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ORAL HEALTH SERVICES IN A MEDICAL SETTING

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Science in Dentistry at Virginia Commonwealth University.

by

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June 2007

Acknowledgement

I would like to take this opportunity to thank Dr. Michael Webb for agreeing to take me on as a resident, to Dr. Teg Brickhouse for her research support, to Dr. Holly Lewis for her wealth of knowledge, to my wife Laura for all the support throughout the years, to my two beautiful daughters for their sacrifices as I ventured on this journey, to my mother who instilled the importance of education in me at such an early age, and to Sigrid, who is the reason I ventured on this path. I see your kindness and beauty in the children I treat every day. I hope to practice every day with the dignity and poise you so often portrayed. You touched the lives of more people in your short life than most do who live many more decades than you had the pleasure of living. I hope to be an advocate to children affected by violence and prevent the loss of innocent lives, as I was unable to do with you and your beautiful children.

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Abstract

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Purpose: The purpose of this study is to examine the baseline oral health status of infants and the level of their caregiver's oral health knowledge for families who received preventive oral health services in a medical setting.

Methods: Using a prospective cohort study, children 0-3 years of age received an oral health screening, risk assessment, caregiver education, and a fluoride varnish treatment in an ambulatory pediatric medical clinic. A 16-item oral health knowledge and socio-demographic questionnaire was delivered to the caregiver of child. This

questionnaire included knowledge, behavior and opinion items on risk factors for dental diseases, care of child's teeth, and socio-demographic characteristics of the family. Six-months after the medical visit, dental claims were examined to see if children had made a dental visit.

Results: One hundred and ninety-five children received preventive oral health services in this clinic. Of these, 103 caregivers agreed to complete the oral health knowledge and socio-demographic questionnaire. Twenty-percent of children screening had visible signs of tooth decay, according to risk-assessment 72% were categorized as high-risk for tooth decay, and 83% received a fluoride varnish treatment. At 6-months, 9% of children were found to have had a dental visit. According to the caregiver questionnaire the likelihood of having a dental visit was correlated with the caregiver's knowledge of when a child should have their first dental visit and having been told by a medical professional when their child should be going to the dentist.

Conclusion: Children are more likely to have a dental visit when caregivers are aware of the age 1 dental visit, or when advised to seek care by a medical professional. With increased education of medical providers, starting in medical residency training, more children can be seen for preventive oral health care resulting in an earlier establishment of a dental home.

INTRODUCTION

Disparities in the oral health of children have been documented in the pediatric dental literature for many years. Recently, however, with the inclusion of the “dental home”, and the age one dental visit, the medical community has begun to appreciate the tremendous need to provide children with basic oral health screenings at an early age.¹ Dental care is the most prevalent unmet health need in US children, and with the collaboration between medical and dental professionals, some states have made great strides in providing much needed dental care to children, especially from lower socioeconomic backgrounds.² Such collaboration is needed, due to the fact that almost three times as many children lack dental insurance as lack medical insurance, and even those that have publicly-funded comprehensive dental care coverage have very low utilization rates.³ Children from low income and minority families have poorer oral health outcomes, fewer dental visits, and fewer protective sealants. Recent data from the Office of the Inspector General of the U.S. Department of Health and Human Services found that only one in five Medicaid-eligible children received routine preventive dental services.⁴

Childhood oral disease has significant medical and financial consequences that may not be appreciated because of the separation of medicine and dentistry.² Primary pediatric medical care is needed to complement dental services due to the potential early onset of decay, the infectious nature of dental caries, and the coordination needed to provide early intervention programs to young disadvantaged children.⁵ Unlike dentists, pediatricians see a large percentage of disadvantaged children throughout their early childhood years.⁵ As a result, the potential exists for oral screenings, education, and direct dental referrals at a very early age, much before the disease process begins. However, with the lack of training in oral health in either medical schools or medical residencies, many pediatricians lack critical knowledge to promote oral health.⁶ Even when pediatricians express an interest in oral screenings, there are few well-developed guidelines for them to follow related to oral health.⁷ Another barrier is the fact that many states do not financially reimburse pediatricians to provide preventive oral services to their patients. Recently, states have started to implement programs and reimbursement codes in the Medicaid system to promote the delivery of preventive oral health services by medical providers.¹²

