ORAL HEALTH OUTREACH AND EDUCATION IN A NON-DENTAL, AMERICAN INDIAN SETTING

by

Kate Lisco Taubert

A Scholarly Project submitted in partial fulfillment
of the requirements for the degree

of

Doctor of Nursing Practice

in

Family and Individual

MONTANA STATE UNIVERSITY
Bozeman, Montana

March 2016

©COPYRIGHT

by

Kate Lisco Taubert

2016

All Rights Reserved

DEDICATION

There are many people who are deserving of recognition for the vital roles that they have played in my graduate education. I would like to start by dedicating this paper to my incredible parents, Louis and Kelly, who have provided me with unconditional love, support, prayers, and encouragement throughout all avenues of my life. They are the ones who raised me to believe that I can climb any mountain no matter how high and to dream the biggest of dreams. My two older sisters, CodyLou and Kyler, also deserve recognition for their unrelenting love, encouragement, laughter, and support. I would like to thank my ever supportive fiancé, Jace Murphy. I cannot express my gratitude enough for his constant and unrelenting love, support, and encouragement, especially through the most trying of times. He has always been there with a listening ear and a kind heart. He has been, and continues to be, my pillar of strength. My golden retriever Leroy has been faithfully by my side through every step of the way. He constantly reminded me that I was not alone in this journey.

Lastly, I would like to dedicate this paper to my fellow-students. We are the inaugural DNP class at MSU and that is something to be proud of. Together, we have weathered the storm. I could not have made it without your support and encouragement throughout this process. Brenna Manion, you deserve a special thank you for all you have done. You have been a never-ending source of support, laughter, friendship, and encouragement. Lifelong friendships and bonds have been formed through this process. I would also like to dedicate this paper to all of the preceptors and professors that have played an integral role in my education. You are the ones who have provided me with the knowledge, tools, and skills to be a successful practitioner. I cannot express my gratitude enough for sharing your time, knowledge, and skills with me. You are the ones who have encouraged me to meet my full potential and reminded me why I have decided to pursue this career path.

ACKNOWLEDGMENTS

I wish to take this opportunity to thank my DNP committee chair, Dr. Laura Larsson, for her continued inspiration, encouragement, support and guidance through this rigorous process. I would also like to thank the other members of my committee, Dr. Stacy Stellflug, Dr. Elizabeth Kinion, and Dr. Gary Pannabecker for their guidance and support as well. Their dedication to the success of this project should be recognition.

I would also like to acknowledge the hosting facility for their role in this project. Without their support I would not have been able to work with this vulnerable group and implement my project to improve the health outcomes of this population. I would especially like to acknowledge the employees at the pediatric clinic for welcoming me with open arms and allowing me to be a part of their routine. Without the cooperation and assistance of the pediatric and dental clinic, this project would not have been possible.

Lastly, I would like to acknowledge the caregiver/child dyads that consented to be a part of this study. These people forever touched my life and I cannot express my gratitude enough for them allowing me to be a part of their healthcare.

TABLE OF CONTENTS

1. INTRODUCTION 1

Background 1
Identification of the Problem.....1
Rational for Intervention 3
Aim Statement.....5

2. REVIEW OF LITERATURE 6

Introduction 6
Search Methods 6
Databases 6
Search Terms 6
Evidence Reviewed 7
Interdisciplinary Care.....7
Oral Health Literacy 10
Fluoride Varnish Application 12
Conclusion.....14

3. METHODS 16

Theoretical Framework 16
Theorist 16
Rationale for Theory Selection 17
Specific Components Utilized 17
The Quaility Improvement Project.....22
Ethical Issue and Protection of Human Rights.....22
Sample and Setting.....23
Location of Data Collection.....23
Eligibility Criteria 25
Sample Characteristics.....25
Intervention Design 25
The Intervention.....25
Steps of Data Collection 26
Tools of Data Collection.....27
Expected Outcomes 28
Analysis 2929
Effect Size.....29
Analytical Methods.....29
Assumptions 30
Conclusion.....3131

TABLE OF CONTENTS - CONTINUED

4. RESULTS 32

Quality Improvement Results 32
Caries Risk Assessment Tool 32
High Risk Factors 34
Additional Data Collected 35
Unexpected Results 37
Harm and Benefits 37
Conclusion 38

5. DISCUSSION 39

Introduction 39
Outcomes Compared to Literature 3939
Implications and Suggestions for Future Studies 41
Financial Implications 43
Strengths 44
Limitations 46
Practical Application 47
Conclusion 49

