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THE EFFECTIVENESS OF VISUAL AIDS IN MOTIVATIONAL COUNSELING ON ORAL HEALTH LITERACY

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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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Abstract

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

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Purpose: The purpose of this study is to determine if motivational interviewing with written/illustrated infant oral health education provided to caregivers of pediatric dental patients increases caregivers' oral health literacy compared to verbal only motivational instruction.

Methods: This is a cohort study of caregivers and their child receiving oral health anticipatory guidance utilizing motivational interviewing with and without visual aids. Caregivers (N=20) of pediatric dental patients age 0-4 that presented to the Virginia Commonwealth University School of Dentistry for a new patient exam were recruited for the study. Caregivers were randomly assigned into 2 groups: the intervention group (IG), and the control group (CG). Each caregiver took a pre-test to determine their infant oral health literacy. Then the IG received infant oral health education using a flipbook, and the CG received the same information in verbal form.

Each caregiver had a brief motivational interviewing session. The caregivers then took the same test (post-test). At the pre-test time period, groups were compared by Fisher's exact test or a two group t-test, as appropriate. The post-test score of the two groups were compared using an ANCOVA.

Results: Currently, 20 patients have been enrolled in the study. There was no significant difference between the CG and the IG in the pre-test scores (P= 0.3913) or the post-test scores (P=0.3022). The intervention group had a nominally higher score after the education.

Conclusions: This study was only a pilot study with N=20 caregivers. This study may be used to estimate the number of subjects needed to demonstrate a significant difference.

Introduction

According to the Surgeon General's report, dental caries is the most common chronic infectious disease among children. Untreated tooth decay causes pain and infection that may lead to other problems such as difficulty in eating, speaking, playing, and learning. Dental caries in early childhood is preventable. The Surgeon General's report recommended enhancing public education about these oral health related issues.[1] According to the ADA, oral health literacy is "the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services needed to make appropriate health decisions."[2] Oral health literacy levels depend on socio-economic status, level of education, and occupational status.[3-5] The oral health literacy of caregivers affects their children. Caregivers who have low oral health literacy have children with deleterious oral health behaviors including nighttime bottle use, no brushing, and a lower health related quality of life.[6-10] By providing education on infant oral health and strategies of dental caries prevention, dental disease complications and treatment cost should be reduced.[11]

Oral health providers have the responsibility to educate the public concerning oral health. It is important for the oral health care providers to understand effective methods to deliver such education. Some studies report that passive delivery of expert advice related to healthy preventive oral health behaviors is ineffective. They show that passively informing patients in conversations about high risk oral behaviors does not affect the behavior.[12,13] While another

study conducted by Seow et al showed that a single dental health education and tooth-brushing instructions resulted in reduction of mutans streptococci infection in young children.[14] Mayer et al showed that a comprehensive preventive program improved both behavior and knowledge of oral hygiene.[15]

The oral health education should be provided so the recipients can understand and apply the knowledge. Doak et al conducted a study to show that 50% of patients had serious difficulty with or could not read instructional material at the fifth grade level. They recommend patients could benefit from health education that uses the minimum essential verbiage and illustrations to instruct patients.[16] Using cartoons and illustrations is an effective means to teach patients health related issues. Delp et al found that compared to patients who received illustrated information as to non-illustrated information, patients who received illustrated information were more likely to read the information and were more compliant with care.[17] Another study showed that when parents were given written illustrated information about their child's oral health care needs, they were more likely to return to an operative dental appointment with their child, felt like this information had been more helpful for them to prepare, and were less likely to insist on being present in the operatory during the operative procedure.[18]

Anticipatory Guidance

Anticipatory guidance is the process of providing practical, developmentally-appropriate information about children's health to prepare parents for the significant physical, emotional, and psychological milestones.[19] Pediatricians have been implementing anticipatory guidance during the well-patient exams for many years. By providing information on child milestones, it engages parents in the development aspects of their child and invites communication between the pediatrician and the caregiver.[20] In pediatric dentistry, topics that should be discussed initially

are usually focused on the parent and include: proper oral hygiene instruction, the cariogenicity of a high carbohydrate diet, trauma prevention, and non-nutritive oral habits. As the pediatric patient gets older, the instruction engages both the patient and the parent and adapts to suit the specific needs of the patient.[19] Keying the comprehensive preventive message to dental developmental milestones not only helps parents focus their children's attention and prevent them from becoming bored, but also helps doctors address realistic situations that characterize an age period. When parents are shown anatomical landmarks in their child's mouth while explaining dental concepts, follow-up telephone consultations are easier, unnecessary office visits are avoided, and management of injuries is improved.[20]

