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**The Role of the Pediatrician in the Oral Health of a Child:
A Survey of Tennessee Providers**

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Senior Thesis
Baker Scholars Program
Emphasis: Dental Public Health

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TABLE OF CONTENTS

0.	Abstract.....	4
I.	Introduction.....	5
II.	Background.....	6
III.	Methods.....	7
	a. Survey Instrument	
IV.	Results.....	9
V.	Discussion.....	18
VI.	Conclusion.....	20
VII.	Future Research.....	21
	a. Bibliography	
VIII.	Appendix.....	24

0. ABSTRACT

Objectives

Underserved populations exhibit social, structural, economic, and geographical barriers to accessing oral healthcare. Furthermore, the importance of good oral health, as a deserving component of comprehensive healthcare, is not well understood by the general public and many health care professionals. One way of ameliorating disproportionate access to oral healthcare in underserved populations is to employ the pediatricians of our current health system. The objective of this study is to assess pediatrician's knowledge, attitudes, and professional experience regarding oral health as it applies to children, and to determine their willingness to incorporate preventive dental education and procedures, such as the application of fluoride varnish or dental sealants, into their practices.

Methodology

Data were collected in the project via a mailed survey to randomly selected pediatricians in practice in Tennessee. The survey was used to assess pediatrician's requisite knowledge and understanding of the role of oral health in children, to gauge their familiarity of preventive dental procedures and their willingness to perform them in their office, to analyze practice demographics, and to see if the pediatrician's definition of what constitutes a well-child check is suggestive of whether or not they believe oral health is a component of comprehensive healthcare. Interviews with several Key Informants were in the original study plan but could not be completed by the project due date. The interviews would have been used to complement the results obtained in the survey portion by virtue of first-hand explanations of the data.

Results

Of the 450 providers randomly selected for survey distribution, 62 participants returned completed surveys for a response rate of 13.8%. Roughly one-third reported having seen caries in infants (31.2%) and school-aged children (39.3%) at least once per month. Only 27.6% *agreed* or *strongly agreed* that the application of fluoride should be part of a routine well-child care check, yet a much higher percentage (96.7%) agreed that an assessment for dental problems should be included during a routine check-up. In total, only 10.8% of respondents correctly answered all 4 knowledge questions. Fifty-seven percent of pediatricians felt familiar with fluoride varnish, yet 82.0% were willing to provide a reimbursement rate. Participants in this study reported that uninsured or Medicaid patients are three times more difficult to refer compared to patients with private insurance.

Conclusion

The consequences of a lack of adequate dental care are immense, and offer enough reason for pediatricians to become involved in the overall oral health of a child. The majority of Tennessee pediatricians responding to the survey reported that they are likely to include anticipatory guidance in oral health and participate in assessment practices such as examining children's teeth for cavities during well-child care visits. Despite this, pediatricians will require adequate training in oral health in medical school, residency, and in continuing education courses to become confident in administering preventive dental care to patients. Dentists will continue to limit the amount of Medicaid patients they will see until reimbursement rates become competitive; until then, children's oral health in vulnerable and underserved areas will continue to be unaccounted for.

I. INTRODUCTION

Dental caries, otherwise known as tooth decay, is the most common, chronic disease affecting children in the United States.^{1,2} According to a report from the Government Accountability Office (GAO) on the National Health and Nutrition Examination Survey (NHANES), dental disease in children has not decreased, noting that about one in three children aged 2-18 enrolled in Medicaid had untreated tooth decay and that one in nine had untreated decay in three or more teeth.³ In fact, the U.S. Department of Health and Human Services' Surgeon General's report, *Oral Health in America* (2000), explains that the rates of dental caries are especially high among children living in families with incomes below the federal poverty level (FPL).⁴ Despite initiatives from Medicaid's Early Periodic Screening, Diagnosis, and Treatment (EPSDT) program, which is intended to provide dental screenings and treatment services for eligible Medicaid patients, the lingering problem of accessing these dental services from current dental providers still remains.

