFL modules in the oral health training delivered to family medicine residents (Silk et al., 2012).

Silk et al. (2012) concluded an increased number of hours were being allocated towards oral health training in family medicine residency programs compared to earlier studies. Another conclusion was that there is an increasing awareness in family medicine residency programs regarding the SFL curriculum. There was no mention of further studies being needed; however, the need for efforts towards increasing the amount of oral health training delivered in family medicine residency programs and the potential activities involved with the training were discussed. No limitations of the study were mentioned.

The studies conducted by Douglass et al. (2009), Gonsalves et al. (2005), and Silk et al. (2012) concluded a limited amount of oral health training is provided in family medicine residency programs. Similar conclusions have been made from studies conducted with other healthcare education programs. Recently, Hein et al. (2011) investigated the inclusion of oral-systemic health content in pharmacy, nursing, and medical school curriculums from around the world. Administrators were surveyed on aspects of oral health training included in the different programs. Questions ranged from the importance of specific oral health content and requirements for including oral health training in the programs to whether students are taught how to provide oral health screenings and assessments. The response rate was 23% ($N=41$) with at least half of the respondents ($n=27$) from educational institutions in the United States. The percentages of healthcare educational programs represented were: 41.5% pharmacy ($n=17$), 39% nursing

($n=16$), and 19.5% medicine ($n=8$). Of the responses received, 53.7% ($n=22$) reported oral health was “somewhat important” to include in the three healthcare curriculums. A similar result of 51.2% ($n=21$) indicated oral health training was not a curriculum requirement in any of the three healthcare education programs. There were no statistically significant differences between the three programs for including oral health training in the curriculum or it being a requirement (Hein et al., 2011). A majority of the institutions (>50% of respondents) indicated students were not taught how to provide an oral health exam. Of the three programs, however, pharmacy scored the lowest in teaching students how to provide an oral health exam in comparison to both medicine and nursing programs. When asked in regards to the oral-systemic education currently embedded into each of the disciplines, 59.6% ($n=24$) indicated inadequacy. Only the nursing discipline viewed oral-systemic education as an important part of curriculum content (Hein et al., 2011).

Hein et al. (2011) also asked administrators an open-ended question on collaboration and providing oral health training to students. Two of the obstacles identified by administrators regarding collaboration were based on not being able to work with a dental school and the lack of opportunities for non-dental professional students to work with dental professional students. Administrators indicated, for non-dental professional students to carry forward practices learned from oral health training, it is important for collaboration to occur with dental professional students.

The low response rate was one of the main limitations of the study, limiting generalization to the global population of these schools. Another limitation was focusing on the three healthcare professions of nursing, medicine, and pharmacy and not additional

healthcare educational programs. Findings of this study indicated healthcare educational programs are not following recommendations to include oral health training and IPE opportunities in curriculums. Further research is needed in the areas of IPE and oral-systemic education in the healthcare educational programs of medicine, nursing, and pharmacy.

These studies have suggested a limited number of total hours are dedicated toward providing oral health training to healthcare professional students, and even more specifically to family medicine and pediatric residents. Some of the studies also indicated the amount of oral health training provided and how it is delivered could affect how the information is utilized later in daily practice. Physicians' confidence levels can also affect the delivery of preventive oral health services in daily practice and are related indirectly to the oral health training provided. Furthermore, several of the studies demonstrated a lack of collaboration and IPE activities in the oral health training provided in healthcare education programs.

Oral Health Training Specifically in Family Medicine and Pediatric Residency Programs

In 2004, Gonsalves et al. conducted one of the first studies on oral health training in a family medicine residency program. The overall purpose was to determine the effects of oral health training on the knowledge and attitudes of family medicine residents. The oral health training was a part of the Physicians' Oral Health Education in Kentucky (POHEK), a partnership between the UKCD, University of Kentucky's Department of Family Practice, the Hazard Family Practice Residency, and the Kentucky Osteopathic Medical School. The partnership among all of these healthcare education

programs was also a component of the Health Resources and Services Administration (HRSA) efforts focused on methods of increasing oral health awareness among physicians. Objectives of the oral health training were: “(1) to provide oral health screening and risk assessment, (2) to recognize and manage (including treat and/or refer) oral disease and/or conditions in children ages 5 years and under, and (3) to provide oral disease prevention education and services” (Gonsalves et al., 2004, p. 544-545).

The development of the oral health training occurred over a three-year time span in a total of three phases. The first phase involved the development of a valid survey, which experts in the fields of oral health and medicine completed to determine the appropriate oral health training content. The second phase of developing the oral health training included family medicine residency faculty participating in oral health training workshops. The third phase was actual implementation of the training in family medicine residency programs. The final oral health training developed consisted of 16 hours of didactic coursework followed by four hours of clinical application. The family medicine residents also worked with dental faculty for two days providing preventive oral health services to children of the ages from two weeks to five years.

A total number of 24 residents received the oral health training in the family medicine residency program. Prior to participating in the oral health training, residents completed a written pre-questionnaire on oral health knowledge and attitudes. This same written questionnaire also was administered after residents received oral health training. Additional outcome measurements of the oral health training included skills assessments and chart audits of the children who received oral exams and fluoride varnish applications. A comparison of the results of the pre-questionnaire versus the post-

questionnaire indicated residents had a significant increase ($p < 0.00$) in knowledge of the oral cavity, and on the specific topics of dental sealants and fluorosis. After completing the chart audits, it was evident that a substantial portion of residents ($n=16$, 65.6%) had utilized the oral health section of the well-child preventive care record by checking the boxes associated with oral health screening (Gonsalves et al., 2004). Despite the limited number of participants, Gonsalves et al. (2004) concluded family medicine residents had an increase in oral health knowledge as a result of completing oral health training provided by residency programs. No limitations of the study or areas needing further research were mentioned. An emphasis was stressed on the need for more family medicine residency programs to include oral health training programs similar to the one in this study.

Wawrzyniak et al. (2006) conducted a study to determine the effects of oral health training on family practice residents providing oral health screenings and applying fluoride varnish during well-child visits. Oral health professionals and a pediatrician developed the oral health training and delivered it to 24 family medicine residents and 10 faculty members over a period of two years. Upon completing the didactic portion of the oral health training program, a dental hygienist demonstrated to participants how to provide oral health screenings, apply fluoride varnish, and deliver oral health education specifically to parents/caregivers (Wawrzyniak et al., 2006). Once residents completed both portions of the oral health training, each demonstrated how to provide preventive oral health services during well-child visits. Residents documented services provided on the well-child encounter form. Two years later, results indicated an increase in the percentage of residents providing oral health services during well-child visits. From a

baseline of 0, a total of 192 children (80% increase) ages six months to three years received oral health screenings, and 198 children (91% increase) received fluoride varnish applications. After the oral health training was completed, 100% of the student and faculty physicians (N = 32) were competent in providing oral health screenings, fluoride varnish applications, and oral health education (Wawrzyniak et al., 2006).

Wawrzyniak et al. (2006) concluded oral health training with the addition of demonstrations by oral health professionals (i.e., IPE) can successfully result in an increase in physicians conducting oral health screenings and applying fluoride varnish during well-child visits. No limitations of the study were mentioned. Like Hahn et al. (2012) and Anderson et al. (2011), Wawrzyniak et al. (2006) made the recommendation for further research to determine, once providers have received the oral health training, if the skills and knowledge are being utilized in later daily practices.

Kebriaei et al. (2008) conducted a study to determine if specific infant oral health training could improve the oral health knowledge of pediatric residents at the University of Nebraska Medical Center. The training included information taken from the American Academy of Pediatric Dentistry's guidelines on infant oral health and was presented to the pediatric residents through the means of a PPT presentation and video. A pre- and post-questionnaire were delivered to all of the pediatric residents ($n=32$). The questionnaire presented questions to the residents on oral health knowledge, perceived opinions of oral health, recommendations for the oral health training, and how the information learned would be utilized in daily practice.

After completing the infant oral health training, there was a significant difference ($p < 0.001$) in the pediatric residents' oral health knowledge (pre-questionnaire mean

score of 10.09 and a post-questionnaire mean score of 13.3). When asked about utilizing the information learned in daily practice, a large portion of the pediatric residents ($n=25$, 78.1%) said they would. Kebriaei et al. (2008) concluded an infant oral health training consisting of a PowerPoint presentation and video could improve the oral health knowledge of pediatric residents. Limitations of the study included a small sample size and residents' self-reported data. Further study was recommended to determine if the pediatric residents retain the oral health knowledge and continue to utilize it in daily practice. Studies are also needed to determine how knowledge retention and utilization are related to the educational methods used to deliver the information.

Chandiwal and Yoon (2012) completed a study assessing a one-time oral health training delivered to family physician and pediatric residents at Columbia University Medical Center in New York ($n=12$ family physicians, $n=80$ pediatricians). The one-time oral health training session consisted of a one-hour presentation on the specific target population of infants. The residents completed a pre-questionnaire prior to the presentation and a post-questionnaire upon completion. Residents were assessed on the subject areas of ECC, oral health screening, fluoride, oral health prevention, and anticipatory guidance. Each of these subjects were covered in the presentation.

In comparing results of the pre-questionnaire versus the post-questionnaire, a 13% improvement on the immediately preceding post-questionnaire was reported after residents completed the oral health training (77% on the pre-questionnaire versus 90% on the post-questionnaire). Not all of the topics covered in the presentation had a significant difference between the pre- and post-questionnaire. Two of these specific areas were anticipatory guidance and oral health screenings. The topics where there were

statistically significant differences ($p < 0.05$) included ECC, fluoride, and oral disease prevention. For the content area of ECC, a mean improvement in score of 12% resulted. A similar mean improvement of 19% resulted in the content area of prevention. The residents had the largest improvement in mean score (39%) on the topic of fluoride (Chandiwal & Yoon, 2012).

Chandiwal & Yoon (2012) concluded physicians do not have adequate oral health knowledge, and that oral health training consisting of one presentation could have an effect on this knowledge level. This study did not determine, however, if this oral health knowledge level was retained or applied in practice. Limitations of this study included an unequal amount of residents from each specialty and not knowing the level of the residency program of each resident when the oral health training was completed (Chandiwal & Yoon, 2012).

Talib et al. (2012) conducted a RCT on an oral health training program involving hands-on training and web-based training. The purpose of this RCT was to determine if one method versus another had better results in providing oral health training to pediatric residents. Even though the main focus of this study was not to evaluate an IPE intervention, it contained a brief component of IPE utilizing a dentist. A total of 56 pediatric residents participated in the study which utilized an existing oral health curriculum, *Open Wide*, available from the National Maternal and Child Oral Health Resource Center. Additional oral health training from the Minnesota Dental Health Screening and Fluoride Varnish Application Program was also utilized. All participants completed a pre-test questionnaire prior to the *Open Wide* web-based oral health training (Talib et al., 2012). Randomly selected pediatric residents ($N=56$) were divided into one

of two groups, a Web-based training plus hands-on training group ($n=29$) or a Web-based training alone group ($n=27$). After completing the Web-based training on oral health, one group participated in an additional hands-on oral health training by a pediatric dentist including specifically how to perform an oral examination, apply fluoride varnish, and deliver anticipatory guidance. A post-test questionnaire was completed by all participants immediately after finishing the Web-based training. All of the pediatric residents completed a skills evaluation at the conclusion of all interventions (Talib et al., 2012).

In comparing the results of the pre- and post-tests, all of the pediatric residents had an overall 12% increase in pediatric oral health knowledge with a 95% Confidence Interval ($p = 0.001$). Both groups also had an observed overall increase in self-confidence. Between the Web-based training and hands-on training group a statistically significant difference of 13.9% (95% CI and $p = 0.03$) was observed in the skills evaluation. The Web-based training and hands-on training group exceeded the web-based training alone group in the area of follow-up care (63% versus 86%). The participants' opinions of preventive oral health services being provided to children by only dentists decreased from 84% to 61% ($p = 0.001$). In comparing the two groups, the web-based training and hands-on training group (decline of -33% versus -11%, $p = 0.033$) had even stronger opinions about providing preventive oral health services during well-child visits. Both groups demonstrated a statistically significant improvement of 6% to 25% in fluoride varnish application ($p = 0.001$; Talib et al., 2012).

Ultimately, this study demonstrated an increase in residents' knowledge on pediatric oral health can occur via web-based training alone. However, there are certain

benefits to providing hands-on training in conjunction with Web-based training in the area of follow-up care. The hands-on training in conjunction with Web-based training also affected the opinions of pediatricians about providing preventive oral health services. Limitations of the study included participants all being from the same pediatric residency program and the dental providers who observed the pediatric residents performing oral examinations being the same providers who delivered the training. In addition, the researchers thought a better method of determining study outcomes could have been utilized rather than auditing patient charts. Talib et al. (2012) suggested an area needing further research was the assessment of integrated trainings for both medical and dental providers. Although many educators and policy makers are discussing IPE, the implementation of it is less than ideal.

The previous studies reviewed suggest both family medicine and pediatric residency programs are attempting to increase physicians' oral health knowledge as well as skills. These studies also utilized various means of educational methods to deliver the training to the residents. Some of the oral health training interventions included expertise and demonstrations from oral health professionals, some included simple presentations and videos, and others included both methods. In addition, these studies suggest various educational methods can be utilized in improving the oral health knowledge of primary care clinicians, but questions remain around the retention and use of knowledge in daily practice and if the educational methods used to deliver the training also have an effect.

Oral Health Training in Healthcare Education Programs

Studies involving an oral health professional in the development or delivery of an oral health training, or some other type of IPE component in the oral health training have

been conducted. The University of Kentucky's College of Dentistry (UKCD) and the Pikeville College School of Osteopathic Medicine (PCSOM) developed and evaluated an oral health training program for third-year medical students. Faculty from both programs, including 11 from UKCD and one from PCSOM, completed a curriculum evaluation before developing the oral health training. Other qualified individuals from the UKCD, including a dentist, identified the current amount of oral health content included in the medical curriculum. The results of this evaluation indicated less than four hours of oral health content were included in the medical curriculum (Skelton et al., 2002).

After selecting specific content areas, faculty member experts developed oral health curriculum educational strategies and materials. The curriculum was delivered in two days and included various active learning strategies. These strategies included faculty demonstrating oral exams for participants ($N=56$ osteopathic medicine students), and participants preclinical practice of oral health screenings on one another. An evaluation plan consisting of pre- and post-questionnaires, student focus groups, and course evaluation occurred at designated periods of time (Skelton et al., 2002).