REFERENCES CITED 51

APPENDIX A: Oral Health Risk Assessment Tool 56

LIST OF TABLES

Table Page

1. Pediatric Oral Health Outreach Results Summary.....35

LIST OF FIGURES

Figure Page

1. Nola Pender's Health Promotion Model (1982) 18

ABSTRACT

Tooth decay is the single most common chronic childhood disease (Centers for Disease Control and Prevention, 2014) and children with minority and low socioeconomic status are at an increased risk for early childhood caries (ECC) development. The number of children who routinely visit primary care providers is much higher than those who have seen a dental provider (American Academy of Pediatrics, 2008). Thus, pediatric primary care providers are in an opportune position to provide oral health screenings, interventions, and referrals. The purpose of this quality improvement project was to identify, implement, and evaluate a Doctor of Nursing Practice (DNP) pediatric oral health outreach and education quality improvement project in an American Indian, pediatric primary care setting. The intervention contained three parts including a caries risk assessment, caregiver education, and a same-day dental home referral. All caregiver/child dyads age birth – 5 years presenting to the pediatric clinic for a well-child visit were eligible and consented to the intervention (n = 47). The results determined that 86.84% of the sample population was at high risk for caries development and that 52.78% of children with first tooth eruption had previously seen a dentist. Of those children, 78.95% had caries. For children with first tooth eruption that had not seen a dental provider in the past three months, a successful completed referral rate of 72.41% was obtained. The average intervention duration was 4.73 minutes. The intervention was successful in integrating well-child and well-dental visiting into a combined visit that was feasible to sustain. All caregiver/child dyads consented to the intervention and received age appropriate oral health education. This interprofessional collaboration and was effective in addressing three aspects of oral health prevention and outreach. Oral health is part of total health, and thus should be incorporated into routine well-child visits.

CHAPTER ONE

INTRODUCTION

Background

Tooth decay is the single most common chronic childhood disease, affecting 28% of U.S. children aged 2-5 years (American Academy of Pediatric Dentistry, n.d.) and 42% of children aged 2-11 years (Hilton, 2013). Early childhood caries (ECC) is a multifactorial infectious disease that can precipitate as soon as the first tooth beings to erupt. This condition can progress rapidly causing detrimental effects on a child's quality of life and overall health. ECC is a preventable disease and it can be stopped and even potentially reversed during its early stages. However, it often progresses without proper care until the tooth is destroyed (Kawashita, Kitamura, & Saito, 2011). ECC affects the surrounding structures and if left untreated, can result in widespread health complications.

Identification of the Problem

The pediatric population, principally those ages 6 months to 5 years from minority and low socioeconomic status, are especially vulnerable to the development of caries. In particular, the oral health of young American Indians and Alaskan Natives has declined over the last several decades. Caries rates among American Indian and Alaskan Native children aged 2-4 years are five times that of non-Indigenous children and the rate of untreated primary tooth decay is nearly three times greater than in the general

population (U.S. Department of Health and Human Services, 2000, as cited in Schroth, Harrison, & Moffatt, 2009).

American Indian children are especially vulnerable to ECC because of risk factors across the social ecologic framework. The American Academy of Pediatrics (2011) stated "The single greatest risk factor for ECC is being poor" (p. 1191). Members of minority groups with low socioeconomic status often have limited access to care. Prevention and treatment services are routinely lacking in this group (Warren et al., 2009). Additional risk factors for ECC include household crowding, family size, nutrition, health behaviors, parenting practices, and other risk factors (American Academy of Pediatrics, 2011).

Children depend on their caregiver for access to health care, and thus low caregiver oral health literacy potentially has detrimental implications for the pediatric population. "Caregivers' infant and early childhood oral health knowledge is of paramount importance in regards to ECC because oral health behaviors are the exclusive domain of the caregiver during the early years of life" (Vann Jr., Lee, Baker, & Divaria, 2010, p. 2). A study by Lee, Divaris, Baker, Rozier, Lee, and Vann (2010) demonstrated that children from minority populations are at an even greater risk for dental decay due to poor caregiver oral health literacy. Untreated cavities can lead to a multitude of complications.

Children experiencing ECC have a much greater probability of subsequent caries in both primary and permanent dentition (Kawashita et al., 2011). ECC may cause pain and infection, which can affect a child's ability to eat, speak, play, sleep, learn properly, and grow. Early tooth loss can also impair a child's self-esteem. Children with ECC are

at increased risk for malalignment and crowding of permanent teeth resulting in poor bite (American Academy of Pediatrics, 2011). If left untreated, the effects of ECC will not remain localized to the affected area, resulting in widespread heath issues. According to Kawashita et al. (2011), “Infants with ECC grow at a slower pace than caries-free infants” (p. 1). This diminished growth may be related to pain and disinclination to eat, as well as iron deficiency associated with ECC (Kawashita et al., 2011).