Individuals left untreated as a result of insufficient access to care represent a portion of the state of Tennessee's vulnerable and underserved populations. This population encounters several obstacles to accessing oral healthcare in Tennessee; these include social, structural, economic, and geographical barriers. It is important to note that vulnerable and underserved populations – usually containing a large percentage of the state's poor and minority individuals – are more likely to report unmet dental need than those with higher incomes and are less likely to visit the dentist.^{5,6} Also, in every age group, persons in the lower-income group are more likely to have had dental caries and more than twice as likely to have untreated dental caries in comparison to their higher-income counterparts.⁷ Though significant strides have been made to recognize regions deemed to be Health Professional Shortage Areas (HPSA), places where the number of practicing dentists cannot support the number of individuals in the given population, much attention should be placed on educating the general public about their own oral health.

Due, in part, to poor oral health literacy rates among the underserved public and health professional realms, there is limited knowledge of the complications of untreated decay. Studies have shown that a lack of adequate dental treatment can present the following medical and social ailments: cardiovascular abnormalities, speech impediments, diabetes, malnutrition and resultant growth and physical development complications, as well as interferences with school attendance and learning.^{8,9,10} In addition, nontreatment of dental caries may be associated with inappropriate use of emergency departments which leads to a drastic increase in fees for service.^{11,12} Though dental caries is a largely preventable disease, those at highest risk for dental problems are also the least likely to receive preventive dental care.^{13,14}

One way of ameliorating disproportionate access to oral healthcare in underserved populations is to employ the pediatricians in our current health system. As suggested by Lewis et al. and Jones et al., increasing pediatrician's involvement in oral health prevention during well-child care visits may improve the quality of oral health in a child who has difficulty obtaining professional dental care.^{2,15} Due to the scope of their practice, pediatric providers would seem to be the most effective medical profession to provide preventive dental education and care because of the number of interactions pediatricians have with children during their first five years. The purpose of this project, therefore, is to assess pediatricians' knowledge, attitudes, and professional experience in Tennessee regarding oral health in children, and to determine their willingness to incorporate preventive dental education and procedures, such as the application of fluoride varnish or dental sealants, into their practices.

II. BACKGROUND

Oral health is in the transition process of becoming a deserving component of comprehensive healthcare as outlined in this excerpt from the Surgeon General's report:

The recognition of well-known and established signs and symptoms of oral diseases may assist in the early diagnosis and prompt treatment of some systemic diseases and disorders. The presence of these signs also may lead to the institution of enhanced disease prevention and health promotion procedures. All health professionals, and the public, should be aware of these signs and symptoms. Individuals, practitioners, and community programs may also benefit from the accelerated development and testing of readily accessible, acceptable, and simple oral-based diagnostics.⁴

As precisely explained from our nation's leadership in healthcare, professional collaboration on oral health is critical to enhancing patient care and improving the country's healthcare infrastructure as a whole. Select states are already taking proactive measures to encourage other members of the healthcare workforce to aid in alleviating the burden of oral healthcare from dentists only.

Following the Surgeon General's report, the American Academy of Pediatrics issued a statement in 2003 calling for pediatricians and pediatric health care professionals to develop a knowledge base to perform oral health risk assessments on all patients beginning at 6 months of age.¹⁶ Later that year, the state of North Carolina initiated a study to accept the challenge.¹⁷ Under the leadership of Dr. Gary Rozier from the University of North Carolina at Chapel Hill, the state sought to expand prevention efforts. In conjunction with the North Carolina Division of Medical Assistance, the agency held responsible for administering Medicaid dollars, the state required pediatricians to complete an AMA-approved continuing medical education course (CME) offered by the North Carolina Society of Pediatrics and North Carolina Academy of Family Physicians in order to be eligible for Medicaid reimbursement for preventive dental procedures performed in their offices. In a year's time, roughly 1600 health professionals who completed the course performed 38,000 preventive procedures; however, ongoing research is underway to determine the effectiveness of the state's approach. Currently, in the state of Tennessee, in order to be eligible for Medicaid reimbursements for preventive dental procedures performed in offices, a pediatrician must become a contracted provider through a managed care company. Once the provider is contracted, he or she is eligible to enroll in an online course to receive training on dental screenings and fluoride varnish application. After completing the course, pediatricians can bill Medicaid for preventive services provided in their office as long as screenings and fluoride applications are performed together, as Medicaid will not pay for one or the other (personal communication: Dr. Jim Gilchrist, Dental Director of Tennessee Medicaid, April 30, 2013).