Four months after completion, results indicated students had improved post-questionnaire scores in comparison to pre-questionnaire scores (pre-questionnaire mean score of 48% and post-questionnaire mean score of 70%). Statistically significant differences ($p < 0.05$ and $p < 0.01$) between scores were reported in seven of the eight topic areas: oral cancer, orofacial pain, pediatric oral health, oral trauma and infections, dental caries, oral anatomy, and periodontal disease. Focus group and evaluation results revealed students' participation in the oral health training was a positive experience.

Students found the information to be valuable, especially the oral exam demonstrations and case study discussions (Skelton et al., 2002).

Skelton et al. (2002) identified several challenges in developing the actual oral health curriculum. These challenges included faculty coordination, time for collaboration, developing the competencies, and identifying a day when students in both healthcare programs were available to complete the curriculum. These challenges, however, did not affect the direct and indirect conclusions drawn. Students who completed the curriculum reported an overall positive experience. In addition, four months after curriculum completion, students had retained the oral health knowledge. An indirect conclusion was made on the positive outcomes of working collaboratively among the dental and medical programs. Participants of the study thought the curriculum should definitely be continued.

PA programs have also integrated oral health training with IPE components. Anderson et al. (2010) evaluated the implementation of an oral health curriculum into a PA program. The curriculum was developed with interprofessional involvement of PA and dental hygiene faculty and delivered prior to students' clinical rotations. Similar to Skelton et al. (2002), the current level of oral health content was measured prior to developing the oral health training. However, unlike Skelton et al. (2002), this study specifically mentioned involving dental hygiene faculty in curriculum development and in its delivery to PA students ($N=43$). Lastly, the oral health training integrated teaching intraoral evaluations in small groups (5 PA students to 1 DH instructor) within existing head and neck exam methods taught and utilized by the PA program.

PA students (N=43) completed a written pre-questionnaire prior to the oral health training implementation to assess oral health knowledge. The same questionnaire was delivered after PA students completed the training. Students' perceived competency was determined by comparing pre and post-questionnaire results. A large percentage ($n=37$, 87%) of PA students perceived competency on the effects of medications on oral health and an 84 to 95% perceived competency on knowing when a dental referral is needed for a patient with dental caries or oral lesions. In addition, PA students perceived they were competent in applying fluoride varnish ($n=31$, 71.1%) and identifying causes of dental complaints ($n=30$, 70%; Anderson et al., 2010).

Limitations of the study included a small sample size and logistical challenges within the study due to the locations of the PA and dental hygiene programs. Future research is needed to determine if, after graduation, the PA students are utilizing the oral health knowledge and skills in daily practice. Anderson et al. (2010) concluded PA students and even other healthcare providers can play a role in their patients' oral health, but to do this appropriate interprofessional training first must be provided.

Two additional studies were found in the literature regarding oral health curriculums in PA programs. The first study by Anderson et al. (2013) at Wichita State University also included the involvement of dental hygiene faculty in the development of the oral health curriculum. Both the dental hygiene faculty and PA faculty worked together to identify missing oral health components in the existing PA curriculum prior to developing the oral health curriculum delivered in the study. The final oral health curriculum included both didactic and hands-on lab exercises covering a wide range of

topics from tooth development to systemic and oral health relationships (Anderson et al., 2013).

Approximately six months after entering the workforce a survey was sent to those PA students (N=46) that completed the oral health curriculum while in the PA program. A combined total of 23 PA specialists and generalists (50% response rate) completed the survey consisting of questions in a Likert-scale format regarding their capability of identifying oral health problems and providing services such as fluoride varnish application and oral health screenings. The results of the survey indicated that all respondents “agreed” to being capable of identifying potential and current oral health conditions. However, there was a large difference between the generalist and specialist PA when it came to delivering preventive oral health services and identifying oral health conditions and risk factors on patients during at least a one month period of time. Only 40% of the specialist PA provided an oral exam and identified patients’ oral health conditions in comparison to approximately 90% of the generalist PA (Anderson et al., 2013).

The overall conclusion of the study indicated that including an oral health curriculum developed by both dental hygiene faculty and PA faculty in a PA program can result in both generalist and specialist PA identifying oral health conditions. Limitations of this study included a limited number of study participants and respondents, and the fact that the evaluation of the oral health curriculum only included one PA program (Anderson et al., 2013).

Bowser, Sivahop, and Glicker (2013) reported findings similar to Skelton et al. and Anderson et al. regarding an interprofessional oral health curriculum for PA students

that involved both dental faculty and dental students. One of the main differences in the oral health curriculum in comparison to the above studies was the fact that it was delivered to PA students (N=40) over the entire three-year span of the PA program. The oral health curriculum included lectures on various oral health topics, interprofessional lab experiences, and hands-on instruction by dental faculty and dental students. A baseline survey assessing the students' oral health knowledge on topics such as systemic and oral health relationships, oral exams, and the students' perceptions of IPE was conducted prior to beginning the oral health curriculum. This same survey was completed at the end of the interprofessional workshop and at the end of the students' clinical year, which was exactly two years later (Bowser et al., 2013).

The survey had a 100% response rate on the baseline survey and the two-year follow-up. All of the PA students had a significant increase in oral health knowledge ($p < .03$ and $p < .02$) after completing the curriculum, except for the topic on tooth eruption. When the survey was taken two years later, 36 PA students again completed the survey to determine if the oral health knowledge was retained. In comparison to the baseline and immediate post-survey, the students' retention of overall oral health knowledge at the two year time frame was almost similar to what it was with the survey immediately following completion of the training. In addition to the survey, the study also examined patient Electronic Health Records (EHR) to determine if the third-year PA students in clinical practice were answering specific oral health questions and if an ICD-9 (International Classification of Diseases) code specific to oral health was indicated in the patient's chart. Of the preventive oral health services delivered by the PA students, oral health education was the most frequently provided. The other preventive oral health services

that were delivered included oral health screening, fluoride varnish application, and dental referral (Bowser et al., 2013). The only limitation of this study identified by the authors was “that oral health practices have not yet been widely adopted across practices where our students are precepted” (Bowser et al., 2013, p. 30).

Nursing education programs, like several other healthcare education programs, have included oral health training and IPE. A descriptive study by Hahn et al. (2012) evaluated the effects of oral health training with IPE on nurse practitioner students' ($N=8$) perceived learning and skills. Similar to oral health training program developed in the study by Anderson et al. (2010), both the nursing faculty from the University of California Los Angeles School of Nursing and dental faculty from the University of the Pacific School of Dentistry collaborated to develop the oral health training. The oral health training included a didactic lecture delivered by dental faculty, hands-on clinical practice of students providing oral health screenings, and a lecture satisfaction survey. The oral health curriculum included various clinical applications including an eight hour practicum activity. Within this practicum activity pairs of nurse practitioner students provided oral health assessments to disabled geriatric patients. A total of three evaluations took place over the time period of the study. Over half of the PA students ($n=5$, 62.5%) perceived the lectures to be positive, and students reported an overall gain from the experience. The entire participant sample of 100% ($N=8$), albeit small, perceived the practicum activity to be a positive experience and also beneficial. Patient evaluations indicated positive ratings which included being satisfied with the overall visits and care coordination (Hahn et al., 2012).

Hahn et al. (2012) reported this study as one of the first to utilize IPE with oral health training in a nurse practitioner program with an integration focus point on the gerontological section of the existing curriculum. In agreement with Anderson et al. (2010), Hahn et al. (2012) also noted challenges in the actual integration of the oral health training and practicum between the nursing and dental programs. One of the benefits and keys to the success of this study, however, was having nursing faculty dedicated to the overall purpose of the oral health training. This dedication affirmed the nursing faculty's desire to integrate oral health training into the nurse practitioner curriculum. Limitations of the study noted were small sample size, no pre- or post-test to determine levels of oral health knowledge before and after the training, and no control group. Another similarity between this study and others reported in the literature was the recommendation for future research to follow-up with these healthcare providers at a later point to determine if the knowledge and skills learned are being utilized in daily practice (Anderson et al., 2010 & Hahn et al., 2012).

Golinveaux et al., (2013) also evaluated an oral health education program delivered to pediatric nurse practitioner students (N=30). A pre- and post-test were delivered to determine the student's oral health knowledge, their attitudes and behaviors on delivering preventive oral health services and their confidence levels. The post-test was delivered five to nine months following the participants completing the oral health training. The oral health curriculum delivered consisted of lectures, simulation exercises, hands-on delivery of preventive oral health services, and observation at a pediatric dental clinic involving pediatric dental residents (Golinveaux et al., 2013).

After completing the oral health training, there were several areas where significant results occurred. The first area of the study where significant results ($p<0.0001$) were seen was in the nurses' overall oral health knowledge. Prior to the training the pre-test mean score was 8.9 and after the training the post-test mean score was 10.4. There was also a significant improvement ($p<0.001$) in the pediatric nurse practitioner's confidence level in providing preventive oral health services with a pre-test mean score of 7.8 and post-test mean score of 14.1. In addition, a significant result ($p<0.01$) was seen between the overall pre-test and post-test scores of the survey focused on the participants' attitudes and providing preventive oral health services at well-child visits. The last measure to be evaluated in the study was the participants' actual behavior and providing preventive oral health services and education during well-child visits. There were specific services the participants delivered and reported being more comfortable with providing such as oral health screenings (83%, $n=25$), talking to parents about their child's nutrition (40%, $n=12$, Always; 43%, $n=13$ Frequently; 17% $n=5$, Occasionally) and discussing the importance of seeing a dentist once a year (37%, $n=11$, Always; 40%, $n=12$, Frequently; and 17%, $n=5$, Occasionally). The one service the participants did not provide as frequently were fluoride varnish applications, but this was due to the fact that the fluoride varnish was not available in the clinics where the services were being provided (Golinveaux, et al., 2013).

The overall conclusion of this study revealed that an oral health curriculum integrated into a pediatric nurse practitioner program can in fact have a significant effect on the providers' oral health knowledge, confidence levels, behaviors, and attitudes regarding incorporating preventive oral health services into well-child visits. The authors

did point out that one of the major limitations of this study was not having a control group; however, this was due to the small class size and ethical reasons concerning those students who would not have been able to complete the training. The other limitation of the study was the participants' self-reported answers regarding the preventive oral health services provided during well-child visits (Golinveaux, et al., 2013).

Silk et al. (2009) conducted a study to assess oral health training utilizing the SFL curriculum in a third-year mandatory interclerkship in a medical school program. Methods of IPE were incorporated into the delivery of this training. The training consisted of half-day workshops and began with 91 medical students completing a pre-questionnaire administered by an Audience Response System (ARS). An oral health and medical professional delivered the didactic portions of the oral health training consisting of half-hour lectures. The students' understanding of the information presented in the didactic portions of the training was again measured utilizing the ARS. Similar to the didactic lectures, a dental or medical professional delivered the second part of the workshop which consisted of hands-on clinical portions (Silk et al., 2009).

After completing the oral health training, medical students completed a post-questionnaire with the ARS and written evaluation of the overall training. Two post-questionnaires were delivered, one immediately after completing the training program and then one six months afterwards with a written post-test. A total of 83 medical students completed the post-questionnaires delivered on the day of the workshop, and 73 completed the six month post-questionnaires. There were a total of ten topic areas on the pre- and post-questionnaires taken from the original SFL curriculum. These areas consisted of the following: number of teeth an adult and three year old should have,

gingival hyperplasia, periodontitis and linked medical conditions, early childhood caries (ECC), effects of cancer radiation therapy, oral cancers, oral infections and antibiotic selection, tongue piercings, and the time frame for re-implanting avulsed teeth (Silk et al., 2009).

The results of the immediate post-questionnaire revealed a statistically significant difference ($p = <0.05$) in all areas. At the six month post-questionnaire, only certain topic areas had a statistically significant result. These topics included periodontitis and linked medical conditions (pre-test 24%, six month post-test 54%), ECC (pre-test 33%, six month post-test 77%) and tongue piercings (pre-test 67%, six month post-test 91%). The medical students (N=88) also completed an evaluation summary of the interclerkship. A majority ($n=87$, 99%) learned new knowledge and a similar amount of students ($n=85$, 97%) believed a physician should definitely have this knowledge (Silk et al., 2009).

Limitations of this study included not utilizing the same delivery method for the six-month post-questionnaire as had been used for the immediate pre-questionnaire, and not utilizing measures to determine if the medical students gained any new clinical skills to deliver preventive oral health services. An additional limitation included not measuring the medical students' attitudes in regards to the oral health training. Due to a decrease in knowledge at the six month post-questionnaire, Silk et al. (2009) recommended further research on the educational methods to increase the retention of knowledge learned through the oral health training.

All of these studies have demonstrated how oral health training, despite utilizing a limited amount of IPE and collaboration can play a role in and increase the oral health

knowledge of healthcare providers. Two of the overarching results that were notable included the healthcare provider students' perceptions that oral health training with IPE was a positive experience and that the training also led to a perceived increased competency in providing preventive oral health services. An emphasis was made on the need further research to determine if the information and skills the healthcare providers learn through the oral health training is retained and utilized in daily practice.

Interprofessional Education (IPE)

IPE is gaining increasing attention in education with one of the main goals being to break down healthcare provider silos. As mentioned in Chapter 1, the NIIOH is providing a platform and resources for integrating oral health training into healthcare education programs. The NIIOH believes IPE is critical to breaking down silos in healthcare. By including IPE in healthcare education, medical and oral health professionals can graduate having collaborated together as students and can carry forward into daily practice working together interprofessionally (National Interprofessional Initiative on Oral Health, 2011).

Since the beginning of the NIIOH, strides have been made to incorporate oral health into several healthcare educational programs. To evaluate these strides and accompanying successes, Harder + Company, a research firm, conducted an exploratory evaluation of the initiative in October 2012. The main purpose of the evaluation was to determine if the initiative has had any effect on the oral health education of healthcare providers. The evaluation occurring from June to September 2012 consisted of key informant interviews with educators and initiative funders, and a survey of accredited

family medicine, physician assistant, and graduate nursing education programs (Harder + Company Community Research, 2012).

After Harder + Company completed all evaluation activities, several key themes were identified on the interprofessional initiative. These themes were then grouped into the following sections:

- Developing Leadership
- Education Systems Change
- Opportunities and Challenges for Systems Change
- State by State Findings
- Implications for the Interprofessional Initiative (Harder + Company Community Research, 2012, p. 4).

