# Promoting Oral Health for Mothers and Children: A Nurse Home Visitor Education Program

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ver the last 10 years, national attention on the oral health of pregnant women and their children has become more prominent. Oral health and its links to overall health are now regarded as essential to the health of pregnant women, their infants, and young children (California Dental Association Foundation & American College of Obstetricians and Gynecologists, District IX, 2010). The 2012 seminal document, "Oral Health During Pregnancy: A National Consensus Statement" (Oral Health Care During Pregnancy Expert Workgroup, 2012), highlights the importance of including oral health in whole person care of pregnant women and provides guidance for the pregnant patient, as well as for medical and dental providers. A mother's oral health status is a predictor of her child's oral health (Oral Health Care During Pregnancy Expert Workgroup, 2012). Low birth weight, prematurity, and early childhood caries (ECCs) are outcomes associated with poor oral health in pregnant women (George et al., 2011).

Although accessing dental care during pregnancy is purported to be important to protect the mother and her fetus, research findings suggest that pregnant women are not receiving adequate dental care. Data from

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The objective of this project was to determine if Nurse Family Partnership (NFP) nurses who received an oral health education session increased their oral health knowledge and practice behavior contributing to positive client oral health outcomes. A quasi-experimental design was used to investigate the impact of exposure to the oral health evidence-based curriculum on NFP nurses and clients. The oral health interventions took place during nurse home visits. The sample included 4 nurses from the Miami Florida NFP, a comparison group of 10 non-Miami NFP nurses, and 27 Miami NFP clients. A web-based 13-item nurse prepost survey was used to assess the impact of oral health education on NFP nurses' oral health knowledge and practice behaviors. A 10-item pre-post telephone survey was conducted with NFP clients to assess their oral health behaviors for self and child. Following an oral health educational session, NFP nurses demonstrated an increase in their oral health knowledge and developed evidencebased oral health practice behaviors. Clients who were given oral health education incorporated this into their childcare, which was associated with significantly improved oral health outcomes. It is recommended that NFP nurses integrate oral health as a standard of patient care in home visit assessments, education, and documentation throughout pregnancy, infancy, and toddlerhood.

**Key Words:** 

Oral health, community health nurses, pregnant women, child.

the Cigna Corporation's (2015) national survey of 801 pregnant women revealed that although 76% of pregnant women reported they had a dental problem, only 57% reported having a dental visit during pregnancy. Pregnant women with dental insurance were twice as likely to visit the dentist. Compounding this issue, dental care is not an essential adult health service offered by the

Affordable Care Act (11th Congress of the United States of America, 2010) and is a state-specific Medicaid benefit. Pregnancy may be the only time a woman, insured by Medicaid, has an adult dental insurance benefit.

The oral health of newborns and young children are a major population health concern. ECC is defined as the presence of one or more decayed, missing, or filled tooth surface(s) on

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any primary tooth in a child younger than 71 months (American Academy of Pediatric Dentistry [AAPD], 2008). The landmark Surgeon General's Report Oral Health in America (U.S. Department of Health and Human Services, 2000) declared ECC a "silent epidemic," the most common chronic disease of childhood, five times more common than asthma. Socioeconomic status plays a key role in the prevalence of ECC in children (U.S. Department of Health and Human Services, 2000). Data from the 2009-2010 National Health and Nutrition Examination Survey revealed that approximately 1 in 4 children aged 3 to 5 years living at the poverty level had untreated dental caries. Dye and colleagues (2015) also reported that children from lower socioeconomic groups with low maternal education have a higher incidence of ECC. The incidence of ECC in young children aged 1 to 3 years increases when the mother has untreated caries (George et al., 2011). Promoting oral hygiene practices, beginning with cleaning the gums of newborns with gauze or a washcloth after feeding to supervised tooth brushing once the first teeth erupt, is essential to prevent ECCs (Haber & Hartnett, 2019).

The detrimental effects of ECCs in children include pain, difficulty eating, problems sleeping, and low selfesteem due to the appearance of damaged teeth, along with costly dental care (Hill et al., 2019). Children in the United States lose over 34 million school hours per year due to tooth decay and resulting problems (Naavaal & Kelekar, 2018). The cost of treatment for severe tooth decay in young children can range from \$10 to \$25,000 per child per episode, especially if the child needs to be hospitalized for operative dentistry and treated under general anesthesia (Hill et al., 2019).