ECC has also been associated with other infectious diseases such as respiratory tract infections and acute otitis media. A more severe consequence of ECC is extensive treatment and surgical intervention that requires general anesthesia (American Academy of Pediatrics, 2011). A study by Yu, Martin, Terpak, and Curtis (2009) found that among 83,973 children younger than 6 years of age who had an ambulatory surgery in California in 2005, dental caries was the second most frequent diagnosis (12%). The ambulatory surgery utilization rate for ECC was highest among 3 year olds (601.4), American Indians (597.3), and Hispanics (362.5) (Yu et al., 2009).

Rational for Intervention

One of the principle barriers to proper oral healthcare is limited access to care. According to the American Academy of Pediatric Dentistry (n.d.), “Fifty percent of American children have never visited a dentist” (p. 2). The number of children who routinely visit primary care providers is much higher. Thus, pediatric primary care providers are in opportune position to provide oral health screenings, promotion, interventions, and dental referrals.

Early screening for signs of dental caries could identify infants who are at high risk for developing ECC, assist in providing information for parents about how to promote oral health, and prevent the development of tooth decay (Kawashita et al., 2011). Determining the causes of dental caries in children, providing education on oral health matters to their parents or caregivers, and controlling demineralization are especially important because children's self-care capacity is low. Interventions aimed at improving the intraoral environment can reduce the risk and can arrest dental caries (Kawshita et al., 2011).

The first step of this project was to conduct a collaborative needs assessment with the Chief of the Tribal Dental Program, the sole pediatric nurse practitioner, and the community health nurses. According to Watkins (2008):

> Needs assessments are used to identify strategic priorities, define results to be accomplished, guide decisions related to appropriate actions to be taken, establish evaluation criteria for making judgments of success, and inform the continual improvement of activities within organizations. (para. 2)

We determined that integrating oral health into well-child visits was an opportunity for reducing the high ECC rates in this setting. There have been several oral health programs implemented in other settings within the community, but none at the pediatric clinic. The majority of dental and well-child appointments function on a same-day appointment method and thus integrating oral health screenings and referral into a routine well-child visit was deemed both feasible and essential. The pediatric clinic is located in a community health center across the hall from the dental clinic.

Aim Statements

Based on a thorough review of literature, a three part oral health intervention was designed and implemented in an American Indian, pediatric primary care setting. The goal was to facilitate the integration of sustainable pediatric oral health initiatives into the well-child appointment. Three specific aims included: (a) conduct a caries risk assessment on 100% of the American Indian pediatric patients age 6 month-5 years, or younger with first tooth eruption, (b) increase dental home referrals of eligible children by 100% in American Indian children younger than 5 years with first tooth eruption, and (c) educate 100% of parents/caregivers of children age birth – 5 years on pediatric oral health promotion, ECC prevention, and self-care behaviors.

CHAPTER TWO

REVIEW OF LITERATURE

Introduction

A sufficient amount of research has been conducted on pediatric oral health. However, evidence regarding the integration of pediatric oral health in the primary care setting is more limited. A thorough review of literature was conducted to determine evidence based practices for the integration of pediatric oral health initiatives in the primary care venue.

Search Methods

Databases

A literature review of MEDLINE, CINAHL, COCHRANE, PUBMED, ScienceDirect, and Google Scholar was completed to gain a better understanding of risk factors for early childhood caries and the primary health care providers' role in pediatric oral health. All articles were limited to the English language. There were not limitations based on year of publication. Twenty-nine articles were evaluated.

Search Terms

Key words used for the literature search included: cavities; children; caries; oral health; dental caries; early childhood caries; pediatric caries; child oral health; Native Americans; American Indians; minorities; oral health risk factors; oral hygiene; oral

health; health literacy; oral health literacy; oral health education; oral health promotion; primary care; pediatrician; oral health screenings; well child checkups/screening; dental home; dental referral; fluoride; fluoride varnishes; fluoride application.

Evidence Reviewed

Interdisciplinary Care

The published literature is conclusive that pediatric primary care providers should routinely assess pediatric oral health status at well-child visits and facilitate dental home establishment by the first year of life. Primary care providers can play an important role in pediatric oral health promotion and prevention. According to the American Academy of Pediatrics (2008):

> Data from the Medical Expenditure Panel Survey (MEPS) revealed that 89% of infants and 1-year-olds had office-based physician visits annually, compared with only 1.5% who had dental visits. Consequently, visits to physicians outnumbered visits to dentists at 250 to 1 for this age group. (p. 1387)

Unlike dentists, primary care providers see a large percentage of children during their infant and toddler years (Pierce, Rozier, & Vann, Jr., 2012). Additionally, there is currently a shortage of pediatric dentists, further highlighting the paramount importance of routine oral health assessment in the primary care setting.