In conjunction with state-level initiatives, recent nationwide studies have surveyed pediatricians on their opinion of playing a role as an oral healthcare provider and whether or not they believe it falls within their scope of practice as a physician. Research done over the last decade reveals an underlying theme: despite a perceived lack of training in the area, the majority of pediatricians are in favor of playing a greater role in the promotion of oral health.^{2,18} In a 2008 survey of graduating pediatric residents, 99% of the residents agreed that pediatricians should inform parents of the negative effects of sleeping with a bottle and of juice and carbonated

beverages, two thirds supported pediatricians doing more difficult assessment tasks, such as identifying enamel demineralization (67%) and identifying plaque (64%).¹⁹ Subsequently, in a national survey of practicing, licensed pediatricians, over 85% of respondents reported that they were “likely” to examine a child’s teeth for cavities and to provide preventive counseling at well-child care visits for children under 5 years of age.² Despite an overwhelmingly high rate of pediatrician involvement in preventive education and identification of dental disease, a relatively low percentage of respondents (20.7%), actually agreed that preventive services, such as the application of fluoride varnish, should be included during a well-child check; however, many (74%) were willing to consider a reimbursement. As the study suggests, this is indicative of a confidence issue on behalf of the pediatrician: relatively few (22%) proved they had a working knowledge of fluoride varnish and felt comfortable enough administering it to patients. Interestingly, there was a positive correlation seen between providers who saw dental problems regularly in their practices and the likelihood of agreeing with application of fluoride varnish. This information demonstrates the potential for a wider acceptance of fluoride application with increased familiarity of its purpose in oral health. As recommended by the Institute of Medicine’s Committee on Oral Health Access to Services, defining a multidisciplinary, core set of oral health competencies, or base standards of care, for all health professions, would enable non-dental providers to meet minimum requirements in oral health to help increase access to preventive services.²⁰

Though pediatric medicine is a creative avenue for increasing access to oral care, there is much ambiguity surrounding the extent of requisite knowledge pediatricians have from medical training concerning oral health in children. Little is known about the extent to which pediatricians are actively participating in preventive dental education or procedures in Tennessee. Additionally, the dental and medical communities lack knowledge on the prevalence of dental disease that presents itself in a pediatric office on a routine basis. Assuming there is a presence of dental disease, as one would expect due to the nature and frequency of dental caries, there can oftentimes be practice limitations to administering preventive procedures or referring care to dentists. These questions and ambiguities have been addressed in a state-wide survey of practicing pediatricians, in hopes of understanding their role in the oral health of a child in Tennessee.

III. METHODS

Data collection for this study involved a state-wide, mailed survey of practicing pediatricians in Tennessee. The study plans also included conducting at least three interviews with Key Informants selected from pediatric residency programs in the state of Tennessee who are responsible for training pediatricians; however, those interviews could not be completed by the due date of this report. The institutional review board of the University of Tennessee approved all study activities.

Survey Instrument

The principal investigator and faculty advisor received permission from Dr. Charlotte Lewis from the University of Washington to use her previously tested instrument for the survey of Tennessee providers. We felt the types of questions asked in the survey were inclusive of all the necessary areas that needed to answer the principal investigators research question: “What is the role of the pediatrician in the oral health of children in the state of Tennessee?” This survey is the most crucial component of my study.

An excerpt from Dr. Lewis’ study explains the mission and purpose of the survey:

“Demographic information collected from the respondents included number of years in practice, number of hours of previous oral health training, number of patients seen per week, number of hours per week providing patient care, and practice type. Information on practice location (urban, suburban, and rural), reimbursement type, and approximate racial/ethnic distribution of respondents’ patient populations was also obtained. The survey questions were divided into 4 domains. These domains were chosen based on review of the literature and important themes that emerged during pilot testing of an earlier version of the survey instrument.