Findings from a study by Collins and colleagues (2016) revealed that parents who practice regular oral hygiene have a positive influence on their child's oral health and oral health practices. Consistent with a recommendation by the American Dental Association that children see a dentist soon after the first tooth eruption and no later than 12 months of age, research data showed that children who have a dental home are more likely to receive routine preventive oral health services (AAPD, 2018).

Dental care is an essential children's benefit in the Affordable Care Act (ACA).

The Nurse Family Partnership (NFP) is a national, not-for-profit program that delivers nurse home visiting services to low-income, first-time mothers by a registered nurse. The client population is at risk for poor maternal-child outcomes related to the social determinants of health. First-time mothers who are less than 28 weeks' gestation are eligible for enrollment in the program. Services continue throughout pregnancy and until the child reaches 2 years of age. The NFP model has been replicated across 42 states, the U.S. Virgin Islands, and 6 tribal nations, Randomized controlled trials have demonstrated success in achieving improvement of maternal child health and economic outcomes (Eckenrode et al., 2010; Olds et al., 2014; Thorland & Currie, 2017).

Goals of the NFP program include improvement in pregnancy outcomes, child health and development, and promoting families' economic self-sufficiency by supporting enrollment in education advancement and job training (Eckenrode et al., 2010; Olds et al., 2014; Thorland & Currie, 2017). The NFP program addresses health knowledge and parenting skill gaps, as well as access to care disparities. Preventive health topics in the NFP curriculum include access to prenatal care, maternal nutrition, tobacco and substance use, preparing for birth, breastfeeding, and maternal depression screening. The NFP model provides nurses with online professional development, parent education handouts, as well as a data collection and documentation system that supports fidelity to maximize accurate delivery of the intervention. Despite the abundance of NFP resources, a gap in maternalchild oral health education and documentation exists. Objectives of this study were to assess the impact of exposure to an oral health education program on change in oral health knowledge for NFP nurses, integrate oral health in nurse home visits with pregnant NFP clients, integrate oral health in NFP clients' oral self-care, and integrate oral health in NFP clients' childcare.

## Methods

The university Institutional Review

Board determined our protocol was exempt from federal oversight. Approval was also received by the NFP Research and Publication Committee (RAPCOM). Participants gave informed consent. Referral for dental emergencies was available. A quasiexperimental design was used to investigate the impact of exposure to the oral health evidence-based curriculum Cavity Free Kids on NFP nurses' oral health knowledge, and integration of oral health in their home visits and on NFP clients' oral self-care and childcare (Washington Dental Service Foundation, 2014).

In 2015-2016, the investigators trained 32 NFP nurses from the Florida state-wide NFP program. The 2-hour program used the Cavity Free Kids curriculum to increase NFP nurses' knowledge about and practice behaviors that could be used to integrate oral health into their home visits with women during their pregnancy or after the birth of their first child and until the child was 2 years of age. NFP nurses who agreed to participate were then followed from baseline to 30 and 90 days to assess their knowledge and integration of oral health into their NFP home visits. Informational flyers were distributed to NFP clients describing the phone interview surveys and were offered a \$20 gift card for each telephone survey in which they participated. The flyers described that the activity was voluntary and that the service would not impact their normal home visits. Contact information for the principal investigators and NFP program nurse manager provided an opportunity to ask and clarify any questions.

# Measures

Sue and Ritter (2007) describe online survey strategies that were used to develop a web-based 13-item nurse pre-post survey to assess the impact of oral health education on NFP nurses' oral health knowledge and practice behaviors, and a 10-item telephone survey to assess NFP clients' oral health behaviors for self and child. Using a Yes-No and Always-Sometimes-Never format, the nurses' survey included questions about prior oral health education, integration of oral health topics in home visits, and use of oral health resources. The telephone survey for NFP clients used demographic questions, including months of gestation and/or child's age. Questions, using a

NFP Florida Program Training n = 32Enrolled in study n = 32Completed baseline, 30- and 90-day surveys n = 14Florida (non-Miami) Miami NFP Nurses n = 4NFP Nurses n = 10Baseline surveys Baseline surveys completed n = 4completed n = 10Miami NFP clients eligible for study n = 7530-day surveys 30-day surveys completed n = 4completed n = 10Miami NFP clients who agreed to participate n = 4290-day surveys 90-day surveys completed n = 4completed n = 10Miami NFP complete Complete Miami Complete non-Miami client responders responders n = 4responders n = 10n = 27