Members of the American Dental Association Council on Scientific Affairs (2006) recommended that a caries risk assessment be employed by dentists to identify those at high risk for caries development. The recent recommendation from the U.S.

Preventive Services Task Force (USPSTF) concurred with the recommendation, expanding it to include all pediatric providers (Duderstadt, 2014).

At this time, many state Medicaid programs reimburse non-dental professionals for oral health prevention services but require that they receive oral health education to be reimbursed. A study by Braun, Racich, Ling, Ellison, Savoie, Reiner, and Westfall (2015), evaluated the impact of Colorado's non-dental provider oral health education program by measuring its reach, effectiveness, adoption, implementation, and maintenance. "From 2009 to 2012, the proportion of young, low-income children receiving oral health preventative services from a medical professional increased 16-fold" (Braun et al., 2015, p. 101). Additionally, a blinded study by Peirce et al., (2012) found that "dental screenings can easily be incorporated into a busy pediatrics practice and that pediatric primary care providers can significantly contribute to the overall oral health of young children by the identification of those children who need to be seen by a dentist" (p. 2).

In a cohort study of 5,235 Medicaid enrolled kindergartners, 45% were found to have decayed, missing, and filled primary teeth (dmft) upon entering kindergarten with the lowest proportion (25%) of those having received preventive oral health services during dentist only visits and greatest proportion (75%) having only been seen by a primary care provider (Kranz, Rozier, Preisser, Steams, Weinberger, & Lee, 2014). This study discussed the important preventative oral health interventions implemented in a primary care setting, and highlighted the essential nature of the dental referral made by primary care providers.

The primary care provider is well-positioned to facilitate this interprofessional collaboration. The ideal approach to early childhood caries prevention and management is the early establishment of a dental home (American Academy of Pediatrics, 2003, p. 1114). According to the American Academy of Pediatric Dentistry (2015), "The dental home is the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way" (p. 12). Establishment of a dental home early in the child's life can expose a child to prevention and early intervention before problems occur and reduce anxiety (Nowak & Casamassimo, 2002). Because ECC can precipitate as soon as the first tooth erupts and is entirely preventable, the American Academy of Pediatric Dentistry, the American Academy of Pediatrics, the American Dental Association, and the Academy of General Dentistry all recommend that children should see a dentist by age 1 and that a dental home be established as soon as possible (Ramous-Gomez, Crystal, Wai Ng, Tinanoff, & Featherstone, 2010).

Providing oral health prevention services in the medical setting offers the advantage of obtaining this care from a previously established provider who is familiar with the patient. Oral health is part of total health, and thus should be incorporated into routine well-child visits. An oral health exam, risk assessment, anticipatory guidance, application of FV, and referral to a dental home by age 1 are critical to preventing early childhood caries (American Academy of Pediatrics, 2013). These early prevention strategies are less invasive and more cost effective than reactive interventions.

Dental costs for Medicaid eligible children who obtained an early preventive dental visit were less than those who had a visit later in life (Savage, Lee, Kotch, & Vann Jr., 2004). The average cost per child at the first dental preventive visit were as follows: before age 1, $262; age 1 to 2, $339; age 2 to 3, $449; age 3 to 4, $492; age 4 to 5, $546. Additionally, those who had early preventive dental visits were more likely to use subsequent preventive services (Savage et al., 2004).

Oral Health Literacy

The second major recommendation from a comprehensive review of literature is that caregiver oral health literacy is linked to children's oral health status. Children depend on their caregiver for access to health care, and thus low caregiver literacy has potential detrimental implications for the pediatric population. "Caregivers' infant and early childhood oral health knowledge is of paramount importance because oral health behaviors are the exclusive domain of the caregiver during the early years of life" (Vann Jr. et al., 2010, p. 2). In "Oral Health in America," the Surgeon General stressed that if parents are unfamiliar with the importance and care of their child's primary teeth, they are unlikely to take appropriate action that may prevent ECC or may fail to seek professional services (USDHHS, 2000).