The key themes identified ranged from the challenges to the successes of the initiative, specifically on the topic of SFL, the integration of oral health into healthcare education programs, the role of oral health professionals in interprofessional education, and the opportunities and challenges of the initiative in moving forward. Under the section of systems change and one of the key themes identified, the topic of IPE was discussed more specifically. Concerns around IPE, the lack of awareness and utilization of IPE in the oral health training of primary care clinicians were also discussed (Harder + Company Community Research, 2012).

In May 2011, a group of professional associations brought together an expert panel to form the Interprofessional Education Collaborative. The associations in charge of forming this expert panel included the Association of Schools of Public Health, the AAMC, the ADEA, the American Association of Colleges of Pharmacy, the American

Association of Colleges of Osteopathic Medicine, and lastly, the American Association of Colleges of Nursing. The main purpose of forming the collaborative was to develop and define specific competencies on the topic of interprofessional collaborative practice. The framework for arriving at the interprofessional collaborative practice competencies was based upon existing competencies among various healthcare professional education programs (Interprofessional Education Collaborative Expert Panel, 2011).

One of the main themes emerging from the Interprofessional Education Collaborative was related to the overall importance of interprofessional education, similar to the NIIOH. The report from the expert panel emphasized in order for healthcare professionals to successfully work interprofessionally in daily practice these same individuals must first work interprofessionally as students. The purpose behind developing a core set of interprofessional collaborative competencies is to provide the framework for healthcare providers to work together as students, work together as colleagues, and work together to ultimately improve patient health outcomes. Additional reasoning behind developing a set of core competencies included the need to identify methods of incorporating the same content across health professions and to possibly have a set of common interprofessional education accreditation standards (Interprofessional Education Collaborative Expert Panel, 2011).

In addition to identifying the need for a core set of interprofessional collaborative competencies, the collaborative came to an agreement on a set of four competency domains. These competency domains included the following: values/ethics for interprofessional practice, roles/responsibilities, interprofessional communication, and lastly, teams and teamwork. Within these competency domains a wide range of specific

competencies were also developed by the expert panel. These competencies, in turn, can be utilized by healthcare education programs as the foundation for various interprofessional education learning strategies and activities in both clinical and community health settings (Interprofessional Education Collaborative Expert Panel, 2011).

The continued efforts of the NIIOH suggest the momentum on including oral health in the education of primary care clinicians is advancing. This movement also was demonstrated in the evaluation Harder + Company completed in October 2012. Within the evaluation, the topic of IPE was stressed and questions were raised as to the status of IPE in the delivery of oral health training in healthcare education programs. This discussion was very similar to the one that occurred during the expert panel brought together to develop the interprofessional collaborative core competencies. It was also one of the main reasons for developing the expert panel and bringing forward the opportunity for collaboration in developing the beginning of an IPE framework for healthcare educational programs to utilize. The evaluation report on the NIIOH and the report from the Interprofessional Education Collaborative Expert Panel suggest IPE as the keystone for healthcare education programs, and even more specifically, oral health training.

As mentioned previously, two of the healthcare professions moving forward with goals of IPE are dental hygiene and nursing. This IPE collaboration was further emphasized by Duley, Fitzpatrick, Zornosa, and Barnes (2012) in a publication describing an ideal Center for Oral Health Promotion model. The authors described this model as a way of bringing dental hygiene students, nursing students and, uniquely,

healthcare management students together through IPE. In this proposed Center for Oral Health Promotion all of the healthcare professional students would work together and provide the services they have been trained to deliver. For example, dental hygiene students would focus on delivering education to patients on the relationships between oral and systemic health as well as delivering preventive oral health services. Nursing students would provide overall health assessments as well as health education to patients, and healthcare management students would ultimately manage the center.

Prior to all of the healthcare professional students working together in this proposed Center for Oral Health Promotion, they would all take required classes on “the basic principles of inter-professional education” (Duley, Fitzpatrick, Zornosa, & Barnes, 2012, p. 67). The authors stressed this center could deliver oral health and overall health preventive services as well as serve as a model for other colleges and universities as a means of creating IPE opportunities among healthcare professional programs. Similar to the NIIOH theories on IPE, this model would immerse healthcare professional students working together in their training and ultimately prepare them to work together professionally after graduation as healthcare providers (Duley, Fitzpatrick, Zornosa, & Barnes, 2012). Unfortunately, at this point in time the proposed Center for Oral Health Promotion has not been established.

An IPE intervention review by The Cochrane Collaboration. IPE is beginning to play a large role in education because of its potential benefits and positive outcomes. The Cochrane Collaboration has reviewed the effectiveness of IPE interventions. In 2008, Reeves et al. reviewed the literature for high level studies on IPE, and more specifically its effects on clinical practice and health outcomes. A total of six randomized controlled studies (RCT) were included in the Intervention Review.

The first RCT conducted by Brown (as cited in Reeves et al., 2008) evaluated an IPE intervention involving 69 healthcare providers (37 in the intervention group and 32 in the control group). Physicians developed the IPE intervention, which consisted of a communication skills program, didactic lectures, and role playing activities. To determine the effects of the program on the communication skills of physicians, nurse practitioners, physician assistants, and optometrists, a satisfaction survey was completed by patients. Survey results indicated there was no increase in patient satisfaction after healthcare providers completed an IPE intervention to improve communication skills.

The second RCT by Campbell (as cited in Reeves et al., 2008) involved six emergency room departments as participants. Three of the departments received the IPE intervention and three did not. Like the first RCT, the IPE intervention included didactic and role playing components in addition to team building activities. A team of violence prevention organizations developed the IPE intervention. Key components of the IPE intervention included collaboration and systems change. Following the intervention, data were collected for 24 months. Results of the IPE intervention indicated improvement, especially in the areas of systems change as well as patient satisfaction ($p = 0.04$ and $p < 0.001$ respectively).

The third RCT by Morey (as cited in Reeves et al., 2008) included control before and after the IPE intervention. Similar to the second RCT, the participants were emergency room departments (six in the intervention group and three in the control group). The main focus of the IPE intervention was improving collaboration among emergency room department staff. The intervention, developed by a physician and nurse from each department, included both didactic, practical, and teamwork activities. To measure the impact on collaboration, data were collected at two separate points following the intervention. Collaboration improved among the emergency room department staff and proved to be statistically significant ($p = 0.012$). Another statistically significant result was emergency room department staff experienced a decrease in the number of patient clinical errors ($p = 0.039$).

The fourth RCT by Thompson (as cited in Reeves et al., 2008) involved participants from primary care practices (59 in the intervention group and 30 in the control group). The IPE intervention included a training developed by a physician and two nurses, consisting of four one hour seminars. A mental health nurse also participated in the development of the IPE intervention since the focus of the training was on mental health. Nine months after participating in the IPE intervention, the primary care practices continued to receive individual coaching. Similar to the third RCT, data were collected at two separate points (six weeks and six months). After the IPE intervention, there was no significant improvement in participants recognizing patient cases of depression.

The fifth RCT conducted by Thompson (as cited in Reeves et al., 2008) involved a one-year IPE intervention on healthcare providers recognizing domestic violence. Participants included primary care practices with two practices in the intervention group

and three in the control group. No reference was given to the developers of the IPE intervention. The intervention consisted of didactic sessions as well as practical applications. At the nine-month data collection point, an increase in domestic violence inquiries and an increase of 30% in the identification of domestic violence cases were reported. Even though increases were seen in both, no statistically significant differences in domestic violence inquiries or the identification of domestic violence cases occurred.

The last RCT by Young (as cited in Reeves et al., 2008) involved an IPE intervention on mental health competence. The developers of the IPE intervention included individuals who had received mental health services. The participants of the study included five organizations from two states with 151 mental health practitioners in the intervention group and 118 in the control group. The intervention consisted of didactic, role playing, and individual facilitation at site visits. Statistically significant increases occurred in the areas of teamwork ($p = 0.003$), competency ($p = 0.02$), education ($p = 0.03$), and holistic approaches ($p = 0.06$).

Unfortunately, due to the limitation of a small number of eligible studies, Reeves et al. (2008) were not able to draw any conclusions. However, improvements in various areas and topics were seen in four out of the six eligible studies. No improvements were experienced in two of the studies reviewed on the actual IPE intervention process or in any patient outcomes (Reeves et al., 2008). This intervention review suggests there were limited benefits to IPE, specifically demonstrated with patient outcomes. Additional high level studies are needed to determine the role of IPE. No studies evaluated the impact of IPE on patient outcomes related to oral health.

Effects of interprofessional education. Although results of The Cochrane Review indicated a need for more high level studies to determine the effects of IPE interventions, additional small scale studies beyond those included in the systematic review have identified positive outcomes of IPE interventions (Dobson et al., 2007; Cooper et al., 2005). These positive outcomes include building teamwork between professionals, improvement in patient care (Dobson et al., 2007) and collaboration, and respect for other healthcare professionals' roles (Cooper et al., 2005). Two professions, dental hygiene and nursing have also embraced IPE by developing an interprofessional education model focused on children with special oral health needs (Mabry & Mosca, 2006).

Dobson et al. (2007) evaluated the effects of IPE and intraprofessional education through a study involving students from pharmacy, nutrition, and physical therapy programs ($N=128$). IPE methods were compared among three groups: one with students from each of the three programs working together, one with students from only two of the programs working together, and one group consisting only of pharmacy students. The students were randomly assigned to one of the three groups. All three of the student groups participated as teams in an assessment lab and developed patient care plans. A pre- and post-assessment lab survey on collaboration and its effects on patient care plan development was completed. Following the assessment lab, individual teams worked together to develop a patient care plan.

Findings of the study were related to past experiences of each program working interprofessionally with other health care programs. Students from the nutrition program reported working with other health care programs the least. Students from both

pharmacy and physical therapy reported working with other health care programs the most ($\chi^2=29.4$; $p < 0.0001$). Pre- and post-assessment lab survey results regarding the specific areas of working collaboratively as a team and in patient care plan development were compared. Results indicated no significant difference in students' preference for working alone, or in a group of students. The intraprofessional group did have a preference for only working with other pharmacy students. A significant difference ($p < 0.05$) was found between the three groups in patient care plan development. Patient care plan total scores for the group of only pharmacy students were lower than those of the interprofessional groups (Dobson et al., 2007).

Dobson et al. (2007) drew several conclusions in regards to students working collaboratively in a team with other healthcare professional students in comparison to working together intraprofessionally as a team. Healthcare professional students who had experience working interprofessionally collaborated better than those healthcare professional students who had no experience working interprofessionally. Another result included healthcare professional students working together interprofessionally as teams. In working together interprofessionally, students developed better patient care plans in comparison to those who were not working interprofessionally. One of the limitations of the study was not being able to control communication in regards to the assessment lab between the three disciplines of healthcare professional students, which could have affected the students' expectations and evaluations of the exercise. Ultimately, it was found that healthcare students who had worked interprofessionally were more apt to work collaboratively with students from other healthcare professions later on in daily practices.

Two years prior to the study by Dobson et al. (2007), Cooper et al. (2005) conducted an in-depth study on IPE. It included participants from four undergraduate programs (medicine, nursing, physiotherapy, and occupational therapy). Two self-selected groups were formed, one that participated in the IPE ($n=237$) and one did not ($n=205$). A majority of students ($n=285$) were from the medicine program. Both groups completed a pre and post *Readiness for Inter-Professional Learning* questionnaire, attended a multi-disciplinary lecture, and completed the standard program courses. Students in the IPE group participated in IPE workshops with trained facilitators, workbooks, e-learning materials, small-group discussions, and other team building exercises. A portion of the IPE group adequately representing all of the programs also participated in interviews.

Quantitative and qualitative results were collected from the pre- and post-questionnaires, reflections and comments made by students, and in-depth interviews. Results from the *Readiness for Inter-Professional Learning* questionnaire were compared between students who received the IPE and the students who volunteered not to receive the IPE. After going through the IPE activities, changes in students' beliefs and benefits of IPE had occurred. Changes included a better understanding of working together ($p < 0.01$), knowledge sharing ($p < 0.01$) and recognizing the importance of learning beyond their own profession ($p < 0.001$). Themes identified through qualitative analysis included usefulness of IPE, value of IPE, timing of IPE, collaboration and various others (Cooper et al., 2005).

Some of the limitations of the study included the students' voluntary decision to participate in the IPE interventions, the use of non-calibrated tutors in delivering the

workshops, and the students' self-reported perceptions of the IPE intervention. An additional limitation was not knowing the long-term impact of the IPE intervention on the students' daily practices. However, the conclusion was made that introducing IPE to students at the beginning of healthcare professional programs and before silos are formed, could have lasting effects on working interprofessionally (Cooper et al., 2005).

Mabry and Mosca (2006) conducted a study evaluating the effects of an IPE model through a collaboration between the United Cerebral Palsy of Greater New Orleans, a dental hygiene program at Louisiana State University Health Sciences Center School of Dentistry, and elementary school nurses. An IPE model consisting of four phases was developed for both dental hygiene students and elementary school nurses. The overall goal of the IPE model was to assess the oral health needs of children with neurodevelopmental/intellectual disabilities and to provide an individualized oral health plan. After providing the oral health screening the dental hygiene students (N=35) provided the information to the elementary school nurses, which was then relayed to the childrens' parents (Mabry & Mosca, 2006).

There were three types of evaluation that occurred in the study. The first evaluation involved the dental hygiene students sharing their overall experiences on the project with a dental hygiene faculty member. The second evaluation captured both the dental hygiene students and nurses perceptions of the experience, and the third evaluation focused on the oral health data gathered from the oral health screenings the dental hygiene students provided to the children. The results of the study revealed that the dental hygiene students believed the IPE model and project to be a satisfying experience (overall score of 4.75 out 5). A majority (70%) of the students felt they played a role in

increasing the nurses' oral health knowledge and a majority (92%) also felt they gained an understanding of the benefits working interprofessionally can have on both learning and the patient's health outcomes. Similar to the dental hygiene students' results, a majority (75%) of the elementary school nurses also thought the experience to be beneficial. The overall conclusions of the study indicated that both the dental hygiene students and elementary school nurses gained a new appreciation of working together interprofessionally. Even more importantly, the nurses learned the importance of children's oral health. No limitations of the study were mentioned (Mabry & Mosca, 2006).