Motivational Interviewing

Currently, motivational interviewing (MI) has been examined as a way to educate parents on how to prevent early childhood caries. MI is a theoretical model developed by Miller as an approach to help overcome alcohol abuse.[21] It is also being used to help patients with drug abuse, smoking cessation, and other addicting behaviors.[22,23] MI is a brief counseling approach that focuses on the proper skills needed to motivate others. It provides strategies to move patients from inaction to action.[24] A major strategy of motivational interviewing is encouraging and allowing the patient to voice their concerns by asking open-ended questions. People change when they hear themselves talk about the need to change.[25] When the patients talk the success rate soars, when the health provider talks the success rates approximates zero.[25] MI in pediatric dentistry consists of establishing a relationship of trust and showing empathy. The caregivers are asked questions to help them to recognize the problem and to elicit self-motivational statements. Reflective listening is used to place emphasis on the self-motivational statements and shows concern and empathy. If resistance is encountered, certain techniques are used to "roll with

resistance" to prevent barriers in communication. Once the parents have identified the problem, they are encouraged to come up with goals to solve the problem, along with ways to overcome any obstacles that might prevent them achieving their goals. Finally, a regular follow up schedule to discuss goals will be established with the parents.[25] Weinstein et al have been studying the effects of MI with parents of young infants. They have found that by using MI, dental caries rates are lower and parents are more likely to be compliant with recommended fluoride varnish treatments.[26-28] Ismail et al conducted a study that examined the effects of motivational interviewing on caregivers of pediatric dental patients. They reported that the caregivers who received MI and watched an informational DVD were more likely to have their child brush at bedtime than those who only watched the DVD. However, the children were not more likely to brush two times a day. After 2 years the MI failed to reduce the number of new untreated carious lesions.[24]

The purpose of this study is to determine if motivational interviewing with written/illustrated infant oral health education provided to caregivers of pediatric dental patients increases caregivers' oral health literacy compared to verbal only motivational instruction.

Methods

Study Design

This is a cohort study of caregivers and their children receiving oral health anticipatory guidance utilizing motivational interviewing with and without visual aids. Caregivers (N=20) of pediatric dental patients whose ages range from 0-4 yrs that presented to the Virginia Commonwealth University School of Dentistry for a new patient exam were recruited and consented for the study. The Institutional Review Board of Virginia Commonwealth University approved the study. The JMP experimental design module was used to randomize an equal number of subjects in groups of ten into two groups: the intervention group and the control group (JMP version 9.0.2, SAS Institute, Cary NC, USA). The caregiver in each group was given a questionnaire to determine their infant oral health literacy (pre-test). The questionnaire consisted of multiple choice and True/False questions. The questionnaire was modified from a previous study that used the questionnaire to test the effectiveness of an audio-visual aid for improving infant oral health through primary caregiver education[30].

Anticipatory Guidance

The caregivers in the intervention group received infant oral health information using a flipbook. The flipbook included infant oral health education instructions in written form with illustrations and pictures. The oral health care information in the flipbook was based on guidelines set by the American Academy of Pediatric Dentistry. It included information on how

to properly clean teeth, the use of fluoride, and caries formation and progression. The caregivers in the control group were given the information in verbal form without illustrations. In order to calibrate the information given to the caregivers, pediatric dental residents were calibrated on how to present the infant oral health education to the caregivers. To ensure that the same information was given to both groups, the residents used an outline from the flipbook to give the information to the caregivers in the control group.