A cross-sectional study by Bridges, Parthasarathy, Wong, Yiu, Au, and McGrath (2014) found caregiver literacy to be associated with children's oral health status. Caregivers' education attainment, income, and age were all associated with dmft scores, in that the lower the caregiver's education attainment, income and age, the higher the dmft score of the child. Miller, Lee, DeWalt, and Vann Jr. (2010) also concluded that

caregiver literacy scores were linked to the clinical oral health status of their children through the use of the Rapid Estimate of Adult Literacy in Dentistry (REALD-30) and clinical evaluation of the children's oral health status (OR = 1.14, 95% CI [1.05, 1.25], *P* = .003). Lee et al. (2010) studied racial differences of oral health literacy using mean REALD-30 scores. Lee and associates determined that Caucasians had overall higher oral health literacy, with a mean score of 17.4, compared to a mean score of 15.3 for African Americans, and 13.7 for American Indians (95% CI [1.4, 2.6]). Thus, it was demonstrated that children from minority populations were at an even greater risk for dental decay due to poor caregiver oral health literacy. Additionally, Vann Jr., Lee, Baker, and Divaria (2010) found strong evidence linking caregivers' lower oral health literacy with negative early childhood health related history, independent of socioeconomic risk indicators. This study revealed that lower caregiver literacy was associated with deleterious oral health behaviors and status (OR = 1.44, 95% CI [1.02, 2.05]) and that caregiver oral health literacy has a multidimensional impact on reported oral health outcomes of infants and young children (Vann Jr. et al., 2010).

A randomized control trial of anticipatory guidance to first time mothers to prevent ECC was conducted by Plutzer and Keirse (2010). An oral health education intervention was applied to the experimental group during pregnancy and again when the child was 6 and 12 months old. The oral health status of the child was then assessed at age 20 months. The authors found that the intervention reduced the frequency of ECC from 8.1% to 1.1% (relative risk = 0.14) in two parent families and from 16.3% to 4.5%

(relative risk = 0.28) in one-parent families. This study demonstrated that increasing parental oral health literacy decreased the child's risk for ECC development.

Fluoride Varnish Application

The third and final recommendation from the literature is that the risk for ECC development can be reduced with routine fluoride varnish (FV) application at 6 month intervals at well child checkups by primary healthcare providers. Children ages 6 months to 5 years who are at high risk for caries development benefit most from receiving treatment.

Lewis et al., (2010) found that most primary care providers reported routinely assessing patient's oral health status, but not applying FV. Fluoride varnishes application to children ages 6 month to 5 years is beneficial to all children in this age group, but especially those at high risk for caries development.

A cross-sectional study by Holve (2006) found that Duraflor FV application applied to children at five well child checkups decreased the decayed missing and filled surface (dmfs) mean score from 23.6 to 15 (95% CI [10.8-20.4]), which is a 35% reduction. Arruda, Kannan, Inglehart, Rezende, and Sohn (2010) conducted a double-blind placebo controlled trial and found that children ages 4-17 who received FV application at six month intervals showed significantly lower decayed and filled surfaces (dfs) than the control group, with a dfs prevention rate of 40% (95% CI [34.3-45.7]). Those who received two FV applications had a 49% reduction in dfs increments and those with only one application had at 31% reduction in dfs increments. Thus, any FV

application is helpful, but greatest preventative effects occur when applied at routine six month intervals.

A randomized control trial by Lawrence, Binguis, Douglas, McKeown, Switizer, Figueiredo, and Laporte (2010) showed FV application at six month intervals to children ages 6 months to 5 years conferred an 18% reduction in the two-year mean 'net' dmfs increment from Aboriginal children and a 25% reduction for all children in the study. Adjusted odds ratio for caries incidence was 1.96 times higher in the control groups than the FV group (95% CI [1.08-3.56], $P = 0.027$).

A two-year prospective-cluster-randomized, concurrent, controlled open trial found that a FV intervention program for children ages 18 months to 47 months reduced net dental caries increment ($d_3$mfs) by 2.3-3.5 surfaces per child (95% CI [1.2, 4.9]). This is 24-36% fewer tooth surface per child that developed dental caries after two years (Slade et al., 2011). Weintraub, Ramos-Gomez, Jue, Hoover, Featherstone, and Gansky (2011) conducted a randomized control trial and reported a statistically significant reduction in the percentage of children with any caries incidence, when children in the experimental FV groups were compared with the control group. The children who received all four varnishes at six month increments had no caries (OR = 3.77, 95% CI [1.88-7.58]). All of the participants received individualized annual oral health counseling visits.

Marinho, Worthington, Walsh, and Clarkson (2013) concurred with the above findings, concluding that FV confers substantial caries inhibiting effects in both

permanent and primary teeth. Pediatric patients treated with FV experienced on average a 43% reduction in dmfs.

In addition to being an effective means of early childhood caries prevention, routine FV application is also cost effective. A base case cost-effectiveness analysis by Quinonez, Stearns, Talekar, and Rozier (2010) found that FV applied at 9, 18, 24, and 36 months of age by primary care providers, was more effective than no varnish in providing an additional 1.52 cavity free months per child between 9 and 42 months of age. This would cost Medicaid $7.18 per cavity free month gained or $203 pre restorative treatment averted. Assuming continued FV applications, this intervention may result in cost savings beyond 36 months of age as illustrated by the decrease in cost per cavity-free month over time, declining from $578.00 initially to $7.18 at 42 months.