Unlike the intervention studies reviewed by The Cochrane Collaboration, these studies were not RCTs; therefore the evidence from them is not as strong. The outcomes, however, suggest positive outcomes of IPE, especially with students working collaboratively and focusing on the health of patients as a team rather than individuals. These cohort studies suggest students who have worked together interprofessionally are more willing to collaborate with healthcare providers outside of their profession. There may also be benefits to including IPE interventions at the beginning of healthcare education programs in order to have positive benefits and outcomes throughout the entire program, and even more so as students encounter collaborating interprofessionally in the delivery of patient care.

Summary

This literature review has presented information on physicians' and program directors' self-reported perceptions of oral health training in healthcare education programs, oral health training in healthcare education programs, with a section specifically

focused on family medicine and pediatric programs, and lastly, literature on IPE.

Through the literature presented, a shift in oral health training in healthcare education programs has been demonstrated, however, several studies suggest a limited number of hours are dedicated to the training. This finding was demonstrated for both healthcare education programs in general and pediatric residency and family medicine programs. Healthcare education programs, such as dental hygiene, nursing and PA, have embraced IPE and included various components of it in the oral health training provided to students. Some healthcare programs are also utilizing existing oral health training programs such as SFL, or are at least aware of this resource. Questions around the effectiveness and outcomes of IPE still remain, and additional high level studies are needed. There is evidence, however, suggesting positive benefits of IPE and how it can contribute to breaking down silos among healthcare professionals.

The literature presented has alluded to areas needing further research. These areas range from oral health training interventions with larger sample sizes, to follow-up studies on physicians who have completed oral health training to determine if they are utilizing the knowledge and skills learned in daily practice. In addition, studies on educational methods used to deliver the oral health training are needed, including the role IPE plays in oral health training. Several of the studies presented assessed components of IPE, but the role of IPE and more specifically oral health professionals, such as dentists and dental hygienists, in the development or delivery of the oral health training of healthcare providers is yet to be determined. Family medicine and pediatric residency programs are two of the specific healthcare professional programs identified to provide oral health training for residents. Various questions have also been raised about IPE,

including availability of collaborators in other disciplines for curriculum development and interprofessional instructional activities . Therefore, the roles of oral health professionals in the development or delivery of oral health training in family medicine and pediatric residency programs needs to be determined.

Chapter III Methods

This study assessed family medicine and pediatric residents' self-reported experiences in relation to oral health training received in residency training. The relationship between the type of instruction, such as the use of Interprofessional Education (IPE) activities, and the delivery of preventive oral health care services during well-child visits was explored. The self-designed instrument for this study was adapted from the 2006 AAP Annual Survey of Graduating Residents (Caspary et al., 2008), which included a specific section on oral health, as well as a study conducted by Lewis et al. (2009) to determine pediatricians' attitudes and perceptions to providing preventive oral health services to children ages 0-3 years. This instrument titled, *Oral Health Training in Family Medicine or Pediatric Residency Program* was used to assess family medicine and pediatric residents' self-reported experiences in regards to oral health training received in residency. This chapter provides an overview of the research design, participants and sample description, data collection instrument and methods, limitations, and statistical analysis.

Research Design

This descriptive study utilized a cross-sectional survey design. This survey assessed and will add information to the literature regarding the self-reported experiences of third-year family medicine and pediatric residents about oral health training and education, the curricular activities used in the training, and the relationship between these activities and the frequency of delivering preventive oral health services to children 0-5 years old during a well-child visit. The results of this study will contribute to knowledge regarding family medicine and pediatric residency programs related to the incorporation

of oral health training and education in program curricula; the role of dentists, dental hygienists, and dental professional students in IPE; and, the relationship between types of instruction and the frequency of pediatricians and family physicians delivering the services.

Participants and Sampling

Participants. The Accreditation Council for Graduate Medical Education (ACGME) is the organization responsible for the accreditation of all medical residency programs in the United States (Accreditation Council for Graduate Medical Education, 2013). One of its annual responsibilities is to compile a list of the current academic year and future sponsoring institutions of residency programs through the Accreditation Data System (ADS). A list of current residency programs by specific specialty, which also includes information such as the program number, name, address, specialty, director name, telephone number, fax, and e-mail, was obtained from the ADS (Accreditation Council for Graduate Medical Education, 2013). The ADS list was utilized to compile a list of current academic sponsoring institutions for the medical residency specialties of both pediatrics and family medicine (Accreditation Council for Graduate Medical Education, 2013). The participants of this study consisted of third-year family medicine and pediatric residents attending accredited and current academic sponsoring residency programs randomly selected for the study's sample.

Sampling. A simple two-stage cluster sample of the 205 pediatric and 470 family medicine residency programs was used for this study. In the first stage, 29% of the US pediatric residency programs (N=60) and 30% of the US family medicine programs (N=140) were randomly selected for inclusion. All third-year residents enrolled in the

randomly selected programs were invited to participate in the study, pending agreement and coordination with either the program director or residency coordinator. The contact information for each program director or residency coordinator was obtained from the ADS list (Accreditation Council for Graduate Medical Education, 2012). Prior to determining the simple random samples from the sample frame utilizing the free online tool, Research Randomizer (Urbaniak & Plous, 2013), each residency program was assigned a specific code number to use for the randomization process. This assigned code remained the same number for each randomly selected program throughout the entire study. After the sample was determined, an initial e-mail was sent to the selected family medicine and pediatric residency program directors or residency coordinators (Appendix A). The purpose of this e-mail was to provide an introduction of the study and to begin the process of developing rapport with either the program director or residency coordinator in hopes of encouraging them to help in the process of survey facilitation (Dillman et al., 2009).

Human Subjects Protection. The main purpose of the Idaho State University Human Subjects Committee (HSC), also known as the Institutional Review Board (IRB), is to protect human research subjects and ensure all research is properly conducted. The researcher submitted an application and obtained exemption from the HSC prior to implementing the study as designed. This study qualified for a Certificate of Exemption under the category applying to educational practices and settings. The risk to participate in this study was minimal, and all third-year residents who elected to participate in the study completed an informed consent form (Appendix B). Necessary measures, such as data coding, were taken to protect participant confidentiality. After thesis completion, all

informed consent forms, survey results, and any other related study forms will be kept in a locked file cabinet by the major thesis advisor for a period of seven years.

Data Collection Methods

Data Collection Instrument. The instrument for this study (Appendix B) was adapted from the 2006 AAP Annual Survey of Graduating Residents (Caspary et al., 2008) as well as a survey from a study conducted by Lewis et al. (2009) to determine pediatricians' attitudes and perceptions to providing preventive oral health services to children ages 0-3 years. Permission to adapt the survey was obtained from each author (Appendix C and D). The survey design was also guided by information gathered from a review of the literature. The survey content begins with demographic questions and then moves into asking the residents questions about their experiences with any type of oral health training received during their residency program. The questions on oral health training experiences provided further detail on the types of educational activities utilized to deliver the training, and more specifically if there were any IPE activities. The final content of the survey ends with asking questions on the frequency of delivering preventive oral health services during well-child visits. The survey consists of closed-ended questions as well as questions with responses designed in a matrix format. As recommended by Dillman et al. (2009) the survey instrument had an appealing visual appearance. The order of questions was taken into consideration with the easier questions placed at the beginning of the survey and the more difficult questions found at the end of the survey. Once finalized, the survey was reviewed for relevance and content validity by five individuals who are experts in IPE and/or the development of oral health education and training for healthcare professionals. The purpose of determining the

content validity of the survey was to ensure there was relevance between the questions asked and the “domain of content” as described by Wynd et al. (2003, p. 509). Utilizing the content validity procedure, raters reviewed the relevance of the instrument developed for this study (Appendix E). Traditionally, a Likert-type scale is used with four available responses: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant. Once the raters evaluated the instrument using the above scale, the responses were coded into two categories to determine if the content of each item was valid or not valid (Wynd et al., 2003).

The comments and suggestions made by the content experts were incorporated into the survey prior to establishing test-retest reliability. The survey was sent to 10 third-year residents from the university affiliated with the study (Appendix F); this institution was excluded from the two random samples selected for the study. Two rounds of the same survey were emailed to these residents at an interval of one week apart. These same third-year residents (n=4) were instructed to respond to the second survey without referring to their previous answers. Results indicated reliability ($r=0.93$) between the two surveys completed one week apart. After all changes were made to the survey, and content validity and reliability were established, HSC exemption status was obtained.

Methods. The methods and research timeline for this study followed those as recommended for online survey implementation by Dillman et al. (2009). In order to develop rapport with program directors and residency coordinators, an introductory and personalized e-mail regarding the study was sent approximately two weeks prior to the start of data collection. This introductory e-mail was sent on two different dates for the pediatric residency and family medicine residency programs. In addition, an attempt was

made to have a common acquaintance or colleague of the program directors and residency coordinators make contact with them via e-mail a week before the introductory e-mail. The purpose of this was to hopefully encourage participation in facilitating the survey to third-year residents. This attempt resulted in a pediatrician who is a champion for oral health sending an email to all of the pediatric residency programs; however, the author was not able to have the same occur with the family medicine residency programs. Various attempts were made to have family physician program directors send an email to the random sample of family medicine residencies, but one of the directors declined and two did not respond to the request.

Individual e-mails rather than a bulk message were sent to all program directors or residency coordinators to garner support for the study and personalize the invitation to facilitate data collection. The e-mail to the program administrator provided a description and purpose of the study with intent to foster buy-in, encouraged the program administrator to forward the study consent form and link to an online survey to third-year pediatric or family medicine residents, asked for a reply as an indication of willingness to forward the study materials to residents, and lastly, the number of third-year residents enrolled to determine the number they forwarded the online survey link to for participation in the study. Acquiring the number of enrolled third-year residents contributed to determining an accurate response rate for the second stage cluster sample; however, a few programs did not respond with the number of enrolled third-year residents. Multiple e-mail attempts were made by the author requesting this number, but some of the attempts were unsuccessful. The initial e-mail also contained information as to “what is being asked of respondents, why they were selected, what the survey is about,

and how they can contact someone to get their questions answered.” (Dillman et al., 2009, p. 276).

A drawing for a \$300.00 Amazon gift card was offered to the programs who offered to facilitate the survey to their third-year residents. A follow-up telephone call to the program was made within three weeks after the introductory e-mail if no reply was received. This step was taken to ensure the program directors or residency coordinators received the e-mail. When individual follow-up telephone calls were made to the programs several requests were made by program directors or residency coordinators to re-send the introductory e-mail, or to send the e-mail to a different program staff member to determine if the program was willing to participate in the study. The author also had to leave voicemails with several of the program administrators. If the program administrator did not return the telephone call, or email the author, then another attempt was made to contact them. A total of two voicemails were left with program administrators. These follow-up telephone calls also resulted in several programs declining to participate in the study for various specific reasons. Reasons for declining to participate in the study included the program administrators commenting that the residents were already too busy to take another research survey, the residents already receive enough research surveys to complete, the time of year was too busy for the residents due to them graduating, the program was new and didn't have any third-year residents, and then a military program declined participation commenting that they are not allowed to participate in research studies.

The online survey link was immediately e-mailed to program directors or residency coordinators who indicated willingness for their third-year residents to

participate in this study (Appendix G). The online survey was delivered through an online survey software company, Qualtrics, and was used to collect qualitative and quantitative data from third-year family medicine and pediatric residents. This data collection method was selected for specific reasons. First, it is convenient for busy individuals, such as residents or students, to complete surveys via this method. Secondly, by having an online survey versus a mail survey it saves time and money by not having to purchase postage. Residents accessed the online survey instrument through a forwarded e-mail from their program directors or residency coordinators. A drawing for a \$300.00 Amazon gift card was offered to the third-year residents as incentive to participate in the study. Within the forwarded e-mail, an invitation to participate in the study was provided and instructions on how to access the informed consent form and online survey were included (Appendix H).

Additional information on the study purpose, benefits of data, qualifications to participate in the survey, and options to withdraw from the study were shared as well. After the third-year residents elected to participate in the study, completed the online informed consent form and online survey, they were asked to provide the name of the residency program they are currently attending, their full name, and e-mail address. This information was and will be kept confidential as each survey response was automatically assigned a code corresponding to the third-year resident's name. This coding process was designed to keep the data confidential, allow for analysis and interpretation, and assist in determining the final participant response rate. The final participant response rate was determined utilizing the number of enrolled third-year residents given by each program director and the number of online survey responses received.

A study and response timeline were developed to facilitate completion of the survey with e-mail reminders provided one time each week to encourage participation. The first e-mail reminder highlighted to program directors that an e-mail survey link was sent to them, provided a thank-you to those who had already sent the online survey to the third-year residents, and lastly, asked the director to forward the link to the third-year residents if they had not already done so (Appendix I). The last e-mail reminder notified the program director of a final date of access to the online survey link and made a final request to send the link or encourage participation of third-year residents in the research (Appendix J). It also emphasized that the online survey link was ending soon as well as the importance of participation from third-year residents in this study (Dillman et al., 2009).

Limitations

There were limitations with this study. The first was the family medicine and pediatric residents' self-reported experiences may not accurately represent actual oral health training and education, the type of curricular activities employed in the training, and if there were any type of IPE involving a dentist, dental hygienist, or dental professional student. The family medicine and pediatric residents' also self-reported frequency of preventive oral health services delivered in daily practice may not represent actual practices. The second limitation was the low response rate. This level of response was related to the fact that the study depended upon the link to the online survey being distributed to the third-year family medicine and pediatric residents by their institution's program director or residency coordinator. To minimize this limitation, the researcher attempted to build rapport with family medicine and pediatric residency program

directors prior to sending the informed consent, and link to the online survey for their enrolled third-year residents. The researcher plans to share research outcomes with participating program directors and residents to build knowledge for informed practice, enhance scope of care, and facilitate interprofessional understanding of training and education received, particularly as it relates to oral health of children. Despite the anticipated low response rate, the survey was randomly selected from a national population of all pediatric and family medicine residency programs. Thus, the results have the potential to provide insight into trends in oral health education provided to residents, interprofessional experiences between these residents and oral health professionals, and preventive oral health services provided by graduating pediatric and family medicine residents.

Statistical Analysis

The statistical analysis of data included descriptive statistics and percentages for participant demographics and other variables identified in the research questions. Percentages were used to describe the interprofessional experiences reported between pediatric residents and oral health professionals of dental professional students. Spearman's rank correlation was utilized to identify relationships between frequency of the delivery of oral health services and the number of hours spent in oral health training and education.