Preventive oral health services provided by pediatricians are arguably most needed for children from low socioeconomic backgrounds because of the fact that childhood dental disease is not equally distributed among socioeconomic backgrounds. Children living below the poverty level have two to five times more dental caries than children at high-income groups.⁵ Children in this group are also more likely to have extensive decay requiring dental rehabilitation under general anesthesia. Moreover,

following a dental rehabilitation with general anesthesia, Almeida, et.al., found that nearly twenty percent of these children required a second general anesthesia within two years of the first dental rehabilitation.⁸ This not only accounts for many lost school and work days, it also becomes very financially taxing.⁹

With the collaboration of the medical and dental communities, the American Academy of Pediatric Dentistry and the American Academy of Pediatrics have made it one of their missions for children have an established dental home by the age of twelve months.¹ This dental home should include comprehensive oral health care which is continually acceptable and family centered. Referrals to specialists are indicated when appropriate. This collaboration should not only include proper treatment of dental decay and emergencies, but also include risk assessment, anticipatory guidance, and dietary counseling. This dental home will more likely be initiated by the pediatric medical provider as these providers are often the first to see these children at a very young age.¹¹

Currently, there is limited oral health training in the medical education system. Lewis, et.al., recommended adequate training in oral health to be included in medical school, residency, and continuing education courses.⁷ This could be incorporated in the undergraduate medical curriculum in their physical examination skills courses and during an oral health rotation during pediatric residency with dental professionals providing education and hands on training to the medical professional.⁷ Scientific oral health literature aimed specifically at pediatricians is limited.⁵ Current searches of the medical literature identify less than twenty articles with a primary focus on oral health published within the last ten years.⁵ As a result of this lack of current training, the medical and

dental communities have teamed up, mainly in pediatric medical and dental residencies, to provide much needed education to medical residents while they progress through their training with the hope of incorporating the concept of the dental home in their future practices.

This project has encouraged interdisciplinary collaboration between medicine and dentistry in an academic clinical setting. The long term goal of this project is to improve infant's access to preventive oral health services in both medical and dental settings. As this project between the Departments of Pediatrics and Pediatric Dentistry continues there will be an opportunity to follow an evolving sample of children who have received preventive dental services in medical settings and their eventual use of dental services in dental settings will be determined by the presence of dental claims in the state Medicaid program. This study will focus on the presence of tooth decay in an infant at baseline and the short-term outcome of a dental visit. The specific aims of this project are to assess any correlations between the data from the oral health screening and the caregiver knowledge of oral health with the likelihood of the child having tooth decay or a dental visit.

MATERIALS AND METHODS

Design

Using a prospective cohort study design, children 0-3 years of age received an oral health screening, risk assessment, caregiver education, and a fluoride varnish treatment in an ambulatory pediatric medical clinic. If the caregiver consented, a 16-item oral health knowledge and socio-demographic questionnaire was given to caregivers of these children. This questionnaire included knowledge, behavior and opinion items on risk factors for dental diseases, care of child's teeth, and socio-demographic characteristics of the family. All infants receiving these preventive oral health services were then directly referred to the VCU Pediatric Dental Clinic. This study was approved for human subjects by the Virginia Commonwealth University Institutional Review Board.

Sample and Data Collection

Oral Screenings

On a rotating basis, pediatric dental residents from the Department of Pediatric Dentistry at Virginia Commonwealth University School of Dentistry attended clinic at

the VCU Ambulatory Pediatric Medicine clinic. During both well and sick visits of children between the ages of zero and three years of age, pediatric dental residents taught pediatric medical residents how to examine the oral cavity of these children for pathology, normal eruptive patterns, and signs of decay. They also instructed medical residents how to perform a risk assessment of the child's oral health with both clinical findings and questions to caregivers and then performed a fluoride varnish application.