Motivational Interviewing

During this visit, the caregivers were also involved in a brief motivational interviewing session. The pediatric dental residents received training sessions to ensure they were proficient in utilizing motivational interviewing techniques. The motivational interviewing techniques that were used in the session were developed from a book titled Motivate Your Dental Patients: A Workbook.[25] Efforts were made to get to know the caregivers and their child. Questions were asked to help the caregivers identify any cariogenic habits and to elicit self-motivational statements. The caregivers were then asked to select two goals from a menu of choices that they determined they could do before their next visit. The caregivers were informed that the health care providers would follow up on the goals at the next recall visit. After the brief MI session, the caregivers from both groups were given the same questionnaire as a post information test (post-test) that was based on the information given in the infant oral health education.

Assessment and Analysis

The assessments were scored as the amount of questions answered correctly. Any question marked "I don't know" was marked as an incorrect answer. The effectiveness of the infant oral health education was determined based on the difference of correct answers marked on the pre-test to the correct answers marked the post-test. At the pre-test time period, groups

were compared by Fisher's exact test or a two group t-test, as appropriate. The post-test score of the two groups were compared using an ANCOVA, covarying out the pre-test score. All analyses were performed using SAS software (JMP version 9.0.2, Cary NC, USA).

Results

To this point in the study, N=20 caregivers were randomly assigned to either receive either only verbal information (group A), or information via a flipbook (group B). An equal number were assigned to each group. The average age of the children was 28 months (SD=14.6, range = 7 to 51 months). There was no difference between the mean ages of the two groups (t = 0.3, p-value > 0.7). For all children, this was their first dental visit. Forty percent (n=8) had other children who had been to the dentist and this percentage was no different between the two groups (Fisher's exact p-value = 1).

The 14 knowledge questions on the children's oral health survey item were scored as the number of correct items. See the Appendix for the correct answers for each item. The average pre-test correct was 10.1 (SD = 1.5, range = 7 to 13) and there was no significant difference between the two groups on the pre-test (t = 0.8, p-value = 0.3913). An analysis of covariance was used to compare the post-test means of the two groups while covarying out the pre-test number correct. ANCOVA indicated some evidence that the pre and post-test were correlated (standardized beta = 0.38, P = 0.11). After adjusting for the pre-test, the two groups were not significantly different (P = 0.3022). The results are summarized in Table 1 where it is seen that the verbal-only groups had slightly higher pre-test scores and the flipbook group had nominally higher scores after the infant oral health educational intervention.

When comparing the difference between the pre-test and post-test scores within each group, both groups scored significantly better (P<.001). There is a significant correlation between the infant oral health literacy based on the pre-test and the caregiver's education level (P=.0089). There is no correlation between the patient's age at the time of the first dental visit and the caregiver's oral health literacy. There is no correlation between the caregiver's infant oral health literacy and having had another child visit the dentist previously.

Table 1: Number Correct

Group	N	Mean	SE	95% CI		p-value
			Pre-test number correct			
Verbal	10	10.40	0.483	9.39	11.41	
Flipbook	10	9.80	0.483	8.79	10.81	
Difference		-0.60	0.683	-2.04	0.84	0.3913
			Post-test number correct			
Verbal	10	12.73	0.291	12.11	13.34	
Flipbook	10	13.17	0.291	12.56	13.79	
Difference		0.44	0.416	-0.44	1.32	0.3022

Discussion

This study was a pilot study for the first N=20 caregivers. There was no expectation that this study would have sufficient power to detect a difference in improvement between the two intervention groups. However, this study may be used to estimate the number of subjects needed to demonstrate a significant difference. A sample size calculation indicates that with a difference as large as that observed (0.44), and the mean square error of the ANCOVA of 0.9, a two group comparison at alpha = 0.05 would need a total N=144 of for 80% power. Additionally, even before the intervention there was already a high level of knowledge (mean 10.1 out of 14, with the worst patients getting 7 of 14 correct) leaving only marginal room for improvement. Taking the difference between the post-test and pre-test score, we may see improvement in the number of items attained. Twenty percent improved not at all or only got one additional item correct. The mean and median amount of improvement was 3 items.