Summary

This descriptive study utilized a cross-sectional survey design based on an instrument adapted from the 2006 AAP Annual Survey of Graduating Residents (Caspary et al., 2008) and from a survey to determine pediatricians' attitudes and perceptions to

providing oral health services to children ages 0-3 (Lewis et al., 2009). The participants of this descriptive study consisted of two simple random samples of 205 pediatric and 470 family medicine residency programs. Invitations were extended to all third-year residents enrolled in the randomly selected programs and sent the link to the online survey by their program directors or residency coordinators. HSC approval was obtained prior to implementing the study. Prior to beginning the online survey, all participants were provided an online informed consent and the option to not participate.

The instrument developed for this study consisted of closed-ended questions as well as questions in a matrix-type format. Prior to implementation, the content validity of the survey was determined with the help of five individuals who are experts in the areas studied. Based on the comments of the experts, the survey was revised and pilot tested by 4 third-year residents who did not participate in the study. The timeline and methods for this descriptive study were based on the web survey recommendations of Dillman et al. (2009). The limitations of this study were the self-reported experiences of pediatric and family medicine residents and the low response rate because of the online survey link being provided through the program directors or residency coordinators. After the data were received, a statistical analysis involving descriptive statistics and Spearman's rank correlation was utilized to determine the study results.

After the conclusion of the study and the results were analyzed, the author will submit a manuscript to the journal titled *Health and Interprofessional Practice* (see Appendix K for complete author guidelines). A manuscript entitled, "Oral Health and Interprofessional Education Experiences in Family Medicine and Pediatric Residency

Programs”, is included in this thesis in lieu of chapters 4 and 5. This manuscript will be submitted for publication in *Health and Interprofessional Practice*.

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Manuscript

**Title: ORAL HEALTH AND INTERPROFESSIONAL EDUCATION
EXPERIENCES IN FAMILY MEDICINE AND PEDIATRIC RESIDENCY**

Authors:

Angela Bailey, RDH-EA, BSDH, MSDH
Jacque Freudenthal, RDH, MHE
Denise Bowen, RDH, MS
Karen Neill, PhD, RN SANE –A

Angela Bailey, RDH-EA, BSDH is Program Manager of the Idaho Oral Health Program within the Idaho Department of Health and Welfare and received a Master of Science in Dental Hygiene degree from Idaho State University; Jacque Freudenthal RDH, MHE is Assistant Professor in the Department of Dental Hygiene at Idaho State University; Denise Bowen, RDH, MS is Professor Emerita in Dental Hygiene at Idaho State University; Karen Neill, PhD, RN SANE-A is Associate Director for Graduate Studies and Professor, School of Nursing, Idaho State University.

Abstract

INTRODUCTION: The problem of early childhood caries requires interprofessional education and care coordination between oral health professionals and primary care providers; however, the extent of preparation of medical residents and its impact on practice requires further investigation.

METHODS: A two-stage cluster sample of 470 US family medicine and 205 pediatric residency programs was used. Initially, 30% (N=140) of family medicine and 29% (N=60) of pediatric residency programs were randomly selected. Participating programs (N=42, 21%) invited residents. Residents (N=95, 28%) completed an online questionnaire regarding oral health training in residency. Statistical analysis included frequencies and Spearman's correlations.

RESULTS: Eighty-three percent of family medicine and pediatric residents reported receiving some oral health education. Clinical experiences involving oral healthcare were frequently reported (77%, n=75) but infrequently included IPE with an oral health professional. Both groups indicated they provided anticipatory guidance regarding regular dental visits and toothbrushing "very often" and bottles at bedtime "often." Residents reported performing dental caries assessments "often" and applying fluoride varnish "occasionally." For family medicine residents, moderate correlations ($p \leq 0.01$) were found between total hours of oral health education and providing anticipatory guidance. For pediatric residents, a moderate correlation ($p < 0.01$) was found between total hours of oral health education and assessing teeth for demineralization.

CONCLUSION: Increased effort is needed to meet national recommendations in the education of family medicine and pediatric residents regarding oral health care for children, inclusive of increased IPE involving oral health professionals.

Implications for Interprofessional Practice or Interprofessional Education

This study:

1. Serves as a current assessment of the level of interprofessional education within the oral health training of family physicians and pediatricians
2. Emphasizes the importance of primary care providers and oral health professionals working together in an interprofessional approach for the overall health of the nation's children.
3. Suggests a need for increased collaboration among dental hygienists, dentists, and dental professional students within the interprofessional education and oral health training of primary care providers, and provides an educational model designed to foster that goal.
4. Emphasizes the need for family medicine and pediatric residency programs to continue to increase implementation of national recommendations and interprofessional education competencies into practice.
5. Supports practice initiatives expanding the application of oral health care interventions by all primary care providers.

Introduction

The American Academy of Pediatrics (AAP) recommends pediatricians play an integral role in children's oral health (AAP, 2003 & AAP, 2014). Other professional organizations also recommend primary care providers (PCP), such as family physicians, nurse practitioners, and physician assistants (PA) provide pediatric preventive oral health services including anticipatory guidance, oral health screenings and assessments, and the application of fluoride varnish (National Interprofessional Initiative on Oral health [NIIOH], 2011). In 2014, the U.S. Preventive Services Task Force (USPSTF) recommended PCP prescribe fluoride supplementation to children beginning at 6 months of age if they reside in areas with suboptimal fluoride concentration in the drinking water, and provide fluoride applications for all children after their first tooth erupts (USPSTF, 2014). In support of these recommendations, medical insurers are now required to reimburse providers under the Affordable Care Act (ACA) for services assigned a grade A or B by the USPSTF. This reimbursement includes fluoride varnish applications for children ages 0-5 years (Kaiser Family Foundation, 2014). As evidenced by these national initiatives, oral health services are increasingly important educational components of family medicine and pediatric residencies where children receive health care.

There has been a national drive to integrate interprofessional educational (IPE) opportunities across the health care professions to improve quality of care and health of the nation (IOM, 2012). Interprofessional Collaborative Practice Competencies (ICPC) were developed in an effort to prepare healthcare professionals to collaborate effectively in clinical practice (Interprofessional Education Collaborative Expert Panel, 2011). IPE

involving oral health experts such as dental hygienists, dentists, and/or dental professional students is integral to effectively meeting these emerging national recommendations regarding preventive oral health services including oral health assessments, anticipatory parental guidance, prescribed fluoride supplementation and fluoride varnish applications for children ages 0-5 years, among other services. An opportunity exists to include IPE and experiences in family medicine and pediatric residencies to move these initiatives forward.

Prevention of oral disease, particularly dental caries, is critical for supporting health status in individuals and groups at highest risk, which include primarily children and adolescents (Centers for Disease Control and Prevention, 2011). According to a 2015 data brief on dental caries and sealant prevalence in children and adolescents by the National Center for Health Statistics (NCHS), “Approximately 37% of children aged 2–8 years had experienced dental caries in primary teeth in 2011–2012” (pg. 1). Oral health is closely linked to health status and has been recognized as an important component of the curricula across the health professions (U.S. Department of Health and Human Services, 2000). Evidence-based oral health services can improve the health status of children and adolescents by prevention and early intervention of diseases, including dental caries, before they develop into more complicated infections (Kaiser Family Foundation, 2014). In 2011, half of all children on Medicaid did not see a dentist, and over 850,000 patients visited US emergency rooms for preventable dental problems (Pew, 2014). Interprofessional collaboration among oral health professionals and PCP is essential to address this need in an effort to prevent oral-systemic health complications. The NIIOH (2009) stated, “Patients of all ages experience dental disease – incurring

unnecessary pain and expense, in part because their primary care providers do not understand how to prevent or address this disease process.” (para 1). Opportunities exist to enhance preventive oral health services to children through increased intervention provided by family medicine, pediatric medical residents and practicing physicians, as well as other professionals. IPE implemented in the preparation of providers on the front line of children’s health care is an opportunity to enhance competencies that expand preventative care to children.

Literature Review

Despite the AAP’s oral health policies (AAP, 2003 & AAP, 2014) and an existing accreditation standard requiring family medicine residency programs to provide oral health education (Accreditation Council for Graduate Medical Education [ACGME], 2007), studies suggest a limited number of total hours are dedicated to this curriculum content in family medicine and pediatric residency programs (Douglass, et al., 2009; Gonsalves, et al., 2005; Lewis, et al., 2009). Caspary et al. (2008) concluded that over one-third of pediatric residents reported receiving no oral health education during residency. The residents reported less than three total hours of oral health training were provided, including lectures, seminars and clinical observations. Similar results were reported by Lewis et al. (2009) whose findings indicated that less than half of post-residency pediatricians (N=251) reported receiving any oral health education while attending medical school, residency, or Continuing Medical Education (CME) courses. These pediatricians reported they believed they should play a role in children’s oral health; however, a low percentage were actually providing preventive oral health services such as identifying plaque on the childrens’ teeth (25%) and applying fluoride varnish

(3.8%). Douglass et al. (2009) reported family medicine residency program directors indicated their curriculum included one to two hours of oral health education content. However, in 2012, , Silk et al. reported 45% of family medicine residency directors indicated that three or more hours were dedicated to oral health training, with 32% reporting utilizing an oral health professional as a part of that training. These authors concluded an increased number of hours were being allocated to oral health training compared with earlier studies. Herndon et al. (2010), in a study of post-residency pediatricians practicing in Florida, found the majority ($n=333$, 79%) indicated receiving oral health training during medical school or residency. Through a multivariate analysis, Herndon et al. (2010) determined oral health training did relate to confidence levels but did not affect physicians' daily oral health practices.

Limited evidence is available to suggest that IPE experiences can impact the delivery of preventive oral health services in the daily practices of pediatric and family medicine residents. A pilot study by Gonsalves et al. (2004) assessed the impact of an oral health training program developed for family medicine residents by experts in medicine and oral health. The training included IPE clinical experiences for family medicine residents to provide preventive oral health services for children under 5 years of age. The investigators conducted post-training chart audits and found 65.6% of these residents recorded oral health screenings as a part of the well-child preventive care record. Wawrzyniak et al. (2006) conducted a study to determine the effects of oral health education on family medicine residents providing oral health screenings and applying fluoride varnish during well-child visits. Oral health professionals and a pediatrician developed the training, and a dental hygienist demonstrated through hands-

on application how to provide oral health screenings and apply fluoride varnish. Two years later, results of the study by Wawrzyniak et al. indicated an increase in the percentage of residents providing oral health services during well-child visits. Talib et al. (2012) conducted a randomized clinical trial (RCT) to compare results of oral health education programs involving hands-on training and Web-based training to pediatric residents. The hands-on component included IPE utilizing a pediatric dentist to demonstrate oral exams, apply fluoride varnish, and deliver anticipatory guidance. Findings indicated the residents' knowledge of pediatric oral health had increased via the web-based training alone. Further, the addition of hands-on training by a dental professional was found to increase the overall skills of oral examination. The authors noted that further study is indicated.

Although some family medicine, pediatric, and other healthcare professional programs appear to be utilizing the expertise of oral health professionals to foster oral health knowledge and skills, questions remain regarding whether frequency and type of instruction is currently increasing in the US to meet increasing standards and expectations. The potential relationship between oral health curricular and IPE experiences and the impact of those experiences on clinical practices during residency and beyond need further examination. The purpose of this study was to determine family medicine and pediatric residents' self-reported experiences regarding: 1) oral health education in residency, 2) type of instruction including IPE, and 3) whether a relationship exists between the delivery of preventive oral health services during well-child visits and the total number of hours oral health education reported by the third-year residents.

Methods

An online survey adapted from the 2006 AAP Annual Survey of Graduating Residents (Caspary et al., 2008) and the survey developed by Lewis et al. (2009) were used to assess the residents' self-reported total number of oral health education hours received during residency, the type of instruction utilized, and frequency of delivering preventive oral health services during well-child visits. The survey content was validated by five experts in IPE and/or the development of oral health education for healthcare professionals. Recommendations from the experts were incorporated in the final survey instrument. In addition, test-retest reliability was established by family medicine residents ($n=4$) from the university affiliated with the study. Results indicated reliability ($r=0.93$) between the two surveys completed one week apart.

A simple two-stage cluster sample of 470 family medicine and 205 pediatric residency programs were used. In the first stage, 30% of the US family medicine programs ($N=140$) and 29% of the U.S. pediatric residency programs ($N=60$) were randomly selected for inclusion using an online research randomizer program. After receiving a Certificate of Exemption from the university's Human Subjects Committee, all third-year residents enrolled in the randomly selected programs were invited to participate in the study, pending agreement and coordination with either the program director or residency coordinator. The contact information for each program was obtained from the Accreditation Data System list, which is managed by the ACGME (ACGME, 2012), and each program was assigned a code for confidentiality.

Individual e-mails were sent to all program contacts to garner support for the study and personalize the invitation to facilitate data collection (Dillman, 2009). The e-

mail communication provided a description and purpose of the study, encouraging the programs' contact person to forward the study consent form and link to the online survey to third-year family medicine or pediatric residents. A reply regarding willingness to forward the study materials to residents and the number of third-year residents enrolled was requested. The total number of enrolled third-year residents was used to determine an accurate response rate for the second stage cluster sample of residents. Several attempts were made to follow up with nonrespondents via email, telephone, and messages.

The online survey link was immediately e-mailed to program contacts willing to invite third-year residents' participation. An online survey platform, Qualtrics, was used to collect data from third-year family medicine and pediatric residents. Residents accessed the online survey instrument, instructions, and informed consent through a forwarded e-mail from their program contact. A drawing for a \$300.00 Amazon gift card was offered to the program contacts and the third-year residents as an incentive to participate in the study. After the residents elected to participate, and completed the online informed consent form and online survey, each was asked to provide the name of the residency program where they were enrolled, their name, and e-mail address. They were assured this information would be coded and kept confidential. The final participant response rate was determined utilizing the number of enrolled third-year residents provided by each program director and the number of online survey responses received.

Statistical analysis included descriptive statistics for participant demographics. Percentages and frequencies were used to summarize residents' responses in relation to the amount and type of learning activities utilized in their oral health education.

Spearman's rank correlation coefficient was computed to identify relationships between frequency of the delivery of oral health services and the total number of hours spent in oral health education.

Results

Response rates were calculated for each participating residency program. In addition, response rates were calculated for number of resident participants in all programs and by individual family medicine and pediatric programs. The response rates for the residency programs willing to facilitate delivery of the online survey to their third-year residents were 21% (N=42 of 201) for all programs combined, 14% (n=20 of 141) for family medicine residency and 37% (n=22 of 60) for pediatric programs. Response rates for the third-year resident participants were 28% (N=95 of 336) for all residency programs combined, 36% (n=38 of 105) for family medicine, and 25% (n=57 of 231) for pediatric. Two responses were not included because the participants only completed the demographics portion of the survey. A total of 95 participants completed the questionnaire.