Conclusion

With more children receiving services in primary care settings than dental settings, pediatricians and other pediatric healthcare providers may be the only sources of preventative oral health education and care for very young children (Lewis et al., 2005). An evaluation of the current literature regarding primary healthcare providers' role in pediatric oral health led to the establishment of three recommendation statements. The three statements include: (a) pediatric primary care providers should routinely assess pediatric oral health status at well-child visits and facilitate dental home establishment by the first year of life, (b) caregiver oral health literacy is linked to children's oral health status, and (c) the risk for ECC development can be reduced with routine FV application

at 6 month intervals at well child checkups by primary healthcare provider. These evidence based statements served as the foundation for this Doctor of Nursing Practice pediatric oral health quality improvement project in a non-dental American Indian setting.

CHAPTER THREE

METHODS

Theoretical Framework

To better understand and explain ECC, the Health Promotion Model (HPM) by Nola J. Pender (1982) was chosen. The theoretical approaches to understanding and explaining ECC are mostly derived from psychology and have in common a description of contributing factors across the social ecologic framework. More than exploring individual level attributes the HPM combined social, family, policy, and environmental dimensions. Each of these dimensions is important in ECC.

Theorist

The HPM describes the multi-dimensional nature of persons as they interact within their environment to pursue health (Current Nursing, 2012). This mid-range model focuses on three areas: (a) individual characteristics and experiences (b) behavior-specific cognitions and affect and (c) behavioral outcomes (Current Nursing, 2012). The end point of the HPM is improving health promoting behaviors through nursing action. These health promoting behaviors should result in improved health, enhanced functional ability, and better quality of life at all stages of development (Current Nursing, 2012).

Individuals interact with their environment, each serving to transform the other (Current Nursing, 2012). Health care professionals are part of this environment and can exert a positive or negative effect on the transformation of health promoting behavior.

The HPM accounts for the effects of individual characteristics and emotions, families, peers, health care providers, external environment, previous experience/behavior, and self-efficacy on health promoting behaviors (Current Nursing, 2012). The healthcare provider must seek to identify the perceived environmental barriers of their patients in order to help them overcome the barriers.

Rationale for Theory Selection

Using the HPM helps identify and explain the varying dimensions of ECC (i.e. healthcare provider, caregiver, culture, and child) and the profound effect that each dimension can have. This model offers a variety of tenets that can be assessed by the healthcare provider and are critical points for nursing intervention and provide a basis for investigative work on pediatric oral health outcomes (Pender, 2011). This model can aid in project and intervention sustainability after implementation. Pender's model is applicable throughout the lifespan and takes into account the developmental stage of the child and caregiver in understanding ECC. The HPM is highly applicable to the community health setting, like the venue for this project, since these settings foster an environment that values and encourages health promotion and illness prevention.

Specific Components Utilized

The HPM is multidimensional with many factors affecting health promotion behaviors (see Figure 1). The three major concepts of the HMP which helped explain ECC include: (a) individual characteristics and experiences, (b) behaviors-specific cognitions and affect, and (c) behavior outcome (Pender, 2011). The first concept of

Figure 1. Nola Pender's Health Promotion Model (1982)

