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ABSTRACT

Title of Thesis: Women, Infants, and Children (WIC) Certifiers' Knowledge and Attitudes regarding the Prevention of Early Childhood Caries

Brittany Washko, Master's Degree Dental Hygiene, 2013

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Purpose: WIC health curricula provide minimal information on oral health yet early childhood caries (ECC) and tooth decay constitute the most common chronic childhood disease. WIC clinic certifiers deliver health information to their clients. This study explored if an educational intervention could influence the knowledge and attitudes of WIC clinic certifiers regarding the prevention of ECC. Factors limiting their ability and willingness to educate clients about ECC and instructional options that could improve their delivery of oral health education also were elicited.

Methods: A purposive sample of nine WIC clinic certifiers from the Anne Arundel County, WIC Program, Maryland, participated in this exploratory study. The design included a pre intervention observation, the educational intervention, and a post intervention observation and a follow-up interview. Close-ended checklists captured pre and post intervention data regarding certifiers' knowledge level and attitudes regarding ECC. A PowerPoint educational intervention included content addressing ECC and ways to apply it to client counseling. A semi-structured interview sought WIC educators' insights regarding the educational intervention's benefits and suggestions for improved learning experiences. All measuring instruments were pilot tested and assessed for content validity. Data analysis included summarizations of qualitative narrative data and

frequency counts. The study was approved by the Institutional Review Board, University of Maryland, Baltimore.

Results: All WIC certifiers increased the scope and depth of the oral health counseling that they provided, as assessed through a comparison of pre and post intervention observation responses. Key barriers to delivering comprehensive oral health education identified were client resistance, a mismatch of client/provider value systems and inadequate appointment time.

Conclusion: Following an oral health educational intervention, WIC clinic certifiers augmented and enhanced their delivery of oral health education. A dental hygienist's educational intervention has the potential to improve WIC educators' knowledge and attitudes toward the prevention of ECC. Longitudinal studies using larger and more diverse samples need to be conducted to assess the long term benefits of oral health educational interventions. Broad scale educational interventions may help reduce future childhood oral disease.

Women, Infants, and Children (WIC) Certifiers' Knowledge and Attitudes regarding the
Prevention of Early Childhood Caries

By:

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Chapter I

Introduction

In 1971, the Centers for Disease Control began documenting untreated dental caries in the United States. Initial data indicated that children aged two to five had approximately 25% untreated tooth decay, and children age six to nineteen year-old young adults were estimated to have 54.7% untreated tooth decay.¹ Although improvement has occurred, data still reflect high levels of untreated tooth decay. Recent data from NHANES found that two to five year olds have 27.9 percent of the caries experience and 20.5 percent are untreated.²

The Surgeon General's Report states that the most common chronic childhood disease is tooth decay.³ One form of tooth decay is called early childhood caries (ECC). ECC has also been referred to as "nursing caries" and/or "baby bottle tooth decay."⁴ According to the American Academy of Pediatric Dentistry, ECC is defined as "the presence of one or more decayed (noncavitated or cavitated lesions), missing teeth (due to caries), or filled tooth surfaces" in the primary dentitions of young children of seventy-one months or less.⁵

Dental decay, in particular ECC, is transmissible, infectious but preventable.⁶ The etiology of ECC depends on multiple risk factors. Meurman and Pienihakkinen conducted a longitudinal study involving children eighteen months to five years old and concluded that the most significant role in the development of the child's oral health status occurs during the first eighteen months of life.⁷ They further stated that strong

predictors of dental caries included the child's consumption of sugar and liquids other than water and a routine of bedtime feeding. Other variables cited as affecting development of dental decay include feeding schedule, the family's lifestyle and routine practices, the child's level of mutans streptococci (MS) colonization, and the job and oral health status of the guardian.⁷ A systematic review of forty-six studies completed by Douglass and Tinanoff states there is strong evidence that children's main source of MS colonization is from their mothers.⁸ Although numerous factors could increase a child's risk for ECC, caretakers play a prominent role as they are making the decisions that affect the child's health.⁸ By increasing the knowledge of caretakers and their valuing of oral health, the risk for the development of ECC could be reduced or eliminated.

Oral disease is prevalent in the child population. A child is five times more likely to have tooth decay than asthma and seven times more likely to have tooth decay than hay fever.³ By the time children enter kindergarten, almost 40% have dental caries.⁹ Twenty-five percent of children from low socio-economic strata have not been to the dentist prior to entering kindergarten.³

According to the Surgeon General's Report, the total number of adults and children who do not have dental insurance exceeds 108 million.³ Children are three times more likely to have dental needs when they belong to families that do not have dental insurance, in comparison to children that belong to families that have either public or private insurance.³

Obtaining insurance coverage for children has met with legislative challenges. During the Clinton administration, legislation instituting the State Children's Health Insurance Program (SCHIP) was introduced and passed under the Social Security Act in 1997.¹⁰

This legislation gave dental access to five million uninsured children.¹¹ However, during the second Bush administration, the expansion of the program was vetoed.¹¹ In 2009, President Barack Obama signed the Children's Health Insurance Program Reauthorization Act.¹¹ This law went into effect on April 1, 2009, and it is providing health care to millions of uninsured children.^{10,11} The passage of this legislation reflects the need for children's access to oral health care and for the provision of needed oral health services.

Nationally, low income children experience the highest percentage of untreated caries, ECC, and incipient dental lesions.³ Reisine and Psoter conducted a systematic review and found that socioeconomic status (SES) has a significant inverse relationship with the occurrences of caries; i.e., the higher rate of caries, the lower the SES.¹²

Several federal programs exist that aid children from lower socio-economic backgrounds. One example is, the United States Department of Agriculture's (USDA) Special Supplemental Nutrition Program for Women, Infants and Children (WIC). There are ninety WIC programs in the United States and its territories.¹³ These programs manage more than 10,000 clinics.¹⁴ In 2011, the average number of clients utilizing WIC services was 8,958,000.¹⁵ Specifically, in 2010, the Maryland WIC program provided services to more than 148,000 women, infants and children monthly.¹⁴ The mothers who seek help from WIC are categorized as low SES; this status is determined by WIC's eligibility guidelines that are based on household income and family size. For instance, a household of one would fall into the annual income category of \$20, 665 while a household of four would be eligible with an annual income of \$42, 643.¹⁶

The United States Department of Agriculture (USDA) provides federal grants to WIC programs and the WIC programs provide checks for nutritious foods, information on healthy eating, breastfeeding support and referral to other health care and social services to pregnant women, breastfeeding moms (up to one year after delivery), new moms (up to six months after delivery), and infants and children under the age of five.¹⁷ The majority of the WIC program's employees are responsible for nutritional counseling, breastfeeding support and referral to other health care and social services. Employees and educators work collaboratively to provide nutritional education to the mothers. WIC employees see their clients on average every three months, more often as circumstances require; thus, they have regular contact with the mothers and they can provide continual education and support.

Purpose of the Study

The purpose of this study was twofold: to explore whether an educational intervention influences WIC clinic certifiers' knowledge and attitudes on the prevention of ECC and to investigate what factors limit their ability and willingness to educate their clients about ECC.

Statement of the Problem

Early Childhood Caries remains a prevalent problem.¹ Although research has defined some of the risk factors for ECC, limited research addresses whether health providers could aid in educating mothers on ECC. For example, a study by Kressin and associates indicates that health care providers (HCP) given an educational intervention on dental health are more able to provide helpful oral health educational assistance to their maternal patients than their colleagues who do not receive an intervention.¹⁸ Gussy and

his colleagues corroborated Kressin's findings by supporting the necessity of education for HCPs and parents on oral health to help prevent premature transmission of cariogenic bacteria.^{18,19}

In the present research study WIC clinic certifiers from the Anne Arundel County, Maryland, WIC Program received an educational intervention regarding the prevention of ECC. The intervention consisted of a PowerPoint presentation and a handout that covered the basic factors that increases a child's risk for developing dental caries. The PowerPoint presentation was designed to enhance the knowledge base of the WIC clinic certifiers and to positively influence their attitudes toward the importance of oral health and toward their willingness to deliver key information from the presentation to the patients. The effectiveness of the intervention was based upon pre and post observations and interviews. It was hoped that the intervention would result in change in the knowledge and behaviors of the WIC clinic certifiers. If positive change occurs, the intervention would appear to offer a feasible educational model for future instruction in ECC prevention and to help the mothers understand and prevent ECC in their children.

Significance of the Problem

Oral health is connected to total body wellness. The health and well-being of a child can be compromised by extensive dental cavities.^{20,21} Severe early childhood caries (S-ECC) can decrease a child's ability to eat due to the discomfort of chewing with the potential for malnourishment.²² Dental caries can interfere with a child's education. Children lose 50 million or more hours of school per year due to dental-related issues. Untreated dental cavities can interfere with children's speech.²³ Economically, ECC also can be costly to society. According to a study completed by Ettlbrick and his colleagues,

the mean hospital bill for children taken to the emergency room for dental-related issues is about \$3,223.²⁴

ECC is a preventable disease.⁶ Considering the physical pain associated with dental cavities in young children, the effect of dental caries on a child's well-being, the number of school hours lost for young children, and the expense of emergency treatment for families, effective educational interventions that enable health professionals to influence and educate mothers in the prevention of ECC are critical.