1. Knowledge and familiarity with preventive therapies. Pediatricians were asked to answer true/false questions about knowledge of caries prevention; and yes/no questions about familiarity with fluoride varnish, dental sealants, and whether they were familiar enough with dental sealants to explain them to a patient.
2. Current anticipatory guidance and assessment practices and opinion on the role of pediatrician in promoting oral health. Respondents rated the likelihood that they would currently perform each of 6 oral health-related tasks during a well-child care visit for a child under 5 years of age on a 5-point scale ranging from very likely to very unlikely. Because we were concerned that respondents would overreport preventive activities, we included a question on inquiring about the mother’s dental health, a risk factor for dental disease in the child, of which we expected few pediatricians to be aware. Pediatricians also rated their agreement with participating in activities that could potentially be part of routine well-child care on a 5-point scale ranging from strongly agree to strongly disagree.
3. Experience with dental problems and barriers to professional dental care. Pediatricians were asked to rate the frequency with which they saw early childhood caries (the term “baby bottle tooth decay” was also provided for survey recipients unfamiliar with the newer term of “early childhood caries”) and caries in school-aged children on a 6-point scale ranging from at least once a week to never. They also rated perceived difficulty in referring various categories of patients to professional dental care on a 5-point scale ranging from very difficult to not at all difficult.
4. Fluoride varnish application. The survey provided the following brief statement about fluoride varnish: “Fluoride varnish is applied to teeth to help prevent cavities and reverse early dental decay. It takes 5 minutes to apply to all of the teeth and can be done by ancillary staff at well-child care visits. Materials cost, 50 cents per patient.” Respondents were then asked whether respondents would consider having fluoride varnish applied to patients in their practice. If they replied “yes,” they were asked to state an acceptable

level of reimbursement for the procedure. Pediatricians were also asked to rate their agreement on a 5-point scale ranging from strongly agree to strongly disagree with application of fluoride varnish as a part of well-child care.”

Using the Health Professional Licensing reports from the Tennessee Department of Health, 450 of the 1319 currently practicing (part- or full-time) pediatricians in Tennessee were randomly selected for inclusion in this study. This sample size was determined using standard techniques, based on a 95% confidence level (e.g. see <http://www.nss.gov.au/nss/home.nsf/pages/Sample+size+calculator>). This list was accessed from the Department of Health’s website: <http://health.state.tn.us/Licensurereports/> on February 23, 2013. The requestor filtered the search by selecting for the following: “Medical Examiners” and “Specialty and Qualifications”. This produced an Excel spreadsheet of all physician licenses; this list was then sorted by specialty for Pediatricians only. Of the names remaining, simple random sampling of the list was used to avoid potential bias of the sample.

Participants in the study were mailed the same three-page questionnaire used by Dr. Charlotte Lewis in a similar national survey of pediatricians.² A letter from the principal investigator describing the purpose of the study was included, as well as a pre-paid postage envelope for participants to return their survey. Information gathered from survey responses included pediatricians’ willingness to incorporate basic, preventive dental exams and fluoride varnish applications into their practices. The survey responses were anonymous, and no identifying information was otherwise noted or requested.

Data were entered into an Excel spreadsheet and subsequently analyzed in Stata version 12.0 (copyright 1984-2013, StataCorp, College Station, TX).

IV. RESULTS

Sample

Of the 450 providers selected at random for survey distribution, 61 participants returned completed surveys and 1 participant returned a blank copy stating he/she had retired; thus, the overall response rate was 13.8%.

Demographics of provider’s backgrounds, including information about their practice and patient base, are summarized in Table 1. On average, respondents reported having been practicing for 16.9 years after the successful completion of medical school and residency. Information gathered on a typical work schedule shows that respondents averaged 37.0 working hours per week in which they cared directly for an average of 99.8 patients. Roughly one-third (36.1%) stated they had not been instructed in oral health in medical school or during residency, yet nearly half (49.2%) had been instructed through continuing medical education courses post-graduation.

Surveying Requisite Knowledge

Respondents' answers to the four knowledge questions are shown in Table 2. Respondents in Tennessee that answered questions on bottle-fed children and cavity-causing bacteria transmission were correct at high percentages – 90.2% and 77.1%, respectively. However, when asked questions in the areas of fluoride supplementation and dental sealants, the percentage of correct responses fell to 52.5% and 29.5%, respectively. In total, only 10.8% of respondents answered all 4 questions correctly.

Familiarity with Preventive Dental Technologies

Pediatricians' familiarity with two preventive dental technologies – fluoride varnish and dental sealants – was surveyed in this study and is documented in Table 3. An overwhelming majority of respondents claimed to be familiar with dental sealants (88.5%), yet only 57.4% felt comfortable enough with this technology to explain it to a patient. In comparison, only 57.4% of pediatricians felt familiar with fluoride varnish. Despite this statistic, 82.0% were willing to provide a reimbursement rate. The average, suggested reimbursement rate was \$22.60. Eighteen percent either did not state a reimbursement amount or responded that no amount could entice them to apply fluoride varnish. Common responses for not providing a reimbursement rate included: 1) their office was not adequately equipped (due to staffing issues, time constraints, and material cost) to start implementing fluoride usage, and 2) their belief that the application of fluoride varnish should remain inside the scope of the dental practice.