To achieve this examination, the child was placed in the caregivers lap and a knee to knee examination was accomplished. The screening was done using a good, direct light source in addition to regular room lighting. A mobile lamp was used in this instance. A disposable dental mirror was used to provide better visibility for visualization of the mouth. Disposable examination gloves were used and standard infection control practices were followed. Screening results were recorded on the child's encounter form to establish a record of initial findings and progress. Pediatric residents were trained to look for chalky, white areas of enamel (early caries), cavitations and staining of the enamel, plaque, fluorosis, enamel hypoplasia, hypomineralization, chipped or misplaced teeth due to trauma, inflammation, and ulceration. Fluoride varnish was applied to the teeth all children with teeth 0 to 3 years. The child's mouth was opened using gentle finger pressure and a thin layer of Cavity Shield© single unit dose varnish was applied to all tooth surfaces. The varnish set on contact with intraoral moisture, thorough drying was therefore not required before application, and wiping the teeth with gauze or cotton rolls was adequate.

Caregiver Questionnaire

The questionnaire given to caregivers was based on existing questionnaires used in infant oral health programs and pilot tested in both English and Spanish.¹² The 16-item questionnaire consisted of questions regarding caregiver knowledge of dental decay, information provided to them from medical professionals regarding referrals to dental professionals, transmissibility of dental decay, and age at which children should receive their first dental visit. Participation was voluntary and informed consent was obtained. A ten dollar incentive certificate was given to caregivers who completed the questionnaire. Data collection occurred in either the clinic waiting room or patient treatment rooms and the questionnaire administered after the child's screening and fluoride varnish treatment.

Dental Visit

At 6-months post-enrollment, the utilization of dental services was examined by the presence of a dental visit. The clinical patient database at the VCU Pediatric Dental Clinic was examined for the record of any dental appointment and subsequent dental visit according to the child's name, birth date, and Medicaid identification number. If the child had a dental visit at another clinical setting this information was not available.

Statistical Analysis

The **independent variable** in this study was the provision of preventive oral health services in a medical setting. The principal **outcomes** were the likelihood of a child having tooth decay or a dental visit in the following 6-month period. Descriptive statistics were completed for the baseline characteristics of oral health screening, risk

assessment, demographics and caregiver questionnaire. Descriptive statistics were used to summarize the responses to the caregiver questionnaire. Pearson's correlations were completed for the oral screening characteristics and caregiver's responses to look for associations with the presence of tooth decay at baseline and having a dental visit at 6 months. Two separate multivariate regression models were then used to describe significant predictors of tooth decay and the likelihood of having a dental visit.

RESULTS

One hundred and ninety-five infants received an oral health screening, risk assessment, caregiver education, and a fluoride varnish treatment in an ambulatory pediatric medical clinic. Of these, 103 caregivers agreed to complete the oral health knowledge questionnaire. Therefore, a 53% response rate was obtained. Descriptive results of participant demographics are found in Table 1. Children ranged in age from 1-42 months with a mean age of 20.6 months ($SD = \pm 8.6$) or 1.3 years ($SD = \pm .8$). Children and caregivers were predominately African American (73%), 13% were Caucasian, 7% Hispanic, and the remaining 7% were either; Asian, American Indian, or race reported as “other”. 59% of the caregivers reported being single parents with a median age of 26 years ($SD = \pm 7.5$). The majority of caregivers (58%) stated they had between six and twelve years of education.