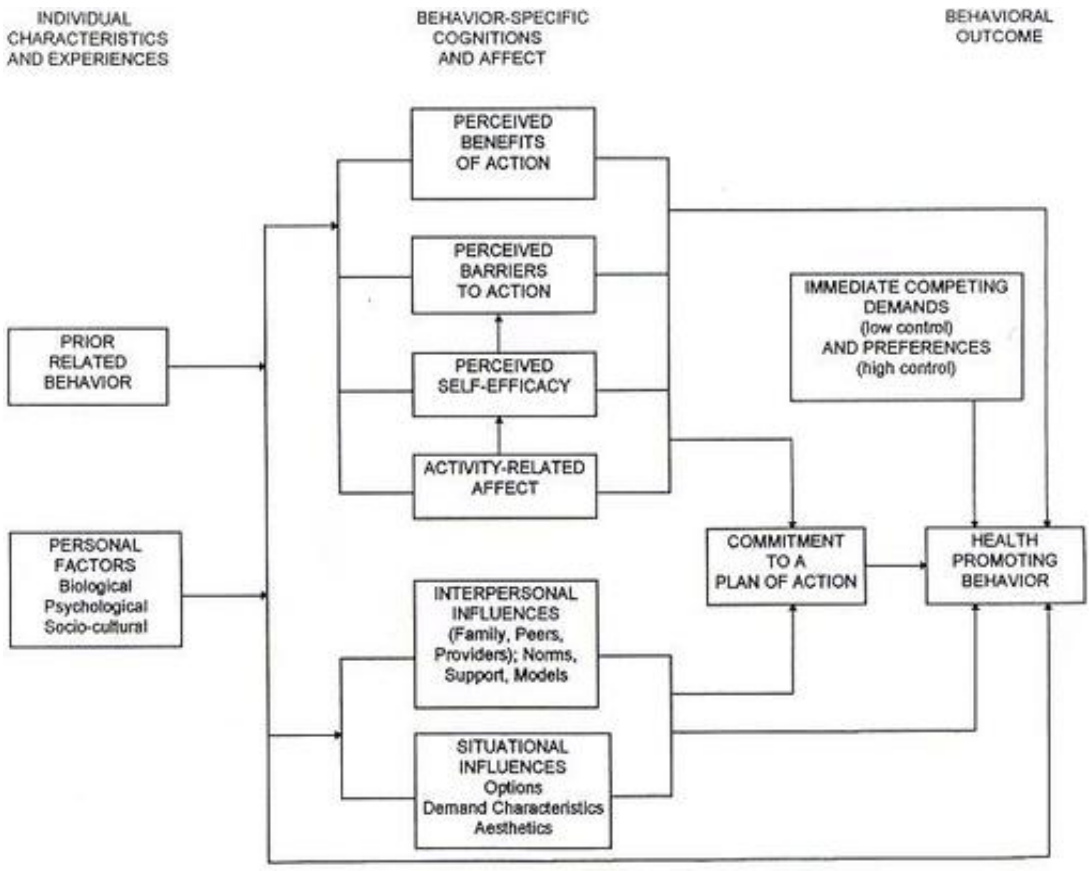


Figure 1. Nola Pender's Health Promotion Model (1982). This figure illustrates the multidimensional aspects affecting health promoting behavior. Adapted from "Nola Pender: The Health Promotion Model," by A. Gonzalo, 2011, *Theoretical Foundations of Nursing*, retrieved from: http://nursingtheories.weebly.com/nola-pender.html

individual characteristics and experiences includes prior related behavior and personal factors. Personal factors are predictive of a given behavior and shaped by the nature of the target behavior being considered (Current Nursing, 2012). Personal factors include biological, psychological, and socio-cultural influences.

Biologically speaking, ECC is an infectious bacterial disease of teeth. "Bacteria, predominately mutans streptococci, metabolize monosaccharaide and disaccharide sugars

to produce acid that demineralize teeth and cause cavities" (J. Douglass, A. Douglass, & Silk, 2004, p. 2113). The severity of ECC is dependent upon the interplay of teeth, bacteria, and sugar consumption. Mutans streptococci typically originate in the mother, or primary caregiver, and are transmitted to the child via saliva contact (J. Douglass et al., 2004). Active or untreated caries and frequent sugar consumption can cause elevated levels bacteria in the saliva, increasing the risk of transmission to the susceptible child. Reported maternal or primary caregiver untreated dental caries was assessed in this project as a biological risk factor for ECC development.

Psychological and sociocultural influences of the American Indian culture on ECC were also taken into account. Sociocultural influences that can impact ECC include caregiver and child concern for oral health, diet aspects that contribute to caregiver and child oral health, child rearing practices, and access to dental and medical care (Reisine & Douglass, 1998).

For this project, it was also essential to consider prior oral health behaviors and their effect on the high ECC rates in this population. Prior related behaviors that impact ECC include but are not limited to brushing and flossing practices, bottle and breastfeeding habits, dietary intake, utilization of medical and dental care, and acceptance of FV application or fluoridated water. When trying to positively impact a person's health behavior, it is essential for the healthcare provider to understand the person's prior behaviors and why they have persisted.

The second concept of the HPM is behavior-specific cognitions and affect. This concept includes perceived benefit and barriers of action, perceived self-efficacy, activity

related affect, interpersonal influences, situational influences, commitment to plan of action, and immediate competing demands and preferences (Pender, 2011).

In order to impact an individual's health behavior, "the individual must perceive the condition as serious, that they are susceptible to the disease and that treatments are effective in preventing or treating the disease" (Reisine & Douglass, 1998, p. 38). For this project to be successful caregivers had to perceive ECC as a serious condition and that their child was susceptible to the disease and that the interventions in this project were effective in preventing or treating ECC. Additionally, health beliefs influence caries risk through behavior. According to Reisine and Douglass (1998), "Children whose parents have lower self-efficacy about caring for their child's teeth report their children have high sugar intake in their diet, leading to high mutans streptococci levels and increase in caries incidence" (p. 39). Oral health self-efficacy is impacted by oral health knowledge. A previously concluded from a thorough review of literature, caregiver oral health literacy is linked to children's oral health status. Caregivers who have confidence in their ability to change their behavior and the behavior of their children or adhere to preventive health programs are more likely to be successful in preventing ECC (Reisine & Douglass, 1998). Caregiver education through this projected aimed to improve caregiver oral health literacy and self-confidence and thus improve pediatric oral health behaviors.