As Table 4 describes, only 27.6% *agreed* or *strongly agreed* that the application of fluoride should be part of a routine well-child care check, yet a much higher percentage (96.7%) agreed that an assessment for dental problems should be included during a routine check-up. In addition, 95.1% agreed pediatricians should counsel children and caregivers on the prevention of dental problems, and about one-third (37.7%) agreed that it is important to refer children to a dentist by twelve months of age.

Current Anticipatory Guidance and Assessment Practices

Following the opinion questions on whether or not pediatricians should include oral health in well-child care checks, respondents were asked how *likely* they were to incorporate it into their appointments. Pediatricians were *likely* or *very likely* to incorporate the following at a high percentage: inquire whether a child is taking a bottle to bed (95.0%), examine the child's teeth for cavities (90.0%), counsel on the importance of going to the dentist (98.3%), and counsel on the importance of regular tooth brushing (96.7%). Pediatricians were less likely to inquire about the mother's dental health (13.3%) and assess children's fluoride intake (52.5%). This information is summarized in Table 5.

Information about the frequency of childhood caries seen in the pediatric office was surveyed alongside current assessment practices; these data are represented in Table 6. Roughly one-third reported having seen caries in infants (31.2%) and school-aged children (39.3%) at least once per month, while 19.7% and 32.8% saw caries at least once per week in these children, respectively.

Referring to Professional Dental Care

Respondents were asked to rate the level of difficulty they encountered when referring care to dentists – this information is seen in Table 7. On average, pediatricians found it to be much more difficult to refer patients who received Medicaid (40.4%), were uninsured and had an emergent dental problem on the evenings or weekends (39.3%), or were uninsured and needed a sliding payment scale (51.7%). In comparison, only 13.6% of pediatricians found it difficult to refer individuals who had private insurance to a dentist, and only 33.3% found it difficult to refer patients who had developmental decay.

TABLE 1. Survey Respondents' practice and provider characteristics.

Provider Characteristics	Respondents n = 61
Years in practice: mean (SD)	16.9 (11.3)
Board Certified:	100%
Hour of instruction in oral health: mean (SD)	1.9 (2.8)
Medical school	2.0 (2.8)
Residency	1.0 (1.9)
CME	
Respondents with no instruction in oral health:	36.1%
Medical school	36.1%
Residency	50.8%
CME	
Hours per week providing patient care: mean (SD)	37.0 (11.1)
Number of patients seen per week: Mean (SD)	99.8 (40.5)
Location of practice:	
Suburban	28.3%
Urban	60.0%
Rural	11.7%
Type of practice:	
Group private practice	67.2%
Solo private practice	9.8%
Staff model HMO	0.0%
Other	23.0%
Compensation: (mean)	73.9%
Fee for service	4.9%
Capitation	12.9%
Fixed salary	6.3%
Other	
Approximate percentage of patients who: (mean)	35.4%
Received Medicaid	8.1%
Are uninsured or self pay	6.5%
Are immigrants	4.9%
Non-English speaking	
Racial/Ethnic distribution: (mean)	
White	65.3%
Black	24.7%
Latino	7.5%
Asian/Pacific Islander	3.4%
Native American	0.7%

Table after: Lewis et.al.²

TABLE 4. Opinion of Dental Procedures in the Pediatric Office

Should the Following be a Part of Routine Well-Child Care?	Percent Agreeing or Strongly Agreeing n=61
Assessment for dental problems during the physical examination	96.7
Counseling on the prevention of dental problems	95.1
Application of fluoride varnish	27.6
Referral to the dentist at 12 mo of age	37.7

Table after: Lewis et.al.²

TABLE 5. Current Anticipatory Guidance and Assessment Practices

How likely are you to do the following in a Well-Child Care Visit?	Percent Likely or Very Likely n=61
Inquire whether a child is taking a bottle to bed	95.0
Examine a child's teeth for cavities	90.0
Counsel on going to the dentist	98.3
Counsel on the importance of toothbrushing	96.7
Assess fluoride intake	52.5
Inquire about the mother's dental health	13.3