Oral Health Screening and Risk Assessment

Descriptive results of the baseline oral health screening and risk assessment can be found in Table 2. At the time of screening, 20% of patients had visible decay with 10% having frank cavitated lesions and 14% having white-spot lesions. Visible plaque was

present on 11% of children's teeth. 1% of patients had experienced dental pain as relayed by caregivers or had some sort of oral pathology. According to risk assessment criteria, 72% were deemed at high risk for developing dental decay. 5% of caregivers reported early eruption of teeth. 7% of children exhibited crowding in the primary dentition. 34% of caregivers had active, non-restored, decay at the time of screening. 30% of caregivers reported their children snacking more than three times a day. 23% reported no fluoride in their drinking water. 36% of children currently took a bottle to bed. 5% of children were determined to have special health care needs. 83% of children received a fluoride varnish application of at the time of screening. (14 caregivers refused the fluoride varnish application while 4 children did not have erupted primary teeth to apply the varnish).

Caregiver Responses to Oral Health Questionnaire

Responses to the caregiver questionnaire are presented in Table 3. 86% of caregivers reported ever wiping or brushing their child's teeth. 46% percent stated brushing or wiping two or more times a day, 43% stated once a day, 5% stated two to three times a week, and 5% stated never wiping or brushing their child's teeth. Of those caregivers that wiped or brushed their child's teeth, 71% reported using toothpaste and 37% stated the toothpaste contained fluoride. 60% of respondents stated that it is either always or sometimes difficult to clean their child's teeth. 18% reported that their child had been to the dentist.

When asked about information provided to caregivers from medical professionals, 65% stated they were told by a physician or nurse when their child should be no longer

using a bottle, 73% stated a physician or nurse told them how to clean their child's teeth, and 66% stated a physician or nurse told them when their child should begin going to the dentist.

When inquiring about caregiver knowledge of and attitudes toward dentistry, 78% of caregivers stated that putting a child to bed with a bottle containing milk can cause cavities, 13% thought it did not, and 9% did not know. When asked about juice at bedtime, 81% thought it could cause decay, 10% thought it did not, and 9% did not know. 49% of caregivers thought that decay in three year old children needed to be restored, 19% thought not, and 33% did not know. 78% knew that fluoride helps prevent tooth decay and 68% knew that fluoride can be used to coat and protect the teeth in infants in children. 75% of caregivers stated that bacteria are partially responsible for the initiation of decay, whereas, only 23% of caregivers stated that adults with decay can transmit bacteria to their children. 95% of caregivers stated that children should begin going to the dentist between the ages of one and three years.

Tooth Decay

Results of the bivariate analysis are presented in Table 4. The only significant correlation found when examining oral screening characteristics was the presence of visible plaque. Children with visible plaque were more likely to have decay ($p=.0002$). Two caregiver questionnaire responses were weakly correlated with the presence of tooth decay. The first was "Has your child ever been to the Dentist?" ($p=.049$) and "Has a doctor or nurse ever told you how to clean your child's teeth?" ($p=.05$). A child who has

seen a dentist was more likely to have decay, while a caregiver who had been instructed by a doctor or nurse on how to clean their child's teeth were less likely to have decay.

According to the multivariate regression (Table 5), only the presence of visible plaque remained to be a significant indicator of tooth decay with children. Controlling for age, children with visible plaque were almost 12 times more likely to have decay than children without plaque (OR=12.02 (95% CI 2.72, 53.12)).

Dental Visit

Results of the bivariate analysis are presented in Table 6. There were no significant correlations found when examining oral screening characteristics and whether or not a child has a dental visit at 6-months. As expected, children who had scheduled an appointment were more likely to have completed a dental visit. One caregiver questionnaire response correlated with the child having a dental visit was the question "Has a doctor or nurse ever told you when your child should be going to the dentist?" ($p=.03$). Caregivers who have been told by a doctor or nurse when their child should be going to the dentist were more likely to have had a dental visit at 6-months. Due to the small sample size of children who had a dental visit (9%) the multivariate regression could not be completed to examine the predictors of having a dental visit.