Interpersonal influences were the most influential aspects of the HPM on this project. Primary sources of interpersonal influences are families, peers, and healthcare providers. Each of these groups can exert and positive or negative effect on ECC. According to Pender (2011), "Health professionals constitute a part of the interpersonal

environment, which exerts influence on persons throughout their life span" (p. 5). This assumption explains the essential role that healthcare professionals exert on patients and their health behaviors. According to this assumption, the healthcare provider driven intervention at the heart of this project was an influential part of the patients' interpersonal environment.

Propositions within this theory further explain the impact of the interpersonal influences on healthy promoting behaviors. Pender (2011) stated, "Persons are more likely to commit to and engage in health-promoting behaviors when significant others model the behavior, expect the behavior to occur, and provide assistance and support to enable the behavior" (p. 5). Additionally the theorist wrote, "Families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health-promoting behavior" (p. 5). If positive oral health behaviors are practiced by caregivers, then the children are more likely to exhibit the same behaviors. These propositions also help explain the idea that poor pediatric oral health can in-part be attributed to poor parental oral health behaviors. Fortunately, these propositions also indicated that if parental oral health knowledge and behaviors are modified through healthcare provider intervention, pediatric oral health status can be improved.

The third and final concept of the HPM is the desired outcome of health promoting behavior. The impact of the nursing intervention on pediatric assessment, referral and access were operationalized to represent this concept of the HPM in the quality improvement project. The long-term objectives in this setting are better home-

care behaviors, improved clinical access, multidisciplinary assessment, and early intervention all with the goal of reduced ECC.

The Quality Improvement Project

The HPM served as the theoretical framework for a pediatric oral health quality improvement project in a non-dental setting, implemented to help enhance the oral health status of a vulnerable, minority, pediatric population. The goal was to facilitate the integration of sustainable pediatric oral health initiatives into the well-child appointment. Three specific aims included: (a) conduct a caries risk assessment on 100% of the American Indian pediatric patients age 6 month-5 years, or younger with first tooth eruption, (b) increase dental home referrals of eligible children by 100% in American Indian children younger than 5 years with first tooth eruption, and (c) educate 100% of parents/caregivers of children age birth – 5 years on pediatric oral health promotion, ECC prevention, and self-care behaviors. This study sought to improve the oral health, and thus total health, of a pediatric American Indian population through education, interprofessional collaboration, and early intervention.

Ethical Issues and Protection of Human Rights

Montana State University Institutional Review Board approval (#KT050615) and Tribal Institutional Review Board approval (#15-01) were granted prior to project implementation. Caregivers provided written informed consent prior to participation, and were provided with a signed copy of the document. The author explained to subjects and

caregivers their right to withdraw at any time and that their decisions to participate would not impact the care they received. Caregivers accompanied their child throughout the intervention. No financial incentives were offered. Deception was not required for the validity of this study. All data collection sheets were stored in a locked box. Computerized data was secured on a password protected computer. Data was not coded. No personal identifiable data was used. Participants were assured that confidentiality would be maintained.

The risks of participation to the child and caregiver were limited but included: (a) being made aware of the health issues that they do not have the resources to address, (b) feeling bad about themselves or their oral health practices, (c) misinterpreting information provided in this project, (d) experiencing stress and discomfort during the oral health exam, (e) receiving an incomplete exam depending on age and cooperation, (f) being inconvenienced by the referral instructions to seek follow-up dental care, and (g) experiencing a burden on their time from participation.

Benefits to the participants included early oral health intervention through oral health screening and dental home referral. Additionally, the author provided age specific pediatric oral health education.

Sample and Setting

Location of Data Collection

The hosting facility was an American Indian Community Hospital located in the plains of the Northwestern United States. The specific location for data collection was an

Indian Health Service pediatric clinic, across the hall from an Indian Health Service dental clinic. The pediatric clinic was routinely staffed with one nurse pediatric nurse practitioner, serving as the sole primary care provider, one nurse, one nurse's assistant, and two receptionists. The full service dental clinic was routinely staffed with three general full-time dentists, one endodontist, one contract general dentist, one pediatric part-time dentist, one part-time oral surgeon, one dental hygienist, one receptionist, and eight dental assistants.

This American Indian Reservation is 1.