Table after: Lewis et.al.²

TABLE 6. Prevalence of dental caries seen in Pediatrics

How often do you see the following in your practice?	Percent Reporting n=61
Early Childhood Caries	
At least once per week	19.7
At least once per month	31.2
Caries in school-aged children	
At least once per week	32.8
At least once per month	39.3

Table after: Lewis et.al.²

TABLE 7. Barriers to Accessing Care – Problems with Referring to Professional Dental Care

How difficult is it to refer a patient who	Percent Reporting Difficult or Very Difficult n=61
Have private insurance and have an emergent dental problem on night/weekend.	13.6
Have significant developmental delay	33.3
Are ≤ 2 years old	25.0
Receive Medicaid	40.4
Are uninsured and have an emergent dental problem on night/weekend	39.3
Are uninsured and need a sliding payment scale	51.7

Table after: Lewis et.al.²

V. DISCUSSION

This study, in conjunction with the previous national survey², confirms that pediatricians overwhelmingly believe that they play an important role in the oral health of children. The vast majority of Tennessee pediatricians responding to the survey reported that they are likely to include anticipatory guidance in oral health and participate in assessment practices such as examining children's teeth for cavities during well-child care visits. Despite the outpouring of enthusiasm, research indicates that pediatricians receive very little education on oral health during medical school and residency programs which can explain why relatively few (27.6%) believe that preventive dental technologies, such as the application of fluoride varnish, should be incorporated into their practices. Still, pediatricians from all practice types noted that they encounter dental decay in children on a routine basis and often times have difficulty referring their patients to dentists

While most pediatricians are likely to participate in anticipatory guidance and assessment practices, few felt the need to inquire about the mother's oral health or examine the fluoride intake of the child. Reasons for these findings could include time limitations on behalf of the physician and the, as suggested by Lewis et al., some pediatricians avoid addressing fluoride altogether out of the concern that it is no longer appropriate, given that fluoride can be consumed in other avenues such as communities with fluoridated water.²

The results of this study also confirm that pediatricians frequently observe tooth decay in children. This comes as no surprise, as dental caries remains the most common, chronic disease affecting children in the U.S.^{1,2} The Accreditation Council for Graduate Medical Education, the body in charge of overseeing medical education requirements and standards, reveals that the subgroup in charge of determining pediatric residency requirements, the Pediatric Residency Review Committee (PRR), makes no explicit mention of oral health, dental health, or dentistry in the educational program requirements.²¹ This is unfortunate due to the prevalence of dental disease and frequency with which children visit the pediatrician versus a dentist. It is important, then, that pediatricians become trained in preventive dental education and basic preventive techniques. Several studies suggest that adequate oral health training during medical education and pediatric residency have the potential to impact children at great risk for oral health problems who might not have access to a dental home.^{19, 22} Additionally, other studies have proven that it is possible to train pediatricians to a level proficient enough to recognize and refer children who have dental disease.²³

Besides poor oral health literacy rates among pediatricians, a second barrier limiting the expansion of pediatrician involvement in oral health is seen in the difficulty pediatricians face in referring their patients to dentists. More specifically, participants in this study reported that uninsured or Medicaid patients are roughly three times more difficult to refer compared to patients with private insurance. Respondents reported that 35.4% of their office compensation came in the form of Medicaid dollars – a percentage rarely seen among most private dental offices. A previous national survey of pediatricians in 2009 indicated that 74% of pediatricians cited the lack of dentists who accept Medicaid as a “moderate to severe barrier for 0-3-year-old Medicaid-insured patients to obtain dental care.”²⁴ Furthermore, studies show that the three main reasons dentists limit or deny seeing Medicaid patients are: “low reimbursement rates, administrative requirements, and patient related issues (e.g. missed appointments).”²⁵ As history has shown, dentists will continue to limit the amount of Medicaid patients they will see until

reimbursement rates become competitive; until then, children's oral health in vulnerable and underserved areas will continue to be unaccounted for unless innovations are made among non-dental health providers.