DISCUSSION

Although great strides have been made in the area of pediatric preventive medicine in the latter part of the twentieth century, much more emphasis needs to be placed on preventive dental care, especially for children of low socio-economic backgrounds or those at high risk for early childhood caries.⁹ Traditionally, the proper age for the first dental visit was thought to be three years of age, due to the rationale that children were thought to have manageable behavior at this age.⁶ However, by age three, many children are already suffering with significant levels of dental decay. With the shift in the paradigm of infant oral health, the American Academy of Pediatric Dentistry along with the American Academy of Pediatrics have begun educating dentists and physicians alike on the importance of the age one dental visit.^{1,10} It is important, that by this age, the family establishes a dental home, to ensure optimal oral health for their infant. Dentists and pediatricians can then educate caregivers on proper oral hygiene, prevention of dental injuries, and the prevention of caries.⁶

This study found that those infants and young toddlers with visible plaque were significantly more likely to have dental decay (Tables 4 and 5). Also, those caregivers of infants who received instruction from medical providers on oral hygiene were less likely

to have decay at the time of the visual examination (Table 4). These results are very promising and could have profound impacts in the future if education regarding infant oral health becomes routine in medical schools and medical residencies. The basic oral health knowledge given to caregivers by medical providers in this study has only been implemented recently, and significant results are expected as this longitudinal cohort of children is followed. It is hypothesized that these children will receive earlier and more dental services than children without an infant oral health visit in a medical setting. As infant oral health education is implemented over many years and nationwide, there is hope for a significant reduction in childhood caries.

The AAP, AAPD, and ADA all agree that the key to improving infant oral health care and preventing ECC is earlier dental screenings.^{1,10,14} However, current research shows that the majority of children are not seeing the dentist by one year of age.¹⁴⁻¹⁶ Both the pediatrician and the general dentist often lack the training or education in the area of infant oral health and oral disease.¹⁰ Extensive training is not needed for these individuals. As shown in this study and several past studies, simple hands on training with pediatric dentists can significantly improve the oral health of infants by referring them for preventive treatment. According to Sanchez, et.al., many pediatricians are aware of their lack of knowledge in infant oral health and are willing to improve their knowledge base through continuing education courses.⁵

This study found that when pediatricians received didactic and clinical infant oral health education, there was a significant increase in the number of caregivers who were informed about the age one dental visit, and hopefully over time, more likely to have a

dental visit. Even though nearly 51% of the caregivers that completed the survey didn't think nor were unaware that decay in children had to be treated, many of these patients, it is presumed, were seen by a dentist as a direct result of being told of its importance by a medical provider. Paradigm shifts are not going to occur quickly. Implementation of infant oral health must be included in the curriculum of all medical students and again emphasized in both pediatric and family practice residencies.⁶ Preventive oral health services for infants is a joint responsibility between medical and dental providers. This education and training of medical and dental providers is an attempt to address the oral health needs of infants and prevent early childhood caries in young children.

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Literature Cited

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Table 1: Participant Demographic Characteristics

<i>Characteristic</i>		<i>n</i>	<i>% mean</i>
Child's Age		101	21 months
Caregiver's Age		101	26 years
Single Parent	N	61	59
	Y	42	41
Caregiver Education	0-6 years	3	3
	6-12 years	56	58
	13-17 years	26	27
	18 or more years	12	12
Race	African American	75	73
	Caucasian	13	13
	Other	15	14

Table 2: Children Oral Health Screening Summary Characteristics

<i>Characteristic</i>		<i>n</i>	<i>%</i>
Decay	Y	10	10
	N	89	90
White Spot Lesions	Y	14	14
	N	85	86
Plaque	Y	11	11
	N	92	89
Pathology	Y	1	1
	N	102	99
Early Eruption (< 6 months)	Y	5	5
	N	98	95
Crowding	Y	7	7
	N	96	93
Decay in Parents or Siblings	Y	34	34
	N	66	66
Frequent Snacking	Y	30	30
	N	73	70
Well Water or Suboptimal Fluoride	Y	23	77
	N	80	23
Bottle in Bed With Milk/Juice	Y	37	36
	N	66	64
Special Healthcare Needs	Y	5	5
	N	97	95
Fluoride Varnish Applied	Y	85	83
	N	18	17