Table 1 presents the demographic data for the sample of third-year residents participating in the study. The average age of participants was 30.5 years, ranging from 28 to 40 years. The majority of the participants reported their race as White, non-Hispanic (75.8%, n=72). Gender was not included in the demographic data due to a malfunction in the online survey program for that item.

Eighty-three percent of all third-year family medicine (n=38) and pediatric (n=57) residents reported receiving some type of oral health education in the residency program. Participants reporting no oral health education during residency were 17% (n=16) for all

respondents (N=95), 32% (n=12) for family medicine residents, and 7% (n=4) for pediatric residents. Although 45% (n=17) of the family medicine residents (n=38) and 42% (n=24) of pediatric residents (n=57) reported receiving 1 to 3 hours of oral health instruction, the median number of hours reported was 1 to 3 hours for family medicine, 4 to 6 hours for pediatrics, and 1 to 3 hours for all third-year residents combined (Table 2).

Tables 3 and 4 report frequency of the type of oral health instruction received during residency including classroom, community, and clinical based activities. The most frequent response was one to three hours of classroom instruction for family medicine (n=15 of 24, 63%) and pediatric (n=35 of 48, 73%) respondents. Clinical activities also were reported frequently by these respondents. One to three hours were reported by family medicine (n=11 of 24, 46%) and pediatric (n=29 of 50, 58%) residents. Both groups included additional respondents reporting more than three hours indicating that a majority of residents in both groups experienced some clinical instruction during residency.

Tables 5 and 6 display data summarizing responses of those residents who responded to the items concerning IPE experiences involving an oral health professional or student: family medicine residents (N=25, 66%) and pediatric residents (N=48, 84%). A majority of both family medicine and pediatric residents, respectively, reported having had no exposure to IPE in the classroom (60%, n=15 and 54%, n=26), community, (88%, n=22 and 85%, n=41), or clinical setting (76%, n=19 and 67%, n=32) during their oral health education. Respondents who reported having any type of IPE during their oral health education with an oral health professional most commonly indicated that a dentist was the oral health professional involved.

The median number of family medicine (n=36) and pediatric residents (n=54) indicating the frequency of preventive oral health services during well-child visits is presented in Table 7. Both pediatric and family medicine residents indicated preventive oral health services were provided "very often" in response to *educating patients and parents/caregivers on the importance of regular visits to the dentist and tooth brushing*. Pediatric residents reported "often" *assessing children's teeth for dental caries and educating parents/caregivers regarding oral health effects of a child sleeping with a bottle with something other than water and giving a child juice, sweetened, or carbonated beverages*. Both family medicine and pediatric residents reported "rarely" *assessing parents'/caregivers' oral health history*. *Applying fluoride varnish to children's teeth* was reported as "rarely" provided by family medicine residents and "occasionally" provided by pediatric residents.

Spearman's Rank Correlation was used to determine the magnitude and direction of relationship between reported preventive oral health services provided during well-child care visits by family medicine and pediatric residents, and the total hours of oral health education or training reported. Correlation data and p values are presented in Table 8. Although several correlations had statistical significance ($p < 0.05$), the strength of some of the associations were weak. For family medicine residents, total hours of oral health education were moderately associated with providing education to patients and parents/caregivers on *the oral health effects of a child sleeping with a bottle with something other than water* ($r = .566$, $p < 0.001$), *importance of regular visits to the dentist* ($r = .539$, $p < 0.01$) and *regular tooth brushing* ($r = .568$, $p < 0.001$). For pediatric residents, *assessing children's teeth for enamel demineralization* ($r = .435$, $p < 0.01$)

during well-child care visits was moderately correlated with the total number of hours of oral health education.

Discussion

Both family physicians and pediatricians can play an important role in children's oral health, especially for those at high risk for dental disease. In 2007, the ACGME enacted an accreditation standard requiring family medicine residency programs provide oral health education (ACGME, 2007), and yet, 32% of family medicine respondents reported receiving no oral health education in their residency. The median response regarding total number of hours reported by family practice residents was one to three hours, possibly slightly more than findings by Douglass et al. (2009) citing one to two hours and supporting findings of Silk et al. in 2012 who concluded that oral health instruction had increased in family medicine residencies. Silk did indicate, however, that 45% of family practice residency program directors reported three or more hours, a total higher than reported by these residents.

No similar accreditation standard for pediatric residency programs has been enacted; however, in 2003, the pediatrician's role in children's oral health was emphasized when the AAP recommended that pediatricians provide oral health risk assessments to children at 6 months of age (AAP, 2003). Since then, several online oral health curriculums have been created and approved for CME for physicians (American Academy of Pediatrics, 2011). These and other national initiatives have apparently positively impacted current oral health curriculum content in pediatric residencies, as only 7% of pediatric residents indicated receiving no education. In 2008, Caspary reported 21% of pediatric residents reported having received no oral health education,

and the total number of hours was one to three. Pediatric residents responding to this study reported receiving a total of four to six hours of oral health instruction. Results of this study indicated that third-year family medicine and pediatric residents continue to receive limited total hours of oral health education in residency, with pediatric residents receiving more hours than family medicine residents. This finding is not surprising, given that the AAP, in comparison to the American Academy of Family Physicians (AAFP), has taken a stronger position promoting pediatricians to provide these services (AAP,2013; AAP, 2014).

Another important factor that could affect whether or not family physicians or pediatricians provide preventive oral health services to children in clinical practice is the type of educational experiences included in the curriculum, including IPE involving oral health professionals. Clinical activities, incorporating the delivery of preventive oral health services, were reported by over half of the family medicine and pediatric residents with the most frequent estimate of total clinical experiences being one to three. Considering the reports of classroom instruction and clinical instruction, it appears that most family medicine and pediatric practice residents are benefiting from a combination of oral health-related didactic and clinical activities. Study findings also indicated that pediatric residents in comparison to family medicine residents, are receiving more oral health education through clinical experiences.

Nonetheless, respondents to this survey reported receiving most of their oral health education or training through classroom instruction. This type of instruction may have included oral health education delivered through online programs (AAP, 2011; Douglas, et al., 2010), although this study did not differentiate online instruction from

classroom instruction when assessing the method of delivery. Therefore, some residents could have interpreted online programs to be a sub-category of classroom instruction. Others may not have considered online instruction.

Some methods of oral health education have been found to be more effective than others in increasing the oral health knowledge of healthcare providers and increasing the preventive oral health services provided by health professional students. One approach that has been reported as positive is an IPE component in the training (Anderson, Smith, & Brown, 2013; Skelton et al., 2002; Gonsalves et al., 2004; Talib et al., 2012; Wawrzyniak et al., 2006). Several of these effective IPE programs utilized an oral health professional to demonstrate how to conduct an oral exam. A large majority of respondents in this study reported encountering no IPE during their oral health education or training; however, findings indicated some programs are including interprofessional collaboration with oral healthcare professionals, primarily dentists. Dental hygienists are primary care oral health professionals licensed to provide preventive and therapeutic services that support overall health through the promotion of optimal oral health (ADHA, 2014). Thus they have expertise regarding oral health instruction and anticipatory guidance. There are 335 entry-level dental hygiene programs (ADHA, 2014b) and 60 dental schools in the US (ADEA); therefore, availability of personnel for IPE is expanded with inclusion of dental hygienists. Medical residency educators should consider collaborative experiences with dental hygiene educators as a method of increasing IPE in the oral health component of their curriculum. Studies involving IPE and oral health curriculum development involving physicians and dentists or dental hygienists have indicated that educational experiences are positive.

Family physicians and pediatricians are in an opportunistic position to deliver oral health screenings and assessments, anticipatory guidance, and fluoride varnish applications to children during well-child visits given appropriate education and training. Residents in this study reported providing education or anticipatory guidance to parents/caregivers more frequently than actually assessing a child's teeth for plaque or enamel demineralization, a finding agreeing with previous findings by Lewis et al., (2009). Both groups did, however, report assessing children's teeth for dental caries "often." Family medicine residents reported only "rarely" applying fluoride varnish to children during well-child care visits, and pediatric residents reported only "occasionally" providing the service. This finding is interesting since it is the one service with Medicaid reimbursement in several states (AAP, 2014). The new USPSTF recommendation on fluoride supplementation and medical insurers providing coverage and reimbursement for the application of fluoride varnish due to the ACA might be the impetus for increasing the delivery of this service. Medical residency programs may benefit from adding IPE activities to their oral health curriculum and by utilizing the expertise of dental hygienists for hands-on demonstrations of the procedure.

Relationships were evident in this study between certain preventive oral health services provided at well-child visits by family medicine and pediatric residents and the total hours of oral health education and education received. In terms of assessing children's teeth for enamel demineralization, study results indicated a moderate correlation between pediatric residents providing this service and the total number of hours of oral health education or training received. However, the moderate correlations between preventive oral health services provided and total hours of related instructions

were limited to providing anticipatory guidance for family medicine residents. This difference could be due to the amount of attention the AAP has dedicated to pediatricians providing these services and the resources they have provided (AAP, 2014), rather than the number of hours of oral health education included in the curriculum. Herndon et al. (2010) found no correlation between total hours of instruction and delivery of preventive oral health services, and this study found few. Perhaps the more important factor is the type of education and experiences related to oral health being included in the residency curriculum. This issue requires further investigation. The low number of responses to the IPE items in this survey precluded statistical analysis of these associations.

One of the limitations of this study was a low response rate of residency programs and third-year residents participating in the study, which is common among studies involving healthcare providers as participants (VanGeest, Johnson, & Welch, 2007). Although these response rates were low, this study utilized a random sample, was conducted on a national level, and had a small, but representative sample of third-year residents. According to Cook, Heath & Thompson (2000), “response representativeness is more important than response rate in survey research.” To encourage survey response, the author provided both the residency programs and residents a monetary incentive to participate in the study, in addition to having a colleague of the pediatric residency programs contact all of the pediatric residency program directors across the nation. Monetary incentives, short surveys, involvement of a medical peer, and surveys via fax have all been shown to increase physician response rates (VanGeest, Johnson, & Welch, 2007).

Other factors that limited the number of responses were the high number of surveys conducted with medical residency programs and the fact the study was conducted near the time the third-year family medicine and pediatric residents were about to graduate from their respective programs. Several family medicine residency programs refused to invite their third-year residents due to the large number of survey requests they regularly receive, and several program administrators failed to return voicemails. Lastly, the participants' lack of interest in oral health education, otherwise known as topic saliency, might have influenced response rates. Topic saliency has shown to play a role in studies with low response rates (Adua & Sharp, 2010). When comparing the response rates of online and mail surveys, online surveys traditionally have a lower response rate (Manfreda, Bosnjak, Berzelak, Haas & Vehovar, 2008).

Conclusion

Findings from this study provide valuable insight into oral health curricular content in US family medicine and pediatric residency programs. Based on this study and similar findings in the published literature, there is a clear need for more effort in this area to meet national recommendations regarding the need for these primary care providers to provide oral health assessments and preventive interventions such as fluoride varnish applications for children ages 0-5 years. This study provides insight into the role oral health professionals may be playing with IPE, and baseline information regarding family physicians and pediatricians applying fluoride varnish to children's teeth during well-child visits prior to the new USPSTF recommendation. Results indicate oral health education, in addition to IPE, may have slightly increased in pediatric residency programs across the nation over the past five to ten years, possibly influenced by the

addition of clinical experiences, based on previous reports in the literature. Further research is needed on the role IPE plays in these providers delivering preventive oral health services to children during well-child visits in clinical practice, and on the effects the USPSTF recommendation has on the provision of these services. Innovative methods for delivery of education in this area are needed with emphasis on the alignment of learning objectives with national recommendations.

An educational model to attain these goals is demonstrated in Figure 1. Medical residency programs can incorporate oral health education into their existing curricula by utilizing Smiles for Life: A National Oral Health Curriculum (SFL). After completing SFL, residents can learn how to provide oral health screenings and fluoride varnish applications through IPE experiences within existing or new clinical and community settings. Implementing this curricular model would allow medical residency programs to support evidence-based best practices, national recommendations, and help prevent tooth decay in children.

Conflicts of Interest

The authors have no conflicts of interest.

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Table 1***Respondents' Age and Race Characteristics***

Characteristics of Residents	Family Medicine <i>n</i>	Pediatric <i>n</i>	Combined N
Average Age ^a	31.5 (2.9%)	29.8 (1.8%)	30.5 (2.4%)
Race			
White	28 (74%)	44 (77%)	72 (76%)
Black	0	3 (5%)	3 (3%)
Asian Indian	0	2 (4%)	2 (2%)
Chinese	2 (5%)	0	2 (2%)
Filipino	1 (3%)	1 (2%)	2 (2%)
Guamanian	1 (3%)	0	1 (1%)
Other Asians	2 (5%)	2 (4%)	4 (4%)
Other	4 (10%)	4 (7%)	8 (8%)
Totals	<i>n</i> =38	<i>n</i> =57	N=95

^aStandard deviation in parentheses

Table 2

Respondents Reporting Total Hours of Oral Health Training and Education during Residency*

Hours	Family Medicine <i>n</i> (%)	Pediatric <i>n</i> (%)	All N (%)
No Training	12 (32%)	4 (7%)	16 (17%)
1-3 Hours	17 (45%)	24 (42%)	41 (43%)
4-6 Hours	8 (21%)	22 (38%)	30 (32%)
7-9 Hours	0	5 (9%)	5 (5%)
10-12 Hours	1 (3%)	1 (2%)	1 (1%)
13+ Hours	0	1 (2%)	1 (1%)
n	38	57	95
Median	1-3 Hours	4-6 Hours	1-3 Hours

*Percentages rounded to the nearest whole number; column totals range from 99% to 101%

Table 3***Respondents Reporting Total Classroom, Community, and Oral Health Clinical Activities Hours of Instruction for Family Medicine Programs***

Location	0 Hours	1-3 Hours	4-6 Hours	7-9 Hours	10-12 Hours	n
Classroom	7 (29%)	15 (63%)	1 (4%)	1 (4%)	0	24
Community Service Experiences	21 (88%)	3 (13%)	0	0	0	24
Clinical Activities	10 (42%)	11 (46%)	3 (13%)	0	0	24

Note: Totals equal > 100 percent as respondents selected all responses that applied.