In comparison to the Washington survey, Tennessee providers also seemed ambivalent about assuming greater involvement in oral health despite large support in incorporating oral health components within well-child care checks. Many of them were willing to provide a reimbursement rate (82% of respondents), while only 57.4% reported being familiar with the technology, and even fewer (27.6%) felt that fluoride varnish application should be a routine component in well-child care. As described in Dr. Lewis' survey, pediatricians were given a statement on the purpose of fluoride varnish, told the length of time and ease of its application, and how little the material cost, yet many still did and do not commit to its distribution. This information suggests a lack of confidence on behalf of the pediatrician, mainly due to limited exposure to oral health in medical training. In addition, there were several respondents who commented that they felt the application of fluoride was ultimately the dentists' responsibility, which may suggest that medical providers are unaware of the state's barriers to accessing dental care. Interestingly enough, concrete evidence shows a significant positive correlation in providers who are in regular contact with dental disease and the number of fluoride varnish applications performed in their offices.²⁶ Though Tennessee providers could correctly answer knowledge questions on bottle-fed children and cavity-causing bacteria transmission at much higher percentages - 90.2% and 77.1%, respectively - in comparison to the national average— 78.8% and 39.5%, they fell short of the national standard when asked questions in the areas of fluoride supplementation and dental sealants (both preventive technologies): 52.5% and 29.5% respectively – in comparison to 60.8% and 37.3%, respectively. It can be expected that the incidence of fluoride application will increase with increased knowledge on the subject matter.

In summary, both dental and medical providers must realize the future challenges our health system will present and be willing to adapt to the change. Understanding that dentistry is a component of comprehensive healthcare is essential to unifying our healthcare infrastructure, which will ultimately lead to the benefit of the state's patients.

Limitations

There are several limitations to this study. First, the low response rate limits the generalizability of the study results. Due to a low response rate, our study runs the risk of having a response bias where the views of those tested could be polarized towards one opinion or way of thinking rather than being inclusive of a diverse perspective. The low response rate could have been attributed in part to this survey being sent by an undergraduate student rather than a recognized researcher or organization (such as the American Academy of Pediatrics). Secondly, data obtained from the surveys were self-reported and there was no attempt to verify information; therefore, information relating to office visits, working hours, percentages of reimbursement, etc., is all subject to the accuracy of the provider. Thirdly, timing constraints limited the number of survey mailings to one time. A higher response rate will be needed to make conclusive generalizations; however, it can be said with certainty that the results in the state of Tennessee, based on the limited response, are still similar to the study findings in Dr. Lewis' national survey.

VI. CONCLUSION

Increasing access to oral health services for underserved populations continues to challenge the current healthcare system to adapt to the future of healthcare in the United States. The consequences of a lack of adequate dental care are immense, and offer enough reason for pediatricians to become involved in the overall oral health of a child. The pediatric medical professional interacts with countless individuals in various socioeconomic circumstances and thus has ample opportunity to instruct on dental practices and to offer basic services to underserved populations.

This study confirms the findings of Dr. Charlotte Lewis' national survey: pediatricians overwhelmingly believe that they play an important role in counseling children and caregivers on oral health issues. This is especially true in the state of Tennessee. As a result, we believe that Tennessee, like North Carolina and Washington, should recognize the necessity of good oral health in children, and provide an alternative and more effective way to train medical providers in preventive oral health methods so they can be reimbursed for procedures performed in their office. Despite Tennessee pediatricians' enthusiasm and willingness to expand their role in preventive oral health, research shows that they lack appropriate instruction on oral health. This could possibly hinder their aptitude in this field, and may adversely affect their confidence in administering basic dental care. In response to this, we offer the state of Tennessee and its pediatricians several recommendations to encourage an effective advancement in the oral health delivery system, in order to meet the needs of a state lacking in its outreach to children's oral health:

1. Pediatricians in the state of Tennessee should be required to receive continuing medical education in oral health as part of the overall CME requirements for licensure in the state. Since providers come from numerous medical school and residency programs across the nation with varying degrees of oral health training, a centralized continuing medical education course (CME) funded by TennCare should be created in order to train pediatricians in preventive techniques. An effective model for this course can be seen through the state of North Carolina's previously constructed CME course. This course should be designed in such a way where pediatricians are taught by licensed, dental professionals for two reasons: 1) it is ultimately the responsibility of the dentist to lead and direct oral health based initiatives in the state and 2) collaboration with dentists may help alleviate problems pediatricians face with referring care. TennCare should only allocate dollars in the form of reimbursement to those who have successfully completed this course – this will ensure that quality care is maintained.
2. Joint advocacy efforts between the Tennessee Medical Association and Tennessee Dental Association are needed to develop solutions to increase access to care. A starting point would be to jointly develop and issue a policy statement supporting the involvement of pediatricians in the provision of oral healthcare. In addition, the American Academy of Pediatrics and American Academy of Pediatric Dentistry – the leadership of care to children in the US – need to work together to define a national standard for professionals to follow, so that no ambiguity exists surrounding professional boundaries and responsibilities.