Figure 1.
Flow Diagram for Nurse Family Partnership (NFP) Nurse and Client Samples

Yes-No format, focused on whether the woman received oral health educational materials, cavity prevention, and infant-toddler oral hygiene, as well as questions about her own oral hygiene and whether there was a regular source of dental care. Content validity for both surveys was established by an interprofessional national panel with expertise in oral health, oral health in pregnancy and children, and nurse home visitor programs that reviewed, provided feedback, and edited the surveys.

#### Sample

Thirty-two Florida state NFP nurses attended the oral health educational session and received a standardized verbal consent form that explained the study and nature of their participation (see Figure 1). Voluntary completion of baseline online surveys provided consent. Nurse participants were identified by code numbers that linked and tracked changes over the three completed online surveys. Fourteen of the 32 NFP nurses, all of whom received the same oral health

education exposure, completed baseline, 30-day, and 90-day follow-up surveys. The Miami NFP nurse group (n=4) was the focus of nurse-client data collection; they were instructed to use the *Cavity Free Kids* curriculum in their home visits and received ongoing support from their nurse manager in integrating oral health education into their visits. Ten non-Miami NFP nurses served as the nurse comparison group; only nurse data were collected for this group. The non-Miami NFP nurses were not



Table 1.

Mean Results of Self-Report Surveys: Nurse Family Partnership (NFP) Nurse and Pregnant Client

Survey Self-Report Items	Baseline		30-Day Follow Up		90-Day Follow Up	
Nurse Group (n)	Miami (n = 4)	Non-Miami (n = 10)	Miami (n = 4)	Non-Miami (n = 10)	Miami (n = 4)	Non-Miami (n = 10)
Respondents who reported receiving prior oral health education for pregnant women.	25%	40%	_	_	_	_
Respondents who currently incorporate oral health for pregnant women into home visits.	75%	100%	100%	100%	100%	100%
Respondents who always discuss how to prevent cavities by providing oral health nutrition advice to their pregnant patients.	25%	50%	75%	50%	75%	60%
Respondents who always explain to pregnant patients why it is important to take care of their mouths during pregnancy.	75%	80%	75%	90%	75%	85%
Respondents who refer all pregnant patients to the dentist.	75%	70%	75%	70%	75%	70%

specifically instructed to use the *Cavity Free Kids* curriculum during their home visits and did not receive continuing nurse manager support about oral health integration. As shown in Figure 1, all 14 NFP program nurses completed the 13-item surveys prior to and at 30 and 90 days following the *Cavity Free Kids* oral health educational program to assess changes in oral health knowledge and practice behaviors (Washington Dental Service Foundation, 2014).

The Miami NFP program had the capacity to serve 100 families throughout 36 zip codes in the Miami-Dade County. Participants were recruited who met the following eligibility criteria: 18 years of age or older, first-time pregnancy or mother of a first child 0 to 2 years of age, lived in the Miami NFP service area, and currently enrolled in the NFP program. Participants under 18 years of age and those who could not be contacted within the last 30 days were excluded from the study, leaving a potential population of N = 75 from which to recruit participants. Bilingual staff members were trained to recruit participants using a standardized script to maintain fidelity. The staff member explained the study and provided an opportunity for questions and offered an opportunity to participate in the study. Participants were given a \$20 gift card for each completed survey.

#### **Data Collection**

Survey data from the 4 Miami NFP nurses collected at baseline, 30- and 90-days were compared with survey data from the 10 NFP non-Miami nurses to identify any differences between them in oral health knowledge and practice behaviors. The online surveys completed by the 14 NFP nurses were administered electronically by a trained staff member at baseline, 30 days, and 90 days.

Forty-two of the 75 eligible Miami NFP clients agreed to participate, a response rate of 56%. A 10-item telephone survey was administered by the trained NFP nurse manager or bilingual NFP staff member to the 42 NFP clients who agreed to participate, prior to and at 30 and 90 days following the start of planned oral health integration into the home visits. Data collectors had no clinical contact with participants, thereby minimizing bias. Twenty-seven clients completed all three surveys.