The Surgeon General's report calls on the need to educate the public concerning oral health. While this study showed no difference in the method of providing the infant oral health education, it did show that providing the education in verbal form or with the help of visual aids did significantly improve the infant oral health of the caregivers. This information demonstrates the importance of taking the time to educate the caregivers at the first dental visit of their children. As this study continues, the data will help oral health care providers determine the most effective method to provide infant oral health education to the caregivers of pediatric dental

patients. Whether or not this will change the behavior of the caregivers is to be determined. It is also anticipated that this study will continue to monitor the ability of the caregivers to recall the information. They will get the same questionnaire at 6 months and 1 year from baseline to determine if there is any difference between the 2 groups in their ability to remember the infant oral health education.

This pilot study did show a significant correlation between the education level of their caregivers and their infant oral health literacy. The caregivers that had a higher level of education scored significantly better on the pre-test. This would be expected as it has been shown in other studies.[3,6,31] It would also be expected that those caregivers who have other children that have been to the dentist would have higher infant oral health literacy, but according these data that is not so. There was no difference in the pre-test scores of those caregivers who have other children that have had dental visits and caregivers that have only one child.

When analyzing the results of the pre-test questionnaire (see table 2), it is interesting to note that 13 of the 20 caregivers responded that their children should be seen by a dentist before his/her first birthday, five answered by age 2 and two responded at age 4. Yet the average age of the patients was 28 months. It appears that most of the caregivers know to bring their child to the dentist by 12 months, but the majority is not. It seems that there is a general knowledge that parents should be brushing their child's teeth as most of them (N=14) answered correctly that they should be brushing their child's teeth once the first tooth erupts in the mouth, and the majority answered correctly (N=17) that their child's mouth should be cleaned even before the teeth erupt. The question with the most incorrect answers had to do with the amount of time required to brush the child's teeth. Only 2/20 (10%) of the caregivers answered this question correctly with majority of them answering 15-30 seconds depending on the age of the patient.

Only three caregivers correctly answered the question that asked at what age should fluoridated toothpaste be used. These results tell us that caregivers know that they should be brushing their child's teeth, but they don't know how to do it correctly.

The question with the most correct answers was concerning the main cause of early baby tooth decay. Each caregiver (N=20) responded correctly. This information helps to understand that the general public does have knowledge of the deleterious effects of nighttime or bedtime feeding using milk, juice, or breast milk.

Table 2: Responses for each of the Oral Health Information questions by study group and time point

		Verbal		Flip book		Combined	
Question	Response	Pre	Post	Pre	Post	Pre	Post
An unhealthy diet can affect a child's baby and adult teeth.							
	FALSE						
	TRUE	10	10	9	10	19	20
	I dont know	0	0	1	0	1	0
Cleaning your baby's mouth after each feeding should begin even before teeth erupt.							
	FALSE	0	0	1	2	1	2
	TRUE	10	10	7	8	17	18
	I dont know	0	0	2	0	2	0
When should you start brushing your childs teeth?							
	Once the first baby tooth appears in the mouth	8	8	6	10	14	18
	At 1 year of age	2	2	2	0	4	2
	At 1.5 years of age						
	Once the child starts walking						
	I dont know	0	0	2	0	2	0
How long should you brush your child's teeth?							
	15-30 seconds depending upon the childs age	7	6	3	0	10	6
	1 minute	1	1	3	2	4	3
	As long as is necessary to remove all the plaque	0	3	2	8	2	11
	I dont know	1	0	2	0	3	0
Fluoride is important for preventing cavities in teeth.							
	FALSE						
	TRUE	10	10	8	10	18	20
	I dont know	0	0	2	0	2	0
When should you start using toothpaste with fluoride for cleaning your child's teeth?							
	Once the first tooth appears in the mouth	1	8	2	8	3	16