Table 3: Caregivers' Responses to Oral Health Questionnaire

<i>Question</i>	<i>Response</i>	<i>Number</i>	<i>Percent</i>
1. Are your child's teeth ever wiped with a cloth or brushed	Y	86	86
	N	14	14
2. How often are your child's teeth wiped or brushed?	Never	5	5
	2-3 times a week	5	5
	Once a day	40	43
	2 times a day	42	46
3. Is toothpaste used?	Y	65	71
	N	27	29
3a. Does the toothpaste contain fluoride?	Y	25	37
	N	29	43
	DK	13	19
4. Is cleaning your child's teeth difficult?	Always	6	6
	Sometimes	48	51
	Never	37	39
5. Has your child ever been to a dentist?	Y	19	18
	N	84	82
6. Has a doctor or nurse ever told you when your child should be off the bottle?	Y	64	65
	N	35	35
7. Has a doctor or nurse ever told you how to clean your child's teeth?	Y	74	73
	N	28	37
8. Has a doctor or nurse ever told you when your child should begin going to the dentist?	Y	68	67
	N	34	33

Table 3 Continued:

<i>Question</i>	<i>Response</i>	<i>Number</i>	<i>Percent</i>
9. Putting a child to bed with a bottle containing milk can cause cavities in the teeth?	Y	78	77
	N	14	14
	DK	9	9
10. Putting a child to bed with a bottle containing juice can cause cavities in the teeth?	Y	83	81
	N	10	10
	DK	9	9
11. Do cavities in three year olds' teeth need to be filled?	Y	48	48
	N	20	20
	DK	33	32
12. Fluoride helps prevent tooth decay.	Y	79	77
	N	5	5
	DK	18	18
13. Fluoride can be used to coat the teeth of infants and children?	Y	67	66
	N	8	8
	DK	27	26
14. Bacteria and germs on the teeth help to produce cavities?	Y	77	75
	N	15	15
	DK	10	10
15. Adults who have cavities can pass tooth decay germs to their children?	Y	21	21
	N	36	35
	DK	45	44
16. At what age should kids start going to the dentist?	1-3 years	95	95
	4-5 years	5	5

Table 4: Correlations for Tooth Decay

	Decay		P Value
	Y	N	
Q5			
Y	7	12	
N	14	70	0.05
Q7			
Y	11	63	
N	9	19	0.04
Plaque			
Y	7	4	
N	14	78	0.0002

Table 5: Multivariate Regression Analysis For Decay at Screening Exam

Multivariate Regression Model Fit for Decay (Y/N) at Screening Exam						
	Estimate	SE	P-value	OR	95% CI	
Intercept	-2.8810	0.81				
Age in Months	0.0542	0.03	0.098	1.06	0.99	1.13
Plaque [Y]	2.4863	0.76	0.001	12.02	2.72	53.12

Table 6: Correlations For Dental Visit

	Visit		P Value
Appointment	Y	N	
Y	8	0	
N	15	59	0.0001
Q8			
Y	8	0	
N	45	28	0.03

VITA

Robert William Mansman II was born on October 2nd, 1977 in Geneva, New York. He graduated from Clover Hill High School, Midlothian, VA 1995. He attended Virginia Commonwealth University in Richmond, VA where he received his Bachelor of Science in Biology. Dr. Mansman received his Doctor of Dental Surgery from Virginia Commonwealth University in May of 2003. Following graduation from dental school, Dr. Mansman completed an Advanced Education in General Dentistry Residency at Fort Meade Army Base in Fort Meade, MD.