Although a study conducted in 2003 concluded that WIC program curricula could benefit from dental educational interventions,⁴ minimal to no research has been conducted to explore if an educational intervention and valid instructions on oral health would influence the WIC clinic certifiers' knowledge and attitudes on the prevention of ECC. In addition, no study has investigated the factors that influence the WIC clinic certifiers' abilities to educate their clients on ECC.

The use of an educational intervention to enhance the knowledge and attitudes of WIC clinic certifiers could lead to increased dissemination of educational information on the prevention of ECC from WIC clinic certifiers to WIC mothers. By identifying some of the factors that limit or increase the ability of WIC clinic certifiers to provide education on ECC, positive changes in the WIC program could occur. Should these research results indicate the effectiveness of the proposed educational intervention for WIC educators, the nationwide implementation of this or a similar intervention for reducing or preventing ECC among infants and young children from low income families could result.

Operational Definitions

For the purpose of this study, the following terms are defined

Knowledge: observed behaviors concerning ECC as defined by the comparison between the results of the WIC clinic certifier's pre and post observation forms regarding prevention of ECC.

Attitude: a positive or negative disposition which is influenced by a person's feeling, values, and beliefs regarding ECC and expressed through one's behavior as defined by the comparison of the pre and post observations attitude section which is divided into five categories that assess the demeanor of the certifier: friendliness, patience, understanding, caring/sharing, and helpfulness. The traits will be rated with good, fair and poor.

WIC Clinic Certifiers: Also known as Certified Paraprofessional Authority (CPPA). These WIC employees are all women. They deliver important information to WIC mothers about healthy eating and provide checks for nutritious foods, breastfeeding support and referrals to other health care and social services. Their educational levels range from high school degrees to bachelor's degrees.

Education Intervention: A PowerPoint presentation involving 18 slides and proper instructions that cover the information on the following topics: bottle and breast feeding methods, cavity transmission, modes of transmission, signs of ECC, effects of cavities in early childhood, dental visits, fluoride, and home care for the infant and child (two-five).

Oral Hygiene Practices: An individual routine for themselves and their children concerning brushing, flossing, wiping down infant's gums, sippy cup/bottle feeding, and diet as defined by open ended interview.

Dental Recare: Refers to the frequency that a person goes to the dentist for a debridement. Regular recare is every six months (twice a year).

Qualitative Research Objectives

1. Investigate the level of knowledge and attitudes of WIC clinic certifiers on the topic of ECC.
2. Determine if the educational intervention influenced the knowledge and attitudes of the WIC clinic certifiers on educating the parent/caretaker about ECC.
3. Explore the variables that reduce the WIC clinic certifiers' ability to educate their clients on ECC.
4. Discover the options that the WIC clinic certifiers would consider to be helpful in improving their educational interaction with their patients.

Limitations

The results of this study may be affected by the following factors that are beyond the control of the researcher:

1. The WIC clinic certifiers are trained to use participant focused counseling; this approach focuses on addressing the WIC participant's concern(s). For example, the WIC staff member might ask: "Is there any nutrition or health issue you want to discuss?" The participant's top concern may not always be oral health even though it may be important to the WIC clinic certifier or identified as a risk by the WIC computer software. After all of a participant's data has been entered into the computer from the medical and nutrition screens, the WIC computer analyzes the input and "assigns risks"; i.e., it identifies nutrition and health issues for that participant, referred to as "risk factors". These issues were addressed with the participant if no other topics are of greater immediate concern.

2. The WIC clinic certifiers have about 30 minutes for each certification appointment. Time could have limited their ability to educate the mothers on oral health issues particularly if it is not the participant's main concern/issue.
3. The target population included nine WIC clinic certifiers who are employed by the Anne Arundel County WIC program; therefore, results are limited to this group.
4. The Glen Burnie WIC clinic certifiers are all women; therefore, results may not be applicable to men.
5. This study used a purposive sample; thus, subject selection bias may be a threat.
6. Subjects knew that they are being observed and interviewed; therefore, the ways the WIC clinic certifiers behaved, and how they answered the interview questions could be biased.
7. The researcher could have misjudged a situation while observing the WIC clinic certifiers.
8. The potential for bias could have been heightened during the interview due to interviewer/interviewee interactions.

Assumptions

The following assumptions were made concerning the implementation of this proposed study:

1. The WIC clinic certifiers responded honestly and accurately to the open-ended interview questions.
2. The WIC clinic certifiers' responses to the open-ended questions were not influenced by the researcher's presence.

3. The WIC clinic certifiers were not influenced by the researcher who observed their interaction with their WIC client.

Summary

This chapter discusses the etiology, prevalence, at risk groups, costs to society and the effects of ECC on children's education, social and physical development. It also explains the WIC program and its eligibility requirements and the need for increased knowledge regarding the prevention of ECC among WIC clinic certifiers. The key terms are operationally defined and the research objectives are stated.

Chapter II presents an in depth overview of related literature that supports the relevance of this study.

Chapter II

LITERATURE REVIEW

The U.S. Surgeon General's report described dental caries as "the single most common chronic childhood disease" in the U.S.^{2,3} A form of dental caries, early childhood caries (ECC), is defined as "the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger."⁵ The American Academy of Pediatric Dentistry (AAPD) has identified ECC as a major public health issue.²⁵ A child is five times more likely to have tooth decay rather than asthma and seven times more likely to have tooth decay as opposed to hay fever.³ Early childhood caries affects more than 27 percent of two to five year olds and 20 percent of the carious lesions are untreated.²

Early childhood caries (ECC) is an infection that can develop and progress rapidly. Often complete destruction of the dentition can occur within six months.²³ ECC usually affects the maxillary anterior teeth first, then the primary molar teeth, and last, the mandibular anterior teeth.²³ This disease affects the smooth surfaces of teeth as opposed to the pits and fissures.²⁶

Infants and children need a healthy primary dentition to aid them in total body wellness.²³ Primary teeth are essential for speech development, mastication and proper tooth eruption and placement.³ Untreated decay in primary teeth can affect infants' and

children's quality of life by interfering with sleep patterns and the ability to focus on learning.^{23,27}

Etiology of Early Childhood Caries

Early childhood caries has multiple etiologies. Dental caries is a transmissible disease resulting from specific bacteria, Mutans streptococci (MS), which adhere to the tooth surfaces. Mutans streptococci (MS) metabolize sugars to produce acid, and with continual exposure, demineralization of tooth structure can occur.²⁸ These bacteria can be transmitted from person to person,^{6,29,30} and are primarily spread from caregiver to child (e.g. mother to child).^{8,31,32} Mutans streptococci have been found in infants' mouths as young as 12-24 months of age.³³ According to the Institute of Medicine, the majority of the population continues to be unaware and uninformed that dental decay is a contagious disease.²⁹

Dietary practices also play a significant role in the development of ECC. If a child's diet contains high levels of fermentable carbohydrates, he/she is at higher risk for dental caries.³⁰ MS converts fermentable carbohydrates into acids which can demineralize tooth surfaces.²⁸ Frequent exposure of children's teeth to a combination of breast milk, formula, and juices can increase their risk for caries.^{23,30}

Lack of good oral hygiene also promotes the development of ECC.³⁴ Children should begin receiving oral hygiene care upon the eruption of the first primary tooth. A caregiver should brush a child's teeth twice a day.³⁰ Caregivers also are responsible for locating a dental home for their child about six months after the eruption of the first tooth.^{23,30}

Inappropriate feeding practices can increase a child's risk for ECC. A high frequency of exposure to liquids other than water can increase a child's risk for dental caries.³⁵

Putting a child to bed with a bottle containing sucrose liquids is the main risk factor for ECC. According to the AAPD, bottle feeding a child while in bed is contraindicated, as milk and other sugary liquids contain fermentable carbohydrates which can bathe the smooth surfaces of the teeth throughout the night, placing the child's teeth at risk for demineralization.^{23,30,36} A child who continually drinks from a bottle and/or sippy cup during the day with liquids other than water also has an increased risk for caries.³⁵ The American Academy of Pediatrics recommends that the caregiver start weaning babies from the bottle at approximately one year.³⁷

Other non-behavioral risk factors can increase the development of dental caries. Socio-economic status (SES) is a significant risk factor for dental caries.³⁸ Comparing all age groups, individuals are more likely to have a history of decay, and two times more likely to have untreated dental decay when they are part of a lower-income strata than when they are from a higher income strata.² The Surgeon General's 2000 report indicated that poor children experience double the amount of dental caries, and more untreated decay as compared to wealthier children.³ A systematic review conducted in 2001 highlighted the relationship between SES and dental caries:¹² As a family's income decreases, the chance of the family visiting dental professionals for preventive services decreases.^{39,40} Poor children are less likely to receive sealants than their wealthier counterparts, despite having almost universal access to dental insurance through Medicaid.^{2,3}