# Results

# Miami and Non-Miami Nurse Family Partnership Nurses

Due to the small sample size, only

descriptive statistics were used to report mean scores for nurses at baseline, 30-day, and 90-day follow up (see Table 1). Of the 32 NFP Florida nurses, 44% (n = 14) completed surveys at all three points in time. Survey responses revealed that at baseline, the 10 non-Miami nurses reported higher oral health knowledge and practice behaviors than the 4 Miami nurses. By the 90-day follow up, 100% of both Miami and non-Miami nurses reported incorporating oral health into home visits. Seventy-five percent of the Miami nurses and only 60% of the non-Miami nurses reported always discussing oral health nutrition with pregnant clients. In contrast, 85% of non-Miami nurses but only 75% of Miami nurses always explained the importance of oral hygiene during pregnancy.

Baseline survey responses of nurses in relation to 0- to 2-year-old clients revealed that non-Miami and Miami nurses reported offering very little oral health training for 0- to 2-year-olds (see Table 2). These data revealed that 75% of the Miami nurses reported no prior oral health education about children ages 0 to 2 years, with non-Miami nurses slightly lower, at 70%. By the 90-day follow up, all nurses (100%) reported incorporating oral health for children into home visits. One hundred percent of the

Table 2.

Mean Results of Self-Report Surveys: Nurse Family Partnership (NFP) Nurse and 0- to 2-Year-Old Child

Survey Self-Report Items	Baseline		30-Day Follow Up		90-Day Follow Up	
Nurse Group (n)	Miami (n = 4)	Non-Miami (n = 10)	Miami (n = 4)	Non-Miami (n = 10)	Miami (n = 4)	Non-Miami (n = 10)
Respondents who reported receiving prior oral health education for 0- to 2-year-olds.	25%	30%	_	_	_	_
Respondents who currently incorporate oral health for 0- to 2-year-olds into home visits.	75%	90%	100%	100%	100%	100%
Respondents who always discuss how to prevent cavities by providing oral health nutrition advice to their 0- to 2-year-old patients.	25%	60%	75%	80%	100%	80%
Respondents who always tell parents or caregivers when to start brushing their children's teeth.	75%	80%	100%	100%	100%	100%
Respondents who always explain in detail to parents or caregivers how to brush their children's teeth.	50%	20%	75%	60%	100%	40%
Respondents who refer all 0- to 2-year-old patients to the dentist.	25%	50%	100%	60%	75%	50%

Miami nurses explained in detail when and how to brush children's teeth, but only 40% of the non-Miami nurses did this. At the 30-day follow up, 100% of the Miami nurses and 60% of the non-Miami nurses reported referring 0- to 2-year-old clients to the dentist. However, both nurse groups decreased at the 90-day mark, with Miami nurses at 75% and non-Miami nurses at their baseline 50% referral rate. The findings show that a majority of nurses perceive that oral health significantly contributes to their clients' overall health. At baseline, 75% of the Miami nurses and 60% of the non-Miami nurses reported they did not use any oral health resources. At the 90-day follow up, 100% of the Miami nurses were using Cavity Free Kids, although only 30% of the non-Miami nurses reported using Cavity Free Kids during home visits.

## **Miami NFP Clients**

Client data were only collected from the 4 Miami nurses and focused on 27 clients who completed a survey at all three points in time (complete responders). Demographic data for complete responders were similar to those of all eligible clients. Data from a correlational sub-analysis of the 27

Miami participants revealed that 43% of pregnant participants (n = 12) reported an oral health complaint. The most common complaint referred to gum disease; most reported their last dental visit to have been 2 to 4 years ago.

Complete client responders reported a significant increase in information received from their nurses about oral health; how to prevent cavities; how to keep their child's mouth, gums, and teeth clean; and contact information for local dentists. They also reported a significant increase in cleaning their child's mouth twice a day as recommended.