Table 4***Respondents Reporting Total Classroom, Community Oral Health Experiences, and Clinical Activities Hours of Instruction for Pediatric Residency Programs****

Location	0 Hours	1-3 Hours	4-6 Hours	7-9 Hours	10-12 Hours	n
Classroom	9 (19%)	35 (73%)	4 (8%)	0	0	48
Community Service Experiences	27 (60%)	17 (38%)	1 (2%)	0	0	45
Clinical Activities	13 (26%)	29 (58%)	5 (10%)	1 (2%)	2 (4%)	50

Note: Totals equal > 100 percent as respondents selected all responses that applied

Table 5

Respondents Reporting Type of IPE Training Provided by an Oral Health Professional in Family Medicine Residency (N=38)*

Location	Dentist	Dental Hygienist	Dental Professional Student	None	n
Classroom	8 (32%)	1 (4%)	3 (12%)	15 (60%)	25
Community Experiences	2 (8%)	0	1 (4%)	22 (88%)	25
Clinical Activities	4 (16%)	1 (4%)	1 (4%)	19 (76%)	25

*Respondents selected all that applied; percentages are based on 25 respondents for each item. A total of 13 family medicine resident respondents did not answer the questions.

Table 6

Respondents Reporting Type of IPE Training Provided by an Oral Health Professional in Pediatric Residency (N=57)*

Location	Dentist	Dental Hygienist	Dental Professional Student	None	n
Classroom	17 (35%)	1 (2%)	4 (8%)	26 (54%)	48
Community Experiences	3 (6%)	0	4 (8%)	41 (85%)	48
Clinical Activities	9 (19%)	1 (2%)	10 (20%)	32 (67%)	52

*Respondents selected all that applied; percentages are based on 48 respondents for each item. A total of 9 pediatric resident respondents did not answer the questions.

Table 7

Median Response to Frequency of Oral Health Services Delivered to Children (0-5 years old) at Well-Child Care Visits in Clinical Practice

Oral Health Service	Family Medicine Residents (n=36)	Pediatric Residents (n=54)	All Residents (n=90)
Assess Children's Teeth for Dental Caries (Tooth Decay)	Often (4)	Often (4)	Often (4)
Assess Children's Teeth for Enamel Demineralization	Occasionally (3)	Occasionally (3)	Occasionally (3)
Assess Children's Teeth for Plaque	Occasionally (3)	Rarely (2)	Rarely (2)
Assess Parents'/Caregivers' Oral Health History	Rarely (2)	Rarely (2)	Rarely (2)
Apply Fluoride Varnish to Children's Teeth	Rarely (2)	Occasionally (3)	Occasionally (3)
Educate Patients and Parents/ Caregivers on Importance of Regular Visits to the Dentist	Very Often (5)	Very Often (5)	Very Often (5)
Educate Patients and Parents/ Caregivers on Importance of Regular Tooth Brushing	Very Often (5)	Very Often (5)	Very Often (5)
Educate Parents/ Caregivers on Oral Health Effects of a Child Sleeping with a Bottle with Something Other Than Water	Often (4)	Often (4)	Often (4)
Educate Patients and Parents/ Caregivers on the Oral Health Effects of Juice, Sweetened Beverages, or Carbonated Beverages	Often (4)	Often (4)	Often (4)

Likert Scale used for frequency responses: 1=Never, 2=Rarely, 3=Occasionally, 4=Often, 5=Very Often

Table 8

Spearman's Rank Order Correlations for Relationship between Frequency of Oral Health Services at Well-Child Care Visits by Total Hours of Oral Health Education/Training

Oral Health Service	Family Medicine Residents (n=36)	Pediatric Residents (n=54)	All Residents (N=90)
Assess Children's Teeth for Dental Caries (Tooth Decay)	.378*	.294*	.345**
Assess Children's Teeth for Enamel Demineralization	.273	.435**	.369***
Assess Children's Teeth for Plaque	.115	.399**	.263**
Assess Parents'/Caregivers' Oral Health History	-.028	.045	.015
Apply Fluoride Varnish to Children's Teeth	.227	.098	.189
Educate Patients and Parents/ Caregivers on the Importance of Regular Visits to the Dentist	.539**	-.075	.231*
Educate Patients and Parents/ Caregivers on the Importance of Regular Tooth Brushing	.568***	.028	.336**
Educate Parents/Caregivers on Oral Health Effects of Child Sleeping with a Bottle with Something Other Than Water	.566***	.142	.348**
Educate Patients and Parents/Caregivers on the	.349*	.063	.184

Oral Health Effects of Juice,
Sweetened Beverages, or
Carbonated Beverages

* $p < 0.05^{**}$; $p < 0.01^{***}$; $p < 0.001^{***}$

Figure 1

Interprofessional Oral Health Education Model



Appendix A: Initial E-mail to Family Medicine and Pediatric Residency Program Administration

Dear _____,

As a graduate student at Idaho State University in the Master of Science in Dental Hygiene program, I am contacting you regarding my thesis study designed to determine family medicine and pediatric residents' self-reported experiences in relation to the following: 1) oral health training and education in their residency program, 2) type of curricular experiences (classroom instruction, community and service learning activities, clinical activities, and interprofessional education), and 3) delivery of oral health care services in their clinical practice experiences.

Your program and third-year residents were randomly selected as potential participants for this study. With your assistance, this study will have the potential to inform governmental agencies, medical and dental educational associations and other healthcare professional organizations on the current status of oral health training delivered in two specialties of medicine that commonly treat children. Ultimately, your assistance and publication of these results in the form of a manuscript could aid in the prevention of dental diseases, especially in young children.

Participating in this study will involve 5-10 minutes of the third-year residents' time to complete an online survey consisting of 10 questions. If you agree to provide assistance with this study your involvement would include two tasks: 1) forwarding a link to the online survey to third-year residents enrolled in your program and 2) indicating the number of residents the link is forwarded to for completion. ***Please reply to this email indicating if you are willing to participate by forwarding the survey to your third-year residents, or if you are not willing to participate by (Insert Date). If you are willing to participate you will also be entered into a drawing for a \$300.00 Amazon gift card.*** If you have any questions or concerns regarding this study please contact me at the following e-mail address: bailange@isu.edu or by telephone 208.305.9154.

Thank you for your time and assistance. I look forward to hearing from you soon!

Sincerely,
Angie Bailey, RDH-EA, BSDH

Cc: Jacqueline Freudenthal, RDH, MHE, Associate Professor in Dental Hygiene and Thesis Advisor

Appendix B: Informed Consent form and Survey of Oral Health Training in Medical Residency Programs

Qualtrics Survey Software

<https://isudhs.qualtrics.com/ControlPanel/Ajax.php?action=GetSurveyPr...>

Default Question Block

Dear Third-Year Resident,

You have been invited to participate in this study because you are a third-year resident in a family medicine or pediatric residency program. **If you choose to participate in this study you will be entered into a drawing for a \$100.00 Amazon gift card.** The purpose of the study is determine family medicine and pediatric residents' self-reported experiences in relation to the following: 1) oral health training and education in residency, 2) type of curricular experiences and resources employed in the oral health training, and 3) delivery of oral health care services in everyday clinical practice. The relationship between the type of instruction and the delivery of preventive oral health care services also will be explored. I am completing this study based on my personal interest in the oral health of children, as well as for my thesis research project as a graduate student at Idaho State University.

Participating in this study involves completing an online survey that will take approximately 5 minutes of your time. Your information (name of residency program currently attending, full name, and e-mail address) and survey responses will be kept strictly confidential, and a code will be assigned to your responses. **Your personal information will only be used for the purposes of the drawing for a \$100.00 Amazon gift card.** Your participation in this study is completely voluntary, and you may elect not to participate in it. There will be no penalty if you choose to either not participate in the study.

All data from survey responses will be stored in a password protected electronic file. The results of this study will be used for scholarly purposes only and will be shared with members of my thesis committee. I also plan to submit a research manuscript for publication; however, results will be reported in group form only.

If you have any questions about the study, please contact Angie Bailey at bailange@isu.edu. This study has been reviewed and exempted by the Idaho State University Human Subjects Committee according to its procedures for research involving human subjects.

ELECTRONIC CONSENT: Please select your choice below.

Clicking on the "agree" button below indicates that:

- you have read the above information in its entirety
- you voluntarily agree to participate in this study, and
- you are at least 18 years of age

☐ AGREE

☐ DO NOT AGREE

Oral Health Training in Family Medicine or Pediatric Residency Program

The following survey asks for information in regards to the oral health training you received during family medicine or pediatric residency. Please select only ONE response unless otherwise stated.

- The term "oral health professional" in the survey questions refers to any one of the following: dentist, dental hygienist, or student enrolled in one of these professional programs.

Please note all responses will be kept confidential and no individual responses will be disclosed to others. Responses will only be reported in aggregate form to describe the oral health training delivered in a residency program. *Your input is appreciated and valuable to this research, designed to support continued development of residency programs.*

Please begin the survey by starting with the following question:

"I was or am a current 3rd year resident in a Family Medicine Program."

- ☐ Yes
- ☐ No

"I was or am a current 3rd year resident in a Pediatric Residency Program."

- ☐ Yes
- ☐ No

Block 1

What is your gender?

- ☐ Male
- ☐ Female

What is your race?

- ☐ White, non-Hispanic
- ☐ Black, African-American, Negro
- ☐ American Indian/Alaska Native
- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese
- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander
- ☐ Other

What is your age?

Block 2

During your residency, how many total hours of oral health training and education did you receive?

- ☐ 1-3 Hours
- ☐ 4-6 Hours
- ☐ 7-9 Hours
- ☐ 10-12 Hours
- ☐ 13 or More Hours
- ☐ I did not receive oral health training or education during my residency

During your residency, how many hours of oral health training and education were dedicated towards Classroom Instruction, Community or Service Learning Activities, and Clinical Activities? You may only select one answer for each category (Classroom Instruction, Community or Service Learning Activities, or Clinical Activities).

	0 Hours	1-3 Hours	4-6 Hours	7-9 Hours	10-12 Hours	13 or More Hours
Classroom Instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Community or Service Learning Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

During the oral health training and education delivered in your residency, was an oral health professional involved with Classroom Instruction, Community or Service Learning Activities, or Clinical Activities? **For this question you may select more than one answer.**

	Dentist	Dental Hygienist	Dental Professional Student	None
Classroom Instruction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Community or Service Learning Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clinical Activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How frequently do you deliver the following oral health services at a well-child care visit for a child 0-5 years old?

	Never	Rarely	Occasionally	Often	Very Often
Assess children's teeth for dental caries (tooth decay)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess children's teeth for enamel demineralization?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess children's teeth for plaque?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess parents'/caregivers' oral health history?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apply fluoride varnish to children's teeth?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the importance of regular visits to the dentist?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the importance of regular tooth brushing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the oral health effects of a child sleeping with a bottle with something other than water to bed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the oral health effects of juice, sweetened beverages or carbonated beverages?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Block 3

If you wish to participate in the drawing for a \$100 Amazon gift card please enter the following information. As previously stated **your personal information will only be used for the purposes of the drawing for a \$100.00 Amazon gift card.**

Your Name

Your e-mail address

Name of Residency Program

(Survey: Pre Content Validity and Test Re-Test Reliability)
Oral Health Training in Family Medicine or Pediatric Residency Program

The following survey asks for information in regards to the oral health training you received during family medicine or pediatric residency. Please select only ONE response unless otherwise stated.

Please note all responses will be kept confidential and no individual responses will be disclosed to others. Responses will only be reported in aggregate form to describe the oral health training delivered in a residency program.

“I was or am a current 3 rd year resident in a”:			
Family Medicine Program	Yes	<input type="radio"/>	No <input type="radio"/>
Pediatric Residency Program	Yes	<input type="radio"/>	No <input type="radio"/>

DEMOGRAPHICS

1. Gender
☐ Female
☐ Male
2. Race

<input type="radio"/> White, non-Hispanic	<input type="radio"/> Korean
<input type="radio"/> Black, African-American, Negro	<input type="radio"/> Vietnamese
<input type="radio"/> American Indian/Alaska Native	<input type="radio"/> Native Hawaiian
<input type="radio"/> Asian Indian	<input type="radio"/> Guamanian or Chamorro
<input type="radio"/> Chinese	<input type="radio"/> Samoan
<input type="radio"/> Filipino	<input type="radio"/> Other Pacific Islander
<input type="radio"/> Other Asian	<input type="radio"/> Other _____
<input type="radio"/> Japanese	
3. Age _____ (Integer Box)
4. Name of Residency Program _____ (Text Box)
5. Your Name _____ (Text Box)
6. Your e-mail address _____ (Text Box)

ORAL HEALTH TRAINING

7. During your residency, how many total hours of oral health training and education did you receive?
- ☐ I did not receive oral health training or education during my residency.
- ☐ 1-3 Hours
- ☐ 4-6 Hours
- ☐ 7-9 Hours
- ☐ 10-12 Hours
- ☐ 12 or More Hours
8. If you received any amount of oral health training and education during your residency, did it include any type of integrated training with an oral health professional?
- ☐ Yes
- ☐ No
- ☐ Not sure

9. During your residency, how many hours of oral health training and education were dedicated towards Classroom Instruction, Preclinical Activities, and Clinical Activities? You may only select one answer for each category (Classroom Instruction, Preclinical Activities, or Clinical Activities).						
	0 Hours	1-3 Hours	4-6 Hours	7-9 Hours	10-12 Hours	12 or More Hours
Classroom Instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preclinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

10. During your residency, was a dentist, dental hygienist, or dental professional student involved in the oral health training and education?
- ☐ Yes
- ☐ No

IF YES, CONTINUE TO QUESTION #8. IF NO, PLEASE STOP COMPLETING THE SURVEY AT THIS POINT.

11. During the oral health training and education delivered in your residency, was a
--

Dentist, Dental Hygienist, or Dental Professional Student involved with Classroom Instruction, Preclinical Activities, or Clinical Activities? You may only select one answer for each category (Classroom Instruction, Preclinical Activities, or Clinical Activities).			
	Dentist	Dental Hygienist	Dental Professional Student
Classroom Instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preclinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. How frequently do you deliver the following oral health services at a well-child care visit for a child 0-5 years old?