An individual's race and ethnicity are related to dental disparities. Poor children and racial and ethnic minorities of all ages in the U.S. are affected by dental caries.^{2,41,42} Vargas and Ronzio explained that the relationship between children at risk and

prevalence of caries exist.⁴³ Numerous factors affect this relationship and prevent families from obtaining caries preventive services.⁴³ Certain racial and ethnic groups experience an increased risk for dental disease. White children have a lower rate and less severe dental caries than minority children.⁴³ Hispanics and African Americans have an inferior oral health status as compared to Whites.^{2,43,44} American Indians and Alaska Natives children aged two to five have three times the amount of tooth decay than the U.S. average.⁴⁵ Over two-thirds of this decay is untreated.^{2,45} These racial and ethnic groups are affected by dental disparities that start at a young age and continue through the cycle of life.^{44,46}

Oral health literacy is also a risk factor for dental caries.²⁹ According to the U.S. Department of Health and Human Services, health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”⁴⁷ Oral health literacy also relates to one’s ability to effectively navigate and gather needed information from the health care system to access care and make appropriate health decisions.²⁹ Patients need to be able to understand the risks and benefits of dental treatments (e.g., root canal therapy) in order to make suitable health decisions.²⁹ A patient’s ability to fill out Medicaid forms, medical history forms, determine when a child should begin using fluoridated toothpaste, and comprehend health-promoting feeding practices are just some examples of health tasks that are affected by oral health literacy.²⁹

According to the Institute of Medicine, health literacy significantly impacts the health outcomes of all age groups, the utilization of the medical system, and the total expenses of health care.²⁹ A nationally representative study, conducted by Yin and associates,

found that almost 30 percent of parents from the U.S. had a health literacy level that was below basic.⁴⁸ Low health literacy of both children and caregivers has been associated with poor health outcomes.⁴⁹⁻⁵¹ Similarly, Miller and colleagues found a significant relationship between children's dental disease status and caregivers' literacy level.⁵² Low literacy is associated with a lack of preventive health behaviors resulting in children with poor oral health status.^{53,54} Caregivers' oral health literacy can have numerous effects on infants and young children's oral health status including the development of ECC.^{53,54} Oral health behaviors affected by low health literacy include bottle feeding at night and daily oral home care.⁵⁵

When comparing the National Health and Nutrition Examination Survey (NHANES) data from 1988-1994 and 1999-2004, an increase in dental caries among preschool children (two to five years old) was noted.^{2,56} Dental caries in children aged two to four years old increased from 18 to 22 percent, and the proportion of untreated dental caries in this population increased from 16 to 17 percent.⁵⁷ NHANES results support that two to five year olds have 27.9 percent of the caries experience and 20.5 percent of this decay remains untreated.² In 1971, the Centers for Disease Control began documenting untreated dental caries in the United States.¹ Although their data indicates some improvement over the past two decades, findings still reflect elevated levels of untreated decay in certain age groups.¹ The CDC data from 2001-2004 indicated that 19.5 percent of children aged have untreated tooth decay, and 22.9 percent of children aged six to nineteen untreated tooth decay.¹

Effects of Dental Caries on Society

Individuals and society suffer when dental caries are left untreated. Researchers studied five major hospital systems located in the Minneapolis-St. Paul metropolitan area in Minnesota during a one year period.⁵⁸ Emergency rooms saw approximately 10,000 dental related cases.⁵⁸ Nearly five million dollars per year was spent on dental related treatment in emergency rooms.⁵⁸ Ettlbrick and colleagues conducted a study with five children's hospitals, and found that the average cost for a single visit for odontogenic infection was \$3,223.²⁴ Seeking treatment at an emergency department for dental pain or infection is more common in lower income groups.⁵⁹ Annually in the United States, tens of thousands of young children have to go under general anesthesia for restorative work and tooth extractions.⁶⁰

A study conducted by Agostini and colleagues, at a university-based pediatric dentistry clinic, found that one-fourth of the children had their first dental visit in the emergency room.⁶¹ The reasons for needing emergency care were as follows: pain or discomfort due to dental caries and eruption difficulties, both mostly associated with ECC, dental trauma, soft tissue pathoses, and problems with orthodontic applications or space maintainers.⁶¹

Children with untreated tooth decay can experience pain, speech and mastication problems, and difficulties with learning.³ Dental-related illnesses have caused over 51 million lost school hours yearly.³ In their cross sectional study, Meadow and associates found that tooth pain was experienced by more than one in every ten school aged children.⁶² Although research conducted over the past decades and education messages

have repeatedly emphasized the importance of prevention, tooth decay is still prevalent among many groups.²⁹

The Relationship between Mothers' and Their Children's Oral Health Status

Research supports a direct relationship between children's oral health status and their mothers' oral health status, oral health knowledge, educational level, age, ethnicity, and socioeconomic level.^{41,63,64}

Dye and colleagues culled data from NHANES and socio-demographic surveys, personal interviews, and dental exams and found that mothers' dental disease status influenced their children's dental disease status.^{41,64} Children had a greater probability of experiencing tooth decay if their mothers had high levels of untreated decay and tooth loss.⁴¹

Vachirarojpisan and colleagues also investigated the relationship between children's extent of ECC and mothers' socioeconomic status, oral home care, dental history, and the presence of mutans streptococci (MS) in their saliva.⁶⁴ Study results supported the association between mothers' lower socioeconomic status (low-income family, social class, education), and their children's enhanced risk for ECC.⁶⁴

In a longitudinal study investigating five year old children's frequency of caries at six months, three, and five years in relationship to socio-demographic status, it was found that family factors, and dental behaviors, mothers' education level, age at child birth, dental home care, and dental disease history were all associated with their children's degree of decayed, missing and filled teeth (dmft).⁶³ Children's dmft scores were lower when their mothers' educational level was above basic; dmft scores were greater when

mothers were of a younger age, had a home care history that did not include frequent flossing and tooth brushing, and had a history of poor oral health.⁶³

Prevention of ECC: Educating Mothers, Pregnant Women and Young Children

Determining if educational programs provided to mothers, pregnant women, and young children would decrease the extent of ECC has been studied. Plutzer and Spencer conducted an experimental study to determine how first time mothers and their infants responded to an oral health support program.⁶⁵ Study intervention materials included three series of printed hand-outs including information on mother's oral health status during pregnancy, dental home care, nutrition, mothers and children's oral status, significance of primary teeth, sleeping and physical oral habits, children's tooth eruption, eating and snacking habits, and oral home care practices.⁶⁵ Children of the mothers who received the intervention materials had a significantly lower rate of ECC than the children of the mothers who did not receive the intervention.⁶⁵ The researchers emphasized that the most essential times to start mothers' education are during their child's early years.⁶⁵

Freudental and Bowen found that the use of a personalized motivational interviewing (MI) method to decrease the risk of ECC had a minimally significant effect on WIC mothers' behaviors.⁶⁶ Change was measured through the use of four Readiness Assessments of Parents Concerning Infant Dental Decay (RAPIDD). Although no significant change in the mothers' cariogenic feeding practices was found, the treatment group did show a positively significant change with utensil sharing and children's brushing routine.⁶⁶

Both of the aforementioned studies show that an educational intervention provided to mothers can aid in reducing risk factors for ECC.^{65,66} Freudental and Bowen did state that four weeks between the pre and posttest may not have been a sufficient amount time to show change.⁶⁶ In contrast, Plutzer and Spencer's study measured change over a one year period.⁶⁵

Prevention of ECC: Educating Health Care Providers and Parents

Children are dependent upon their caregivers and health care professionals to achieve a healthy oral health status. Thus, parents and HCPs who treat infants and toddlers must be educated to aid in the prevention of ECC.^{6,19}

Kressin conducted a study to determine if pediatric physicians and nurses could aid in reducing ECC through educational counseling.¹⁸ The sample drawn from two pediatric outpatient academic medical centers included fourteen pediatricians and nineteen nurses who worked with children between six months to five years old.¹⁸ Subjects who received the hour long educational training intervention conducted significantly more counseling sessions on ECC than subjects in the control group.¹⁸ Children attending the intervention site experienced a 77 percent lower rate of ECC,¹⁸ indicated the success of counseling interventions.

Another study sought to determine if health care professionals (HCPs) who had an increased patient load of families with infants could be trained to promote oral health care.¹⁹ The training program's goals were to increase HCP's knowledge of ECC, including its risk factors and preventative behaviors.¹⁹ The HCPs who were from rural Local Government Areas (LGAs) in Victoria, Australia, worked with a sample of parents who had children aged 12-24 months. HCPs obtained information on the parents' oral

health knowledge, behaviors, attitudes, and values using semi-structured interviews and focus groups.¹⁹ The HCPs gave educational information and personalized recommendations to the parents concerning their children's oral health status.¹⁹ The results indicated that the risks of ECC are related to the parents' lack of knowledge, confidence, and hygiene behaviors.¹⁹ Although the parents in the study had some accurate beliefs regarding the risks of ECC, their behaviors were not consistent with these beliefs.¹⁹ For example, most of the parents believed that ECC is caused by insufficient oral hygiene and a sugary diet, yet most were unaware that *S. mutans* could be transmitted via saliva.¹⁹ More than 50 percent of the sample put their infants to bed with a bottle.¹⁹

The Surgeon General's 2000 report stated that the effects of oral disease on children was a major concern and that increased collaboration was a principle action that was needed to promote oral and total body wellness.³ As collaborators, HCPs, mothers, and people who work with mothers, infants and children need to be educated on the risks and preventative behaviors of ECC. Health care providers and mothers/caregivers who respond positively to educational interventions can help to decrease the incidence of ECC.^{6,18,19,65}

"Train the Trainer" (TTT) is a recognized educational model that has shown success in multiple disciplines.⁶⁷ TTT has been used successfully in addressing awareness and education concerning breast cancer,⁶⁸ and in training pharmacy students on ways to educate patients.⁶⁹ Researchers from the Harvard School of Public Health stated that TTT is the method of choice for public health preparedness in Maine.⁶⁷ TTT enables individuals who are educated in a particular content-area to select potential trainees who

are tied to a community goal.⁶⁷ Based on this rationale, the TTT model could be employed to educate the WIC clinic certifiers on ECC.

Women, Infants and Children (WIC) program

4. Value Enhanced Nutrition Assessment (VENA), a participant-focused counseling approach, is used by WIC clinic certifiers. VENA instructs that WIC clinic certifiers first verbally review the medical and nutrition questionnaire with their clients. The certifier filled out the questionnaires based on the client's responses. These questionnaires are found on the WIC computer software. After the medical and nutrition questionnaires are completed, the computer program analyzes the data and determines "assigned risks" based on the participants' responses. The WIC clinic certifiers addressed the participants' main concerns and "assigned risks" first and if time allowed, proceeded to other issues. The participant's top concern may not always be oral health even though it may be important to the WIC clinic certifier or identified as a risk by the WIC computer software. Oral health issues might be addressed with the client if no other topics are of greater immediate concern.

WIC programs offer their clients checks for nutritious foods, nutrition education, breast feeding education and referrals to health care professionals and social services, as warranted.¹⁷ The WIC clinic certifiers educate pregnant women and parents/legal guardians with children under the age of five.¹⁷ Research related to ECC has been conducted in WIC programs in the United States. Bray and associates studied the relationship between ECC and certain risk factors among children enrolled in WIC and

Well Children Services Programs located in the Kansas City Health Department.⁴

Parent(s) or guardian(s) also participated in this study.⁴ Quantitative data were collected during the children's dental screenings and qualitative data were obtained through parents/guardian completions of self-report questionnaires that explored the predisposing risk factors for ECC.⁴

Study findings revealed that children from the WIC program and well child services population had about a 40% caries rate and that the WIC programs offered minimal oral health care prevention information.⁴ The researchers concluded that WIC's program curriculum could benefit from educational dental interventions.⁴ Interventions that provide parental guidance, instructions, and demonstrations on how to care for their children's teeth appear to be successful.¹⁹ The use of a dental educational intervention to enhance the knowledge and attitudes of WIC clinic certifiers, could lead to increased dissemination of educational information on the prevention of ECC from WIC clinic certifiers to WIC mothers.

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Chapter III

Women, Infants, and Children (WIC) Certifiers' Knowledge and Attitudes regarding the Prevention of Early Childhood Caries¹

ABSTRACT:

Purpose: WIC health curricula provide minimal information on oral health yet early childhood caries (ECC) and tooth decay constitute the most common chronic childhood disease. WIC clinic certifiers deliver health information to their clients. This study explored if an educational intervention could influence the knowledge and attitudes of WIC clinic certifiers regarding the prevention of ECC. Factors limiting their ability and willingness to educate clients about ECC and instructional options that could improve their delivery of oral health education also were elicited.

Methods: A purposive sample of nine WIC clinic certifiers from the Anne Arundel County, WIC Program, Maryland, participated in this exploratory study. The design included a pre intervention observation, the educational intervention, and a post intervention observation and a follow-up interview. Close-ended checklists captured pre and post intervention data regarding certifiers' knowledge level and attitudes regarding ECC. A PowerPoint educational intervention included content addressing ECC and ways

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to apply it to client counseling. A semi-structured interview sought WIC educators' insights regarding the educational intervention's benefits and suggestions for improved learning experiences. All measuring instruments were pilot tested and assessed for content validity. Data analysis included summarizations of qualitative narrative data and frequency counts. The study was approved by the Institutional Review Board, University of Maryland, Baltimore.

Results: All WIC certifiers increased the scope and depth of the oral health counseling that they provided, as assessed through a comparison of pre and post intervention observation responses. Key barriers to delivering comprehensive oral health education identified were client resistance, a mismatch of client/provider value systems and inadequate appointment time.

Conclusion: Following an oral health educational intervention, WIC clinic certifiers augmented and enhanced their delivery of oral health education. A dental hygienist's educational intervention has the potential to improve WIC educators' knowledge and attitudes toward the prevention of ECC. Longitudinal studies using larger and more diverse samples need to be conducted to assess the long term benefits of oral health educational interventions. Broad scale educational interventions may help reduce future childhood oral disease.

Key words: CARIES PREVENTION, CONTINUING EDUCATION, EARLY CHILDHOOD CARIES (ECC), EDUCATIONAL INTERVENTION, WOMEN, INFANTS, CHILDREN (WIC) PROGRAM

INTRODUCTION

The Surgeon General's Report states that the most common chronic childhood disease is tooth decay.¹ When comparing the National Health and Nutrition Examination Survey (NHANES) data from 1988-1994 and 1999-2004, an increase in dental caries among preschool children (two to five years old) was noted.^{2,3} Dental caries in children aged two to four years old increased from 18 to 22 percent, and the proportion of untreated dental caries in this population increased from 16 to 17 percent.⁴ Dental decay, in particular ECC, is a transmissible and infectious disease that is preventable.⁵

The American Academy of Pediatric Dentistry (AAPD) defines early childhood caries (ECC), also referred to as "nursing caries" and/or "baby bottle tooth decay",⁶ as "the presence of one or more decayed (noncavitated or cavitated lesions), missing teeth (due to caries), or filled tooth surfaces" in the primary dentitions of young children of seventy-one months or less.⁷ The AAPD also has identified ECC as a major public health issue.⁸ A child is five times more likely to have tooth decay than asthma and seven times more likely to have tooth decay as opposed to hay fever.¹

In 1971, the Centers for Disease Control began documenting untreated dental caries in the United States.⁹ Although their data indicates some improvement over the past two decades, findings still reflect elevated levels of untreated decay in certain age groups.⁹ Untreated dental decay also poses costs to society. In their study, Agostini and colleagues found that one-fourth of the children had their first dental visit in the emergency room.¹⁰ The reasons for needing emergency care were as follows: pain or discomfort due to dental caries and eruption difficulties, both mostly associated with ECC, dental trauma, soft tissue pathoses, and problems with orthodontic applications or space maintainers.¹⁰

Early childhood caries can develop and progress rapidly. Often complete destruction of the dentition occurs within six months.¹¹ The etiology of ECC depends on multiple risk factors. Strong predictors of dental caries include the child's consumption of sugar and liquids other than water, a routine of bedtime feeding, a family's lifestyle and routine practices, the child's level of mutans streptococci (MS) colonization, and the occupation and oral health status of the guardian.^{12,13} A systematic review of forty-six studies finds strong evidence that a child's main source of MS colonization is from its mother.¹⁴ Lack of good oral hygiene also promotes the development of ECC.¹⁵ Children should begin receiving oral hygiene care upon the eruption of the first primary tooth and a caregiver should brush a child's teeth twice a day.¹⁶

A high frequency of exposure to liquids other than water can increase a child's risk for dental caries.¹⁷ Putting a child to bed with a bottle containing sucrose liquids is the main risk factor for ECC. According to the AAPD, bottle feeding a child while in bed is contraindicated.^{11,16} Milk and other sugary liquids contain fermentable carbohydrates

which can bathe the smooth surfaces of the teeth throughout the night, placing the child's teeth at risk for demineralization.^{16,18} A child that continually drinks from a bottle and/or sippy cup during the day with liquids other than water also has an increased risk for caries.¹⁷ It is recommended that the caregiver start weaning babies off the bottle at approximately one year.¹⁹

Literature Review

Infants and children need a healthy primary dentition to aid them in total body wellness.¹¹ Primary teeth are essential for speech development, mastication and proper tooth eruption and placement.¹ Untreated decay in primary teeth can affect infants' and children's quality of life by interfering with sleep patterns and the ability to focus on learning.^{11,20,21}

According to the Surgeon General's Report, the total number of adults and children who do not have dental insurance exceeds 108 million.¹ Children whose families do not have dental insurance tend to be from lower socio-economic strata are three times more likely to have dental needs, in comparison to children who belong to families that have either public or private insurance.¹ Seeking treatment at an emergency department for dental pain or infection is more common in the lower income groups.²² Annually in the United States, tens of thousands of young children have to go under general anesthesia for restorative work and tooth extractions.²³

An individual's race and ethnicity are related to dental disparities. Poor children and racial and ethnic minorities of all ages in the U.S. are still affected by dental caries.^{2,24,25} Vargas and Ronzio explained that the relationship between children at risk and prevalence of caries exist.²⁶ Numerous factors affect this relationship and prevent

families from obtaining caries preventive services.²⁶ Certain racial and ethnic groups experience an increased risk for dental disease.²⁶ White children have a lower rate and less severe dental caries than minority children.²⁶ Hispanics and African Americans have an inferior oral health status as compared to Whites.^{2,26,27} American Indians and Alaska Natives children aged two to five have three times the amount of tooth decay than the U.S. average. Over two-thirds of this decay is untreated.^{2,28} These racial and ethnic groups are affected by dental disparities that start at a young age and continue through the cycle of life.^{27,29}

Oral health literacy is also a risk factor for dental caries.³⁰ According to the U.S. Department of Health and Human Services, health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”³¹ Oral health literacy also relates to one’s ability to effectively navigate and gather needed information from the health care system to access care and make appropriate health decisions.³⁰ The Institute of Medicine reports that health literacy significantly impacts the health outcomes of all age groups, the utilization of the medical system, and the total expenses of health care.³⁰ Low literacy is associated with a lack of preventive health behaviors resulting in children with poor oral health status.^{32,33}

A nationally representative study, conducted by Yin and associates, found that almost 30 percent of parents from the U.S. had a health literacy level that was below basic.³⁴ Caregivers’ oral health literacy can have numerous effects on infants and young children’s oral health status including the development of ECC. Oral health behaviors that were affected by low health literacy included bottle feeding at night and daily oral

home care.³⁵ The most significant role in the development of the child's oral health status occurs during the first eighteen months of life.¹² By the time children enter kindergarten, almost 40% of them have dental caries.³⁶ Twenty-five percent of children from low socio-economic strata have not been to the dentist prior to entering kindergarten.¹ Although numerous factors could increase a child's risk for ECC, it is clear that caretakers play a prominent role as they are making the decisions that affect the child's health.^{14,37} By increasing the knowledge of caretakers and their value of oral health, the risk for the development of ECC could be reduced or eliminated.

Socio-economic status (SES) is a significant risk factor for dental caries; the higher rate of caries, the lower the SES.^{38,39} Nationally, low income children experience the highest percentage of untreated caries, ECC, and incipient dental lesions.^{38,39} The Surgeon General's 2000 report indicated that poor children experience double the amount of dental caries, and more untreated decay compared to wealthier children.¹ A systematic review conducted in 2001 highlighted the inverse relationship between SES and dental caries.³⁸ As a family's income decreases, the chance of the family visiting the dental professionals for preventive services also decreases.^{40,41} Poor children are less likely to receive sealants than their wealthier counterpart, despite having almost universal access to dental insurance through Medicaid.^{1,2}

Several federal programs exist that aid children from lower socio-economic backgrounds. One example is, the United States Department of Agriculture's (USDA) Special Supplemental Nutrition Program for Women, Infants and Children (WIC). In total, there are ninety WIC programs in the United States and its territories.⁴² These programs manage more than 10,000 clinics.⁴³ In 2011, the average number of clients

utilizing WIC services was 8,958,000.⁴⁴ In 2010, the Maryland WIC program provided services to more than 148,000 women, infants and children monthly.⁴³ The mothers who seek help from WIC are categorized as low SES; this status is determined by WIC's eligibility guidelines that are based on household income and family size.⁴⁵ For instance, a household of one would fall into the annual income category of \$20,665 while a household of four would be eligible with an annual income of \$42, 643.⁴⁵

The WIC program provides nutritional counseling, nutritious foods, breastfeeding support and referral to other health care and social services for pregnant and breastfeeding women (up to one year after delivery), new mothers (up to six months after delivery), and infants and children under the age of five. The WIC employees provide breastfeeding support and referrals to other health care and social services.¹⁵ WIC employees see their clients on an average of every three months, more often as circumstances require; thus, they have regular contact with the mothers and they can provide continual education and support.

Determining if educational programs provided to mothers, pregnant women, and young children would decrease the extent of ECC has been assessed. Plutzer and Spencer conducted an experimental study to determine how first time mothers and their infants respond to an oral health support program.⁴⁶ Study intervention materials included three series of printed hand-outs including information on mother's oral health status during pregnancy, dental home care, nutrition, mothers and children's oral status, significance of primary teeth, sleeping and physical oral habits, children's tooth eruption, eating and snacking habits, and oral home care practices.⁴⁶ Children of the mothers who received the intervention materials had a significantly lower rate of ECC than the

children of the mothers who did not receive the intervention.⁴⁶ The researchers emphasize that the most essential times to start mothers' education are during their child's early years.⁴⁶ An educational intervention provided to mothers can aid in reducing risk factors for ECC.^{46,47}

Although limited research addresses whether health providers could aid in educating mothers on ECC, two studies show that health care providers (HCP) given an educational intervention on dental health are more able to provide helpful oral health educational assistance to their maternal patients than their colleagues who do not receive an intervention.^{48,49} A study conducted in 2003 concluded that the WIC's program curricula could benefit from dental educational interventions.⁶ Minimal to no research has been conducted to explore if an educational intervention and proper instructions on oral health would influence the WIC clinic certifiers' knowledge and attitudes on the prevention of ECC; in addition, no study has investigated the factors that influence the WIC clinic certifiers' abilities to educate their clients on ECC. An educational intervention could enhance the knowledge and attitudes of WIC clinic certifiers; this intervention could lead to increased dissemination of educational information on the prevention of ECC from WIC clinic certifiers to WIC mothers/caretakers. By identifying some of the factors that limit or increase the ability of WIC clinic certifiers to provide education on ECC, positive changes in the WIC program could occur.

The purpose of this study was to explore whether an educational intervention (PowerPoint and Dental Facts Sheet) influences WIC clinic certifiers' knowledge and attitudes on the prevention of ECC as assessed by the educational advising of their

clients, and to investigate what factors limit their ability and willingness to perform this service.

Methods and Materials

The study's pretest-posttest design compared the knowledge and attitudes of WIC clinic certifiers prior to and following an educational intervention on ECC. Pre and post intervention forms (check list of topics), an educational PowerPoint intervention, and follow-up one-on-one interview were the key elements of the design. The WIC certified educators deliver all educational services to their clients during counseling sessions. At each session, the WIC certifier obtains medical and nutritional data on the history and current well-being of the children or mother, and or both depending on the type of certification. Using WIC computer software, certifiers analyze these data and identify what the client considers the main issues of concern. Mothers may not indicate that oral health is of primary concern; thus discussion of behaviors that promote oral health might not be addressed during educational sessions unless introduced by the clinic certifiers. The researcher only observed the WIC certifier counseling the children with their birth parents.

The study sample included nine female certifiers drawn from a pool of WIC certifiers employed at two WIC clinics in Anne Arundel County, Maryland. To qualify for study enrollment, potential participants had to be at least twenty one years of age and have a minimum of one year working experience with the WIC program. Table 1 displays the sample's demographic characteristics.

Subject	Age	Ethnicity	Years as WIC employee	Education/Degree
A	57	Cuban-American	8	College coursework; no degree
B	32	Caucasian	7	Bachelor's Degree of Health Sciences in Community Health
C	31	Caucasian	5	Bachelor's Degree of Health Sciences Partially completed Master's Degree of Nutrition
D	45	Hispanic	5	Technical School; Administrative Assistant Certificate
E	4	Hispanic	4	Bachelor's Degree of Accounting
F	34	African American	5	Associate's Degree of Health Education Bachelor's Degree of Sociology and minor in Social Welfare
G	2.5	African American	2.5	Associate Degree of Education
H	60's	Caucasian	30	Some college courses
I	7	Hispanic	7	Associate's Degree of Recreational Leadership

Table 1: Demographic Characteristics

To recruit participants, an email was sent to the certifiers explaining the study's goals and objectives. It also included an attached informed consent form requesting a response

of *participate/not participate* within ten business days. The certifiers were instructed to print out the informed consent, read the entire document, and communicate with the researcher regarding any questions or concerns that they might have. If they chose to participate, they signed the consent form and submitted it to their supervisor who then gave it to the researcher.

Prior to any data collection, sessions were scheduled, the observation and interview forms were prepared and the informed consents were verified. The language of communication in all the observation and interview sessions was English, even though some of the certifiers were also proficient in Spanish. Table 2 displays WIC clinic certifiers' Spoken language.

<u>Language spoken</u>	Fluent English	Primarily fluent English and Rudimentary Spanish	Bilingual: Fluent English and Spanish
Number of Subjects	2	2	5

Table 2: WIC Clinic Certifiers' Spoken Language

Baseline data on certifiers' attitudes and knowledge were collected using check lists and note taking that was done during the observation of certifier-client counseling sessions. Identical pre and post intervention checklists were utilized (Appendices A and B). The initial checklist surveyed the WIC clinic certifiers' baseline knowledge of ECC and their overall attitudes regarding child and maternal oral health at the start of an observation session. The client's verbal consent was obtained to allow the researcher to be present during the observation and to take notes. The researcher tried to minimize distraction by unobtrusively sitting in the corner of the room. During the observation, the researcher listened and watched the interaction between the WIC clinic certifier and the

mother and child. The researcher checked “yes” or “no” in the knowledge section of the observation form, indicating if the certifier discussed any of the predetermined topics. If the topic was not applicable to the client, the researcher checked “n/a” in the “n/a” column. The researcher then completed the attitude section of the form. Attitudes were assessed based on the following five characteristics: friendliness, patience, understanding, caring/sharing, and helpfulness. These qualities were rated on a scale of “good”, “fair” and “poor” as determined by the number times they were observed during the session. The rating of “good” indicated frequently, “fair” specified sometimes, and “poor” meant rarely. A comment section was also included. The pre observation session took approximately thirty minutes.

The educational intervention included a power point presentation and distribution and discussion of an information sheet. Content on the following topics was presented: bottle and breast feeding methods, caries transmission, modes of transmission, signs of ECC, effects of tooth decay in early childhood, dental visits, fluoride, and home care for infants and children of two to five years of age. Content information was obtained from multiple sources including the American Academy of Pediatrics (AAP): Breastfeeding and the Use of Human Milk, an AAP brochure: A Guide to Children’s Dental Health (2004) and two WIC brochures: Tips for Healthily Teeth (2007) and Keep your Baby Smiling...Prevent Baby Bottle Tooth Decay. Specific slides explained how the certifiers could make the information applicable to their counseling. The posttest observation was conducted one week later, following the same protocol as the pretest: Each certifier was observed while she provided counseling during the mother and child’s second visit.

To achieve content validity, an expert panel of educators and public health dental

hygienists reviewed the checklist topics and affirmed the relevance of the content. Three rounds of pilottesting were performed to ensure the reliability strength of the research instruments.

Following the completion of both observation sessions, the researcher conducted a semi-structured one-on-one interview with each of the WIC clinic certifiers in a private room. Demographic data addressing language, age, education level, ethnic background, and employment information were obtained at the start of the interview session. The individualized open-ended questions were then presented. The questions were developed based on a comparison of each certifier's knowledge and attitudes data obtained from the pre and post intervention observations held during the counseling sessions. To facilitate the interview process and ensure the accuracy of the data, the interviews were audio taped. The taped data were transcribed and summarized.

To safeguard for confidentiality of the collected information, each participating certifier was identified by a letter of the alphabet, and the study documents were stored in a locked cabinet at the supervisor's office. All observation sessions were conducted in a private room.

Qualitative data was generated from the pre and post intervention observation sessions and the follow up individualized interviews. Upon completion of the study all raw data (all study documents and tapes) were destroyed.

Results

This qualitative study had ten potential participants, all female. One subject was not able to complete the study due to a medical problem so a final subject group of nine was used. (See Table 1: certifiers' demographic data.)

Baseline knowledge and attitudes of the WIC clinic certifiers were assessed during a client (birth parent and child) educational session. These sessions were observed by one member of the research team who attended all sessions.

Knowledge at Baseline

Pre observations revealed that all certifiers covered the topic of sugar content in juice and milk when they interacted with their clients. However, no WIC clinic certifiers discussed the connection between sugar and tooth decay (Topic 23). Nine other relevant topics also were not addressed (Table 2: Topics- 12, 13, 15, 16, 21C, 21D, 21E, 23, and 24). Only one out of nine certifiers covered the four following topics which questioned about dental home and dental homecare habits: brushing two times a day, using a pea sized amount of toothpaste, and using water only with children under two years old (topics- 20A, 18A, 18B, and 18C). Table 3 exhibits the pre intervention knowledge scores.

Attitudes at Baseline

Attitudes were measured using the following variables: friendliness, patience, understanding, caring/sharing, and helpfulness. The summary of the results in Table 3 reveals that every clinic certifier had a “good” rating in each of the attitude categories. All certifiers were willing to help their clients by providing them with brochures for additional information. (See Table 4.)

Following the educational intervention (i.e., the PowerPoint slide presentation and discussion of Dental Facts Sheet) WIC clinic certifiers’ baseline and post intervention knowledge and attitude ratings regarding the education of their mother clients about ECC were compared.

Comparing Pre and Post Knowledge

Unlike the pre intervention measurements, all WIC clinic certifiers related sugar content in juice and milk to tooth decay when interacting with their clients following the educational session. The results for the post observation showed that all certifiers covered all the topics in Table 3 including numbers 14, 20A, 21A, 21B, 21C, 21D, 22, and 23, in contrast to the pre intervention results where no certifiers discussed the topics number 21C, 21D, and 23. Topics 19A, 19B, and 21F were covered by eight out of nine certifiers after the intervention while those same topics had only been covered by four, five, and two out of nine certifiers, respectively. Additionally, two topics concerning bottle water and fluoride, and brushing two times a day (topics 21E and 18A) were covered by 7/9 certifiers after the intervention while previously no certifiers had covered topic 21E, and only one certifier addressed topic 18A. The remaining results are found in Table 3.

Comparing Pre and Post Attitude

No changes in the overall attitudes occurred from pre to post observation. The ratings could have declined but they could not have improved as they were at the highest level at pretest.

<u>Observation Notes</u>	Pre Observation			Post Observation		
	Yes	No	N/A	Yes	No	N/A
Topics addressed by the certifiers...						
1. Going to bed with a bottle containing liquids other than water are harmful	1	1	7	2	0	7
2. Going to bed with a bottle is harmful to the teeth (milk collects around the teeth and can cause a cavity)	0	2	7	2	0	7
3. Prolonged at will breast feeding is harmful (milk collects around the teeth and can cause a cavity)	0	2	7	1	1	7
4. Sweet liquids and or milk in bottle at night can cause a cavity	1	1	7	2	0	7
5. Liquid content in a bottle should only be milk, formula and or water during the day. No juice!	2	0	7	2	0	7
6. Weaning baby from bottle after 12 months is important	0	2	7	2	0	7
7. Never put baby in bed with bottle	1	1	7	2	0	7
8. Mother should always hold the bottle while feeding the infant	2	0	7	0	0	9
9. Do not use bottle as pacifier	1	1	7	0	0	9
10. Best method is the breast method A. Less expensive compared to formula	2	0	7	1	0	8
11. B. Infection-fighting antibodies are in the breast milk	1	1	7	0	0	9

12. Cavities can be passed from caregiver to infant/child. The bacteria in saliva can cause tooth decay.	0	9	0	0	9	0
13. Different modes of bacterial transmission which can cause cavities A. ___ Eating from same Utensils B. ___ Kissing C. ___ Licking Bottle Top (testing temp) D. ___ Licking Pacifier	0	9	0	0	9	0
14. Signs of ECC in the mouth: Found on front anterior teeth A. ___ White Spots B. ___ Brown Discoloration C. ___ Tooth Decay	6	3	0	9	0	0
15. Effects of getting cavities in baby teeth: A. ___ Pain B. ___ Infection C. ___ Eating Problems (difficulty chewing) D. ___ Tooth Loss	0	9	0	1	8	0
16. Effects of baby teeth getting cavities: E. ___ Speech Problems F. ___ Crowded Teeth G. ___ Problems with Adult Teeth	0	9	0	1	8	0
17. Dental home care for child with no teeth (Wipe gums, cheeks with washcloth) at least once a day	0	1	8	0	0	9
18. Dental Home Care: A. ___ A child with one tooth or more: should brush at least twice a day with a soft bristle toothbrush made for babies.	1	8	0	7	2	0
18. Dental Home Care: B. ___ Children over two years of age should use a pea-sized amount of toothpaste containing fluoride.	1	8	0	4	5	0

18. Dental Home Care C. ___ Parents should brush teeth of a child under 2 years only with water.	1	8	0	5	4	0
19. Dental Visit A. ___ Dental visits should occur no later than six months after first tooth erupts.	3	6	0	8	1	0
19. Dental Visit B. ___ Every six months for routine check up	5	4	0	8	1	0
20. Dental Home A. If child client does not have dental home, give options or information for dentist. Following up and giving information.	1	8	0	9	0	0
20. Dental Home B. ___ Ex- WIC Program has dental clinic on site (Anne Arundel County) or other	2	7	0	6	3	0
21. Fluoride: A. ___ Addressing whether a child is getting enough or too much fluoride.	4	5	0	9	0	0
21. Fluoride B. ___ Addressing if child is on well or city water.	8	1	0	9	0	0
21. Fluoride C. ___ City water usually does have fluoride	0	9	0	9	0	0
21. Fluoride D. ___ Well water usually does not have fluoride	0	9	0	9	0	0
21. Fluoride E. ___ Bottled water usually does not have fluoride (will state on bottle)	0	9	0	7	2	0
21. Fluoride F. ___ *Stating that mothers must always check with	2	7	0	8	1	0

doctor or dentist about child's fluoride intake.						
22. Milk and juice contain sugar.	9	0	0	9	0	0
23. Sugar causes tooth decay.	0	9	0	9	0	0
24. No juice in sippy cup all day (frequent juice throughout the day time is worse than juice taken only at meal times).	0	9	0	6	3	0
25. Liquids other than water in sippy cup can be harmful to a child's teeth.	3	6	0	6	3	0

Table 3: Comparing Pre and Post PowerPoint Knowledge

Attitude	Pre- Observation			Post- Observation		
	Good	Fair	Poor	Good	Fair	Poor
Friendliness (Smiling, warm, comforting)	9	0	0	9	0	0
Patience (good listener, calm)	9	0	0	9	0	0
Understanding (empathic with client's feelings)	9	0	0	9	0	0
Caring/Sharing (feeling, showing compassion, and personal experience)	9	0	0	9	0	0
Helpfulness (giving referrals, resources, brochures)	9	0	0	9	0	0

Table 4: Comparing Pre and Post PowerPoint Attitude

Interviewees were asked to identify barriers that they felt hampered the effectiveness of their educational sessions with clients on ECC. Certifiers reported that lack of client cooperation was the leading factor. Other barriers cited included inadequate appointment

time and conflicting client values systems; i.e., mothers putting a low priority on oral health. The certifiers' identified barriers are presented in Table 5.

Subject	Responses
A	First is time. Second is client corporation. Third it is hard to confront people who are overweight or have bad teeth because finding the appropriate words to say without hurting their feelings is difficult.
B	Participants' attention span and workload
C	Time is definitely an issue. The family's (birth parent and children) behavior. For example, kids screaming and running; mother chasing after them while trying to receive education. Client cooperation.
D	Clients being receptive towards the topics. For example, some do not care about oral health and do not want to hear about it.
E	Time. Client's cooperation; for example, the child is running around and parent is distracted.
F	Time is not necessarily the number one factor. I feel the biggest factor is the willingness to be able to put aside their own parental fears, and keep in mind what is important for their children.
G	The main factor is time (back to back appointments). Second, clients valuing the information. Third, sometimes clients can feel like it is an attack because they do not have the best oral care.
H	Client cooperation
I	Cultural values- Important topics in one culture are not important in another.

Table 5: Barriers to Education on ECC

The WIC clinic certifiers also were asked to consider variables that might be helpful in improving their educational interactions with their clients. Two interview questions addressed this issue.

The majority of the WIC clinic certifiers agreed that it would be helpful to have a PowerPoint educational presentation similar to the one they received in the study at least twice a year as a continuing education course. This “booster session” could reinforce and expand upon basic information, and introduce certifiers to new oral health materials. The certifiers stated that knowing more about oral health gives one the confidence and

knowledge to educate clients more effectively. Additional results related to improvements can be found in Tables 6 and 7.

Subject	
A	Having information presented opens my mind and eyes more. Being educated on a topic allows me to focus on it.
B	Valuing oral health and having knowledge on oral health
C	Seeing a client's problem like bad teeth or a client's tooth ache – these are opportunities to educate.
D	Having enough time to educate on oral health.
E	"Someone to give us literature handouts, one-on-one training (less reading) things like this to keep us informed. Like the dental fact sheet you handed out."
F	Having the information delivered through a PP. Models to show parents and children (decay on a tooth) - something that shows how a cavity progresses.
G	Regular training and education on oral health would help. Someone could come and provide continual education courses on oral health.
H	I feel brochures are helpful and refreshing. We are able to order dental kits and they are helpful. I plan to order some soon.
I	We need more visual aids (flip charts, posters) explaining decay, fluoride and other topics, so people would see it.

Table 6: Certifiers' Suggestions to Improve Educational Interventions

Subject	
A	Sure if there is new information and or just a review.
B	Yes definitely. I can't remember if we get an oral health lesson once or twice a year. I feel it would be helpful to see it twice a year. More frequently if there is new information or something we need to know.
C	Absolutely it wouldn't hurt. I think it would be good to have different dental and medical organizations come in and provide a refresher course at least once a year. Keep the information updated.
D	That would be great to review and especially update information. This PP would also be good for our WIC clients at check pick up (time). There is already a nutrition class provided at check pick up, but they would benefit from dental class too.
E	I think we should. It is helpful to learn information and new information on oral health. When you hear about a topic, it becomes more important to you.
F	Currently, we are not educated a ton on oral health education. Unless one of the dentist gives information at an in-service. This dental in-service maybe occurs once a year. I do believe oral health is something we need to reinforce. I feel the more someone sees and hears the more they can keep it apart of their regular information to counsel the families.
G	We probably hear oral health information twice a year at our in-service. Learning the information quarterly would not be a bad thing.
H	I feel at least once a year would be refreshing. To reinforce information and explain new information.
I	It would be good to have a course two-three times a year. New and old information could be useful.

Table 7: Certifiers' Perspectives on Continuing Education

Post Interview

The interview consisted of the following questions. The certifiers' summarized responses are presented in Table 8.

Interview Question	The WIC Clinic Certifiers' Summarized Responses
1. Before the PowerPoint (PP) presentation, how important was it to you to educate clients on the prevention of ECC?	Prior to the PP, most knew ECC (oral health) was important and would ask WIC's basic questions. 4/9 certifiers stated that after the PP, they valued oral health more and increased the amount of times that they asked follow up questions and went into depth on oral health information.
2. After the PP presentation, did your information change when educating clients on ECC/oral health?	All the WIC clinic certifiers stated that the PP made them value and apply the information to counseling (i.e., knowing information on fluoride aids in asking follow up questions).
3. Average clients seen work day? After PP, have you increased the number of times you have educated clients on ECC? (following up and going into detail on the basic questions)	Certifiers average 10-11 appointments a day. 7/9 certifiers stated that they all increased the number of appointments during which they go into depth and explain oral health. 2/9 certifiers stated they discuss oral health with every client now.
4. Do you feel it would be helpful to see the PP or a similar PP with topics on oral health as a continuing education? At staff meetings?	Research Objective 4: Table 7
5. What barriers do you feel decrease your chances to educate a client on ECC?	Research Objective 3: Table 5
6. What are some factors that increase your ability to educate your clients more on oral health/ECC?	Research Objective 4: Table 6
7. How do you make information about oral health important to your clients?	4/9 certifiers stated that explaining the importance of oral health repeatedly and trying to connect with clients was necessary. 3/9 certifiers stated sometimes clients' attitudes will not change and you know they are not interested in the educational messages. 2/9 certifiers stated the best window to educate is when a client has pain or a toothache.
8. What would you change about the PP?	7/9 certifiers would not change anything with the PP. They thought the information was very informative (reviewed, expanded, and explained new information). Also, language in the PP was basic enough that one can learn it. 1/9 certifiers stated the only things she would change was adding recommendations for types of toothpaste and mouth rinse. 1/9 certifiers stated the only thing she would change is adding more slogans.

Table 8: Interview Questions and Summarized WIC Clinic Certifiers' Responses

Some of the questions in each interview were individualized to each WIC clinic certifier. These questions inquired about the observed change that occurred from their pre to post intervention observations. (See Table 9: Changes Comparing Pre and Post Observation.)

Subject	
A	<p><i>Overall, I noticed you mentioned oral health topics more in your post observation. For instance, you said fluoride prevents tooth decay. Did the PP influence this?</i></p> <p>Certifier: Well, I feel that I have always said that and it is my pre-knowledge.</p>
B	<p><i>I noticed in your post observation you stressed juice has sugar which causes tooth decay. Did the PP influence this?</i></p> <p>Certifier: Yes. I believe I always mentioned juice has sugar. However, since the PP I stress sugar causes tooth decay</p>
C	<p><i>I noticed that you tried your hardest to explain to the mother that going to bed with a bottle can be harmful to the child's teeth. Did the PP influence this?</i></p> <p>Certifier: I know I tried. I also really stressed brushing twice a day. The PP influenced this. I was able to educate on fluoride, tooth decay, bottle feeding and brushing habits. I would watch the PP again.</p>
D	<p><i>I noticed you mentioned oral health facts more frequently in your post observation. You stated children should brush twice a day, and you mentioned that fluoride keeps the teeth healthy. You went over the size of the toothbrush. Most importantly you explained that milk and juice contain sugar which will cause decay. Did the PP help with this information?</i></p> <p>Certifier: Of course, it gave me more information on oral health.</p>
E	<p><i>You mentioned more information on oral health in your post (observation) in particular with the child with a cleft lip and palate. Your follow up questions were great. You asked about the child's eating and tooth development. You asked good questions about his specialists and if the child was getting cleanings. Do you feel the PP gave you confidence and information to ask the follow up questions?</i></p>

	<p>Certifier: Yes, I feel the PP helped me because it gave me a lot of information.</p>
F	<p><i>I noticed you asked more questions about oral health and you went into greater detail during your post observation. For instance, you followed up with how often the child was brushing, and if the mother was helping. Did you feel the PP gave you new knowledge and reinforced old knowledge?</i></p> <p>Certifier: Yes, I did. In a sense it gave me more confidence to be able to express all the different points that I need to inform clients about regarding ECC. It informed me how important it is to inform them as soon as possible.</p>
G	<p><i>During the post observation you educated more on oral health. For instance, you stated “sugar is bad for your teeth.” That was important because the mother was giving her child so much juice. Do you feel this information was influenced by the PP?</i></p> <p>Certifier: Yes, the PP was very helpful. I would and probably should watch it again because there was so much helpful information provided.</p>
H	<p><i>During your post observation; you stressed how important fluoride was to the teeth. You also tried to educate and stress to the client that the child needs to go to the dentist. You even tried to add it in again at the end of the visit. Do you feel that PP influences this?</i></p> <p>Certifier: I definitely do. Like I said, it was great and I received good information overall.</p>
I	<p><i>I noticed during your post (observation) you had good follow up questions about oral health. For instance the child had a partial; you asked how did this occur, was it from decay, and do you have a dentist now? Then you educated and stressed that they could possibly go to the WIC dental clinic and that fluoride is important for the teeth. Did the PP influence this?</i></p> <p>Certifier: The PP and dental fact sheet was helpful. Yes, I now have a lot of information to give. With a new WIC mom I thought it was good to educate her on the WIC dental clinic. The fact sheet helped me remember important dental facts.</p>

Table 9: Changes Comparing Pre and Post Observation

Discussion

The Surgeon General’s 2000 report states that the effects of childhood oral disease (ECC) are a major concern, and that increased collaboration is a principle action that is

needed to promote oral and total body wellness.¹ The Institute of Medicine (IOM) reinforces that health literacy has a significant impact on the health outcomes of all age groups and that health literacy among health care workers and their clients could result in improved oral health outcomes.³⁰ In recent years, studies have shown that oral health interventions that provide parental guidance, instructions, and demonstrations on how to care for children's teeth can be successful.¹⁸ Only one study has examined WIC program curricula. Curricula were assessed as including minimal oral health educational interventions; to fill this void, it was recommended that dental hygienists could help provide oral health education to their clients (caregivers and children).⁶

WIC certifiers are in a unique position to provide counseling to individuals who have significant risk factors for decay caries.^{36,37} The WIC program provides nutritional counseling, education on nutritious foods, breastfeeding support, and referrals to other health care providers. WIC also offers social services for pregnant and breastfeeding women, (to one year after delivery), new mothers (to six months after delivery), and infants and children from lower socioeconomic strata under the age of five.⁵⁰

To address the void previously noted in WIC educational curricula,⁶ the current research study included an educational intervention on the following topics: bottle and breast feeding methods, caries transmission, modes of transmission, manifestations of ECC, effects of caries in early childhood, dental visits, fluoride, and home care for the infant and child (two-five). Overall, the study aimed to explore whether an educational intervention could influence the WIC clinic certifiers' knowledge and attitudes on the prevention of ECC as assessed through their client advisement. Factors that limit their ability and willingness to educate their clients about ECC were also explored.

Observation and interview methods were used to collect data on how the educational intervention affected which information the clinic certifiers delivered to their clients and how they delivered it. This qualitative method allowed the researcher to use a natural setting and gather behavioral data as they were provided. A qualitative approach also provided an opportunity for in-depth and individualized probing through interviews following the post intervention observation. The narrative responses obtained from the WIC clinic certifiers helped identify not only the benefits of the educational intervention, but also the limitations the certifiers encountered when delivering oral health information to their clients. Data on how these barriers could best be lifted also were discussed. A qualitative methodology appropriately addressed the limited number of WIC certifiers who were available and could participate in the study.

This study was exploratory and has laid the groundwork for further investigation. It provides insight into the benefits of an educational intervention delivered to health care professionals who have direct contact with clients in need of help. Nonetheless, the findings have several limitations that reduce their applicability to other populations. The sample size was small, and subjects were from only one geographic site. The evaluation tools were original and although pilot tested, they did not go through a rigorous assessment to ensure an acceptable level of reliability and validity. A third limitation is associated with a lack of control regarding the subjects' demographic characteristics as intervening variables in the obtained results. Finally, the certifiers' awareness of being somehow "evaluated" during the observation and interview sessions could have influenced how they interacted with their clients at the time, especially since they knew the researcher was concerned with oral health topics.

A replication with a larger sample size covering a number of sites and modification of the testing instruments through the use of several and more diverse pilot groups could generate more reliable results and consequently lead to higher generalizability. Using a mixed method research, combining a large survey and a follow-up interview with a small number of subjects could provide a wider, more in-depth understanding of how oral health education can be made more available to those who have limited access to oral care. The dental hygienist's role is providing educational interventions to WIC clinic certifiers holds promise for improvements in oral health literacy and ultimately, in the reduction of early childhood caries.

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Appendix A: Pre Observation Form

Topics addressed by the certifiers...	Pre Observation		
	Yes	No	N/A
1. Going to bed with a bottle containing liquids other than water are harmful			
2. Going to bed with a bottle is harmful to the teeth (milk collects around the teeth and can cause a cavity)			
3. Prolonged at will breast feeding is harmful (milk collects around the teeth and can cause a cavity)			
4. Sweet liquids and or milk in bottle at night can cause a cavity			
5. Liquid content in a bottle should only be milk, formula and or water during the day. No juice!			
6. Weaning baby from bottle after 12 months is important			
7. Never put baby in bed with bottle			
8. Mother should always hold the bottle while feeding the infant			
9. Do not use bottle as pacifier			
10. Best method is the breast method A. Less expensive compared to formula			
11. B. Infection-fighting antibodies are in the breast milk			
12. Cavities can be passed from caregiver to infant/child. The bacteria in saliva can cause tooth decay.			
13. Different modes of bacterial transmission which can cause cavities A. ___ Eating from same Utensils B. ___ Kissing C. ___ Licking Bottle Top (testing temp) D. ___ Licking Pacifier			
14. Signs of ECC in the mouth: Found on front anterior teeth A. ___ White Spots			

<p>B. ___ Brown Discoloration C. ___ Tooth Decay</p>			
<p>15. Effects of getting cavities in baby teeth: A. ___ Pain B. ___ Infection C. ___ Eating Problems (difficulty chewing) D. ___ Tooth Loss</p>			
<p>16. Effects of baby teeth getting cavities: E. ___ Speech Problems F. ___ Crowded Teeth G. ___ Problems with Adult Teeth</p>			
<p>17. Discussing: Dental home care for child with no teeth (wipe gums, cheeks with washcloth) at least once a day.</p>			
<p>18. Discussing home care for child with at least one tooth: brush at least twice a day with a soft bristle toothbrush made for babies. ___ A. Children over two years of age should use a pea-sized amount of toothpaste containing fluoride. ___ Parents should brush teeth of a child under 2 years only with water.</p>			
<p>19. Dental Visit should occur: ___ A. Dental visits should occur no later than six months after first tooth erupts. ___ Every six months for routine check up</p>			
<p>20. Fluoride: ___ Addressing whether a child is getting enough or too much fluoride. ___ Addressing if child is on well or city water. ___ *Stating that mothers must always check with doctor or dentist about child's fluoride intake.</p>			

Appendix B: Post Observation Form

<u>Observation Notes</u>	Post Observation		
Topics addressed by the certifiers...	Yes	No	N/A
1. Going to bed with a bottle containing liquids other than water are harmful			
2. Going to bed with a bottle is harmful to the teeth (milk collects around the teeth and can cause a cavity)			
3. Prolonged at will breast feeding is harmful (milk collects around the teeth and can cause a cavity)			
4. Sweet liquids and or milk in bottle at night can cause a cavity			
5. Liquid content in a bottle should only be milk, formula and or water during the day. No juice!			
6. Weaning baby from bottle after 12 months is important			
7. Never put baby in bed with bottle			
8. Mother should always hold the bottle while feeding the infant			
9. Do not use bottle as pacifier			
10. Best method is the breast method A. Less expensive compared to formula			
11. B. Infection-fighting antibodies are in the breast milk			
12. Cavities can be passed from caregiver to infant/child. The bacteria in saliva can cause tooth decay.			
13. Different modes of bacterial transmission which can cause cavities A. ___ Eating from same Utensils B. ___ Kissing C. ___ Licking Bottle Top (testing temp) D. ___ Licking Pacifier			

21. Fluoride: A. ___ Addressing whether a child is getting enough or too much fluoride.			
21. Fluoride B. ___ Addressing if child is on well or city water.			
21. Fluoride C. ___ City water usually does have fluoride			
21. Fluoride D. ___ Well water usually does not have fluoride			
21. Fluoride E. ___ Bottled water usually does not have fluoride (will state on bottle)			
21. Fluoride F. ___ *Stating that mothers must always check with doctor or dentist about child's fluoride intake.			
22. Milk and juice contain sugar.			
23. Sugar causes tooth decay.			
24. No juice in sippy cup all day (frequent juice throughout the day time is worse than juice taken only at meal times).			
25. Liquids other than water in sippy cup can be harmful to a child's teeth.			

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