After all baby teeth have erupted	2	0	0	1	2	1
After 2 years of age or whenever the child can spit	5	2	2	1	7	3
I dont know	2	0	6	0	8	0
The amount of toothpaste one should use for brushing a child's teeth greater than 2 years of age should be about the size of:						
A grain of salt	0	1	0	0	0	1
A small pea	7	9	6	9	13	18
A small grape	0	0	2	0	2	0
A strip as big as the head of the toothbrush	3	0	0	1	3	1
I dont know	0	0	2	0	2	0
Fluoride in drinking water is the main source of fluoride intake during development of teeth.						
FALSE	2	0	1	0	3	0
TRUE	5	10	5	10	10	20
I dont know	3	0	4	0	7	0
The main cause of early baby tooth decay is the nighttime or bedtime feeding using bottled milk, juice or breast milk.						
FALSE	0	0	0	0	0	0
TRUE	10	10	10	10	20	20
Weaning from a baby bottle should be planned when the child is:						
2.5 years old						
1 year old	10	10	10	9	20	19
I don’t know						
The childs teeth should be cleaned at least twice a day. The most important cleaning time is after the last feeding at night.						
FALSE						
TRUE	10	10	8	10	18	20
I don’t know						
It is necessary to fix cavities in baby teeth.						
FALSE	1	0	0	0	1	0
TRUE	7	10	10	10	17	20
I dont know	2	0	0	0	2	0
When should you take your child to the dentist for his/her first dental visit?						
When the first tooth appears or no later than the childs first birthday	6	10	7	10	13	20
At 2 years of age	4	0	1	0	5	0
After 2 years of age or whenever the child can spit						
At 4 years of age	0	0	2	0	2	0
I don’t know						
Regular dental visits can prevent problems in your child's teeth and mouth.						
FALSE	0	0	2	1	2	1
TRUE	10	10	8	9	18	19
I don’t know						

This study could be improved by collecting the data necessary to determine significance. It was also observed that the caregivers did not seem to carefully mark their answers correctly as some of the answers were marked correctly on the pre-test and then marked incorrectly on the post-test. This could be due to the fact that the data gathering process while the caregiver was in the dental clinic took a prolonged period of time. The caregivers, especially with young and anxious children, seemed impatient as they filled out the questionnaires. Because 10 residents provided the education to the caregivers, it is difficult to assess whether the education provided was exactly the same in all instances, despite the calibration attempts.

Future studies could investigate the long term effectiveness of the method of delivery of the education by determining how well the caregivers retain the infant oral health education. Does the oral health behavior of the caregiver correspond to the oral health literacy of the caregiver is another study that would be of benefit.

Conclusion

Because the Surgeon General made the recommendation to enhance public education of oral health, the purpose of this study is to determine an effective means of delivering anticipatory-guided oral health information in a motivational interviewing setting to caregivers of pediatric dental patients.

- This study did show that providing the education in either form did improve infant oral health literacy of the caregivers.
- This study also showed significant correlation with education level and infant oral health education.
- This study also provided some insight on the oral health literacy of caregivers and their actions.

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Literature Cited

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Appendix A

Correct answers to the oral health questionnaire

An unhealthy diet can affect a child's baby and adult teeth.
True

Cleaning your baby's mouth after each feeding should begin even before teeth erupt.
True

When should you start brushing your child's teeth?
Once the first baby tooth erupts in the mouth

How long should you brush your child's teeth?
As long as is necessary to remove all the plaque

Fluoride is important for preventing cavities in teeth.
True

When should you start using toothpaste with fluoride for cleaning your child's teeth?
Once the first tooth appears in the mouth

The amount of toothpaste one should use for brushing a child's teeth greater than 2 years of age should be about the size of:
A small pea

Fluoride in drinking water is the main source of fluoride intake during development of teeth.
True

The main cause of early baby tooth decay is the nighttime or bedtime feeding using bottled milk, juice or breast milk.
True

Weaning from a baby bottle should be planned when the child is:
1 year old

The child's teeth should be cleaned at least twice a day. The most important cleaning time is after the last feeding at night.
True

It is necessary to fix cavities in baby teeth.
True

When should you take your child to the dentist for his/her first dental visit?
When the first tooth erupts or no later than the child's first birthday

Regular dental visits can prevent problems in your child's teeth and mouth.
True

Vita

Christian Sargent Peck was born on February 23, 1980 in Methuen MA. He attended Utah Valley University in Orem Utah. He then took off 2 years of schooling to serve an ecclesiastical mission for the Church of Jesus Christ of Latter Day Saints. He then graduated from Weber State University in 2006. He was accepted to the Virginia Commonwealth School of Dentistry and graduated with a degree of Doctor of Dental Surgery in 2010. Christian then entered the pediatric dentistry residency at Virginia Commonwealth University School of Dentistry.