	Never	Rarely	Occasionally	Often	Very Often
Assess children's teeth for dental cavities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess children's teeth for enamel demineralization?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess children's teeth for plaque?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess parents/caregivers oral health?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apply fluoride varnish to children's teeth?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers the importance of regular visits to the dentist?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

parents/caregivers on the importance of regular tooth brushing?					
Educate patients and parents/caregivers on the oral health effects of a child sleeping with a bottle with something other than water to bed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the oral health effects of juice, sweetened or carbonated beverages?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for your time and participation in this survey!

Appendix C: Permission to Modify 2006 AAP Annual Survey of Graduating Residents

MaryPat Frintner

4/03/13

To: bailange@isu.edu
Outlook [Active View](#)

1 attachment (119.4 KB)



2006 PL3 Survey.pdf

View online

[Download as zip](#)

Hi Angela,

Bill Cull asked me to respond to your inquiry. Please find attached the 2006 AAP Annual Survey of Graduating Residents. If you decide to use any of the questions, we ask that you cite the AAP Survey.

Please let me know if you have any questions.

Best wishes on a successful study,

Mary Pat

Mary Pat Frintner, MSPH
Dept of Research
American Academy of Pediatrics
141 Northwest Point Blvd
PO Box 927
Elk Grove Village, IL 60007-0927
Office: 847/434-7664
Fax: 847/434-4996

>>> Angie Bailey <bailange@isu.edu> 4/3/2013 10:19 AM >>>
Hello Mr. Cull-

My name is Angie Bailey and I am a graduate student in the Master of Science in Dental Hygiene Program through Idaho State University, and I was given your contact information from Gretchen Caspary Tolksdorf. The reason I am contacting you is

because I am trying to request a copy of a survey as well as permission to use and or possibly modify it for my thesis from a study Mrs. Tolksdorf completed in 2008. The title of the study is "Perceptions of Oral Health Training and Attitudes Toward Performing Oral Health Screenings Among Graduating Pediatric Residents". If you are able to help me with this survey request, please reply back to this email and I will email an official survey request letter. Thank you for your time and I look forward to hearing from you soon!

Sincerely,
Angela D. Bailey, RDH-EA, BSDH

Appendix D: Permission to Modify Lewis et al. (2009) Survey

4/08/13

[Documents](#)

To: 'Angie Bailey'

From: **Charlotte Lewis** (cwlewis@u.washington.edu)

Sent: Mon 4/08/13 12:32 PM

To: 'Angie Bailey' (bailange@isu.edu)

Outlook [Active View](#)

1 attachment (55.9 KB)



Survey11.doc

[View online](#)

[Download as zip](#)

Hi Angie,

I am attaching the survey. I am on my way out of town so I don't have time to send you the attached letter but you should consider this email to be permission to use my survey as you specified below. Good luck and all the best,

Charlotte

From: Angie Bailey [mailto:bailange@isu.edu]

Sent: Sunday, April 07, 2013 1:46 PM

To: cwlewis@u.washington.edu

Subject: Request for Survey from "The Role of the Pediatrician in the Oral Health of Children: A National Survey"

Hello Dr. Lewis,

My name is Angie Bailey and I am a graduate student in the Master of Science in Dental Hygiene Program at Idaho State University in Pocatello, Idaho. I am in the process of completing my thesis proposal and even more specifically developing the instrument I will be utilizing for the study.

For the study I will be surveying 2nd and 3rd year family medicine and pediatric residents to determine if they received any type of oral health training in the residency program, if they are utilizing any of the knowledge and skills learned from the oral health training in everyday clinical practice, and what, if any, type of interprofessional education activities specifically involving a dental professional were included in the oral health training they received.

With this being said, I would like to request a copy of the survey utilized in the study, *The Role of the Pediatrician in the Oral Health of Children: A National Survey*, as well as permission to use or modify it for my thesis. If this request is acceptable, please indicate so by signing the attached electronic file of this letter and returning an electronic version of it by replying to this e-mail, or by postal mail to the following address: Angela D. Bailey, 2301 Essex Way, Boise, ID 83709.

If you have any questions regarding this specific request, please do not hesitate to contact me either by e-mail (bailange@isu.edu) or telephone (208)-305-9154. Thank you so much for your time and I look forward to hearing from you soon!

Sincerely,

Angela D. Bailey, RDH-EA, BSDH

Appendix E: Content Validity Instrument

As a subject expert in interprofessional education and/or the development of oral health education and training for healthcare professionals, please check 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, and 4 = very relevant to represent your assessment of the question validity. In addition, please feel free to make comments or recommendations in the space provided. Thank you for your time!

ORAL HEALTH TRAINING

1. During your residency, how many total hours of oral health training and education did you receive?

- ☐ I did not receive oral health training or education during my residency.
☐ 1-3 Hours
☐ 4-6 Hours
☐ 7-9 Hours
☐ 10-12 Hours
☐ 12 or More Hours

Not Relevant (1)_____ , Somewhat Relevant (2)_____ , Quite Relevant (3)_____ , Very Relevant (4)_____

Comments/Recommendations: _____

2. If you received any amount of oral health training and education during your residency, did it include any type of integrated training with an oral health professional?

- ☐ Yes
☐ No
☐ Not sure

Not Relevant (1)_____ , Somewhat Relevant (2)_____ , Quite Relevant (3)_____ , Very Relevant (4)_____

Comments/Recommendations: _____

3. During your residency, how many hours of oral health training and education were dedicated towards Classroom Instruction, Preclinical Activities, and Clinical Activities? You may only select one answer for each category (Classroom Instruction, Preclinical Activities, or Clinical Activities).							Not Relevant (1)	Somewhat Relevant (2)	Quite Relevant (3)	Very Relevant (4)
	0 Hours	1-3 Hours	4-6 Hours	7-9 Hours	10-12 Hours	12 or More Hours				
Classroom Instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preclinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Comments/Recommendations: _____

4. During your residency, was a dentist, dental hygienist, or dental professional student involved in the oral health training and education?
- ☐ Yes
- ☐ No

Not Relevant (1)_____, **Somewhat Relevant (2)**_____, **Quite Relevant (3)**_____, **Very Relevant (4)**_____

Comments/Recommendations: _____

IF YES, CONTINUE TO QUESTION #4. IF NO, PLEASE STOP COMPLETING THE SURVEY AT THIS POINT.

5. During the oral health training and education delivered in your residency, was a Dentist, Dental Hygienist, or Dental Professional Student involved with Classroom Instruction, Preclinical Activities, or Clinical Activities? You may only select one answer for each category (Classroom Instruction, Preclinical Activities, or Clinical Activities).				Not Relevant (1)	Somewhat Relevant (2)	Quite Relevant (3)	Very Relevant (4)
	Dentist	Dental Hygienist	Dental Professional Student				
Classroom Instruction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preclinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clinical Activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Comments/Recommendations: _____

6. How frequently do you deliver the following oral health services at a well-child care visit for a child 0-5 years old?

	Never	Rarely	Occasionally	Often	Very Often	Not Relevant (1)	Somewhat Relevant (2)	Quite Relevant (3)	Very Relevant (4)
Assess children's teeth for dental cavities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess children's teeth for enamel demineralization?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess children's teeth for plaque?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Assess parents/caregivers oral health?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Apply fluoride varnish to children's teeth?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers the importance of regular visits to the dentist?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the importance of regular tooth brushing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Educate patients and parents/caregivers on the oral health effects of a child sleeping with a bottle with something other than water to bed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Educate patients and parents/caregivers on the oral health effects of juice, sweetened or carbonated beverages?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Comments/Recommendations: _____

Thank you for your time and participation in this survey!

Appendix F: Letter for Test-Retest Reliability

Dear Idaho State University Third-Year Family Medicine Resident,

As a graduate student at Idaho State University in the Master of Science in Dental Hygiene program, I am contacting you regarding my thesis study designed to determine family medicine and pediatric residents' self-reported experiences in relation to the following: 1) oral health training and education in their residency program, 2) type of curricular experiences (classroom instruction, preclinical activities, clinical activities, and interprofessional education), and 3) delivery of oral health care services in their clinical practice experiences.

In order to establish reliability, I am asking for your assistance in completing the attached survey. Completing the survey for reliability will take approximately 5-10 minutes. In one week I will send the survey to you again to complete a second time. I would appreciate you e-mailing the first completed survey by (INSERT DATE) to bailange@isu.edu. The second survey will be e-mailed to you on (INSERT DATE). Please e-mail the second survey to the same e-mail address by (INSERT DATE).

I greatly appreciate your assistance in this process of establishing reliability and realize as a family medicine resident your time is limited. As a token of appreciation for providing assistance in this process, a drawing for two \$10.00 Starbucks gift cards will be held for those residents who participate. I understand if you are unable to provide assistance and would appreciate a response to this e-mail if you are unable to participate. Thank you for your time!

Sincerely,
Angie Bailey, RDH-EA, BSDH

Cc: Jacqueline Freudenthal, RDH, MHE, Associate Professor in Dental Hygiene and Thesis Advisor

**Appendix G: E-mail with Survey Link to Family Medicine and Pediatric Residency
Program Administrators**

Dear _____,

Thank you for your willingness to facilitate this survey, (INSERT PROGRAM ADMINISTRATOR'S NAME), to your third-year residents. Please forward the following e-mail with a description of the study, a link to the online survey, and an informed consent form to the third-year residents enrolled in your program. Also, please provide me with the number of residents to whom you have forwarded the survey, so that I can calculate a response rate for my study. If you have any questions, you may reply to this e-mail, contact me at bailange@isu.edu, or my thesis advisor, freujacq@isu.edu. Again, thank you for your assistance!

Sincerely,

Angie Bailey, RDH-EA, BSDH

Cc: Jacqueline Freudenthal, RDH, MHE, Associate Professor in Dental Hygiene and Thesis Advisor

Appendix H: E-mail Study Invitation to Third-Year Residents

Dear Third-Year Resident,

You have been invited to participate in this study because you are a third-year resident in a family medicine or pediatrics residency program. **If you choose to participate in this study you will be entered into a drawing for a \$300.00 Amazon gift card.** The purpose of the study is determine family medicine and pediatric residents' self-reported experiences in relation to the following: 1) oral health training and education in residency, 2) type of curricular experiences and resources employed in the oral health training, and 3) delivery of oral health care services in everyday clinical practice. The relationship between the type of instruction and the delivery of preventive oral health care services also will be explored. I am completing this study based on my personal interest in the oral health of children, as well as for my thesis research project as a graduate student at Idaho State University.

Participating in this study involves completing an online survey that will take approximately 5 minutes of your time. Your information (name of residency program currently attending, full name, and e-mail address) and survey responses will be kept strictly confidential, and a code will be assigned to your responses. Your participation in this study is completely voluntary, and you may elect not to participate in it. There will be no penalty if you choose to not participate in the study. If you elect to participate in this study, an informed consent form is provided at the beginning the survey. Please complete this question prior to beginning the survey.

All data from survey responses will be stored in a password protected electronic file. The results of this study will be used for scholarly purposes only and will be shared with members of my thesis committee. I also plan to submit a research manuscript for publication; however, results will be reported in group form only.

If you have any questions about the study, please contact Angie Bailey at bailange@isu.edu. This study has been reviewed and exempted by the Idaho State University Human Subjects Committee according to its procedures for research involving human subjects.

Sincerely,
Angie Bailey, RDH-EA, BSDH

Cc: Jacqueline Freudenthal, RDH, MHE, Associate Professor in Dental Hygiene and Thesis Advisor

Appendix I: First Follow-up E-mail to Program Administrators

Dear _____,

A few weeks ago, an e-mail was sent to you requesting your assistance in facilitating an online survey to third-year residents enrolled in your program. The online survey should only take approximately 5 minutes of your residents' time.

With your assistance, this study will have the potential to inform governmental agencies, medical and dental educational associations and other healthcare professional organizations on the current status of oral health training delivered in two specialties of medicine that commonly treat children. Ultimately, your assistance and publication of the results in the form of a manuscript could aid in expanding interprofessional education of medical residents for the prevention of dental diseases, especially in children.

If you have already forwarded the online survey link to the third-year residents, I appreciate your assistance. If you have not forwarded the online survey link to them yet, please forward the link and informed consent form to them, which also explains the purpose of the study.

I greatly appreciate your assistance in facilitating this online survey to your third-year residents. Thank you for your time!

Sincerely,
Angie Bailey, RDH-EA, BSDH

Cc: Jacqueline Freudenthal, RDH, MHE, Associate Professor in Dental Hygiene and Thesis Advisor

Appendix J: Second Follow-up E-mail to Program Administrators

Dear _____

I hope this e-mail finds you well. I understand that your time is valuable. I am hoping you may be of assistance by taking a few minutes to forward this online survey to third-year residents enrolled in your program. By forwarding this online survey link, the third-year residents could help aid in the prevention of dental diseases, especially in young children and adolescents.

If you have already forwarded the online survey link to the third-year residents, I appreciate your assistance in facilitating the survey to them. If you have not forwarded the online survey link to them yet, please forward the link and informed consent form to them, which also explains the purpose of the study. Please also inform me how many residents to whom you have forwarded the link, so I can calculate a response rate for my study.

Thank you in advance for your assistance in facilitating this online survey to your third-year residents. I greatly appreciate your time!

Sincerely,
Angie Bailey, RDH-EA, BSDH

Cc: Jacqueline Freudenthal, RDH, MHE, Associate Professor in Dental Hygiene and Thesis Advisor

Appendix K: Author Guidelines for Health & Interprofessional Practice

The guidelines for submission are the following:

- The manuscript has never been published;
- The manuscript is not being considered for publication in another journal;
- All authors have met the requirements for authorship;
- The manuscript has no individually identifiable information/references to the authors included in the manuscript;
- Acknowledgements are *not* included in the manuscript, but rather in a separate section of the submission process;
- All individuals or institutions listed in the acknowledgements have given written consent;
- The manuscript follows the American Psychological Association (6th Edition);
- The manuscript is double-spaced in a Microsoft Word file with 12-point font;
- If there are any videos or audio then these should be uploaded separately as well along with any illustrations, figures, or tables;
- The abstract should be no more than 250 words;
- Lastly, a cover letter should be included with the names of the co-authors and the reasons behind why the manuscript should be published in the journal (Pacific University).

The manuscript should be formatted in the following six sections: introduction, literature review, methods, results, discussion, and conclusion. There should also be a separate section titled “Implications for Interprofessional Practice” which has three to

five items that support the impact the study will make to either interprofessional practice, interprofessional education, or both (Pacific University).