3. The state of Tennessee and its dental professionals should recognize the potential benefits of distributing core, dental competencies to non-dental providers. Per the recommendation from the Institute of Medicine's Committee on Oral Health Access to services (recommendation #1a and 1b):
 - a. "The Healthcare Resources and Services Administration (HRSA) should convene key stakeholders from both the public and private sectors to develop a set of oral health competencies for health care professionals.
 - b. Following the development of a core set of oral health competencies for non-dental health care professionals:
 - i. Accrediting bodies for undergraduate and graduate-level non-dental health care professional education programs should integrate these core competencies into their requirements for accreditation
 - ii. All certification and maintenance of certification for health care professionals should include demonstration of competence in oral health care as a criterion."²⁰

VII. FUTURE RESEARCH

Dr. Erwin and I will continue with this study by issuing another mailing to our selected sample in hopes of improving our response rate. In the meantime, we look forward to completing interviews with Key Informants as we believe their insights will be crucial to our success moving forward in determining our state's needs when addressing children's oral health in underserved areas. Also, I look forward to future opportunities during my time at the University of Tennessee Health Science Center College of Dentistry in hopes that I can work with our state's dental leadership to improve access to and quality of dental care to our state's populace.

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VIII. APPENDIX

Key Informant Interviews

In addition to the mailed survey, study plans also included conducting at least three interviews with Key Informants; however, those interviews could not be completed by the due date of this report. Interviews with Key Informants will be held to gather insights and thoughts about the training of pediatricians and their capacity to provide oral health services for children. All Key Informants in the study are licensed medical professionals that are responsible for training pediatricians. These informants will be asked to participate in a 60 minute, audio-recorded interview at the time and place of their choosing. Interviews will be audio-recorded in order to facilitate comprehensive, qualitative data analysis and interpretation. All information will only be available only to persons conducting the study, and the identity of the key informants will be known only by the researchers. While exact words will be used in the reporting of findings, personal identifying information will not be used in any public use of data. All potential identifying information in the study records will remain confidential.

Key Informant Semi-Structured Interview Guide

I. Introductions

- A. Principal investigator will introduce himself, his undergraduate background, and outline the purpose of the key-informant interview.
 - i. The objective of this interview process is to gain a broader understanding of pediatricians' medical curriculum, and secondly to see to what degree they have been exposed to dentistry and oral health care during the course of their residency training. In addition to the key informant interviews, a Knowledge, Attitudes, and Practices survey on oral health (as it applies to children) will be sent out, at random to pediatricians currently practicing in the state of Tennessee. The results of this study can help identify areas within our current healthcare infrastructure that can improve Tennessee children's access to oral health care.
- B. Interviewee: State name, job or title, associated institution, degrees held.
- C. Interviewee: State job responsibilities at institution.

II. Experience in Medical Training and/or Pediatric Residency

A. Describe your experience in general medical training (MD or DO) from a curriculum standpoint.

1. Describe your own training related to oral health in a) medical school, and b) residency
2. Describe the training provided in your current setting, during a) medical school, and b) residency
3. For both # 1 and # 2 above specifically address the following (In either your own training or training you are currently responsible for):
 - a. Was there any co-training with dental students or dental graduates? If so, specify.
 - b. Did/does the training include i) oral health physical assessment; ii) provision of fluoride, fluoride varnish, or other preventive measure? What was your understanding of its role in overall health?

III. The Practicing Pediatrician

- i. Is oral health a point of emphasis during a standard well-child check? If not, why not?
- ii. What are some of the benefits and drawbacks of including it?
- iii. Should pediatricians play a role in the provision of oral health care? If so, specify role(s). If not, why not?

IV. Discussion

- A. Interviewee given further time to explain answers to questions.
- B. Interviewee given the opportunity to ask questions.

V. Closing

- A. Where do you see the field of pediatric medicine going in the coming years?
- B. What brings you to that conclusion?