Paired sample t tests were used to evaluate responses of NFP Miami clients who completed all three surveys to measure changes in oral health knowledge and practices (see Table 2). Approximately half of complete client responders reported having a regular dentist for themselves. Yet more than a third of complete client responders reported having a problem with their mouth, gums, or teeth. Approximately 40% of complete client responders reported seeing a dentist within 6 months, and almost 25% within one year. Onefourth of complete client responders

reported not seeing a dentist in a year, and almost 12% in 5 years or more. For mothers who reported their last dental visit to be over 5 years, the median birth weight of their newborns was significantly lower than that of newborns whose mothers had a dental visit in less than 5 years (p <0.02). Women who reported greater than 5 years since their last dental appointment were over 6 times more likely to deliver a low birth weight infant than others. Fewer than 20% had a dentist for their child, and none of the children had had a dental visit. Complete client responders listed many oral health topics they would like more information about, including teething, white spots, insurance assistance, and drinking while falling asleep.

Participants were invited to complete a final survey evaluating the status of their children's teeth when they were close to graduation from the NFP program at age 2 years (see Table 3). Of the 10 graduates, 100% participated and were given an additional \$20 gift card. Ages of the children ranged from 17 to 24 months. All participants reported receiving instructions on how to keep their child's mouth, gums, and teeth clean. They



Table 3. Survey Findings from Complete Client Responders

Survey Self-Report Items	Baseline (n = 27)	30-Day Follow Up (n = 27)	90-Day Follow Up (n = 27)
Respondents who reported receiving information from their nurse home visitor about oral health.	35%	70%*	85%**
My nurse home visitor talked with me about how to prevent cavities in my teeth.	50%	82%*	82%*
I feel like I know enough about how to keep my mouth, gums, and teeth clean.	85%	93%	93%
I have been given instructions on how to keep my baby's mouth, gums, and teeth clean.	52%	70%	85%***
My nurse home visitor gave me contact information for local dentists for myself.	26%	44%	59%**
My nurse home visitor gave me contact information for local dentists for my child.	4%	39%**	41%***
Respondents who reported cleaning their child's mouth.	74%	80%*	89%*
Respondents who reported cleaning their child's mouth twice a day.	35%	58%*	71%**

<sup>\*</sup>Significant change from baseline, p < 0.05.

also reported cleaning their child's teeth regularly. Additionally, 100% of participants surveyed reported no evidence of any visible plaque, decay, or white or brown spots on their child's teeth (signs of ECCs).

## **Discussion**

This study focused on evaluating the effectiveness of an oral health educational program for the 10 non-Miami and four Miami NFP nurses and the 27 Miami clients who completed all three surveys to assess changes in oral health knowledge and practice behaviors. Variation between Miami and non-Miami nurses was apparent in the findings for both nurse-pregnant client data and nursechild data. An explanation for the lower scores obtained for the non-Miami nurses may be that they were not specifically asked to use Cavity Free Kids with their clients. They did not receive continuing follow up and support from their nurse manager, nor were their clients surveyed. As such, they may have perceived that oral health education and preventive measures with clients were not that important. In contrast, the Miami nurses received continuing follow up and support from their nurse manager in implementing this program. Having a champion is an important part of implementing and sustaining any clinical practice change (Dolce et al., 2018).

One limitation of this study was the small sample size of NFP nurses and lack of a non-Miami client comparison group, thereby precluding the ability to generalize beyond this sample. Another limitation was the use of self-report data from both NFP nurses and clients, which rely on their perception and/or recall. However, the Miami NFP nurse and client data appear to validate each other.

Based on this small test of change, data reveal that nurses, when exposed to oral health content, best practices, and nurse manager support, can increase their oral health knowledge, and incorporate these oral health behaviors into their practice. It also suggests that mothers, when given oral health education, incorporate this information into their childcare and contribute to positive oral health outcomes. Oral health education resulted in an increase in both nurse and client self-reported oral health knowledge and practice behaviors and positive oral health outcomes because all graduating 2-year-olds did not have any reported signs of dental decay.

# **Implications for Practice**

The NFP program provides a potential service delivery model for vulnerable families at risk for poor oral health that impacts maternal and child outcomes, such as low birth weight, premature births, and ECCs. The NFP provides a unique opportunity working in the home with highrisk mothers and infants to assess the availability of supplies for oral hygiene as well as eating habits. It is recommended that the NFP integrate identified oral health elements as a standard of care in assessments, education, and documentation throughout pregnancy, infancy, and toddlerhood. Documentation will provide oral health data that tracks quality improvement metrics about maternal and child oral health outcomes.

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<sup>\*\*</sup>Significant change from baseline, p < 0.01.

<sup>\*\*\*</sup>Significant change from baseline, p < 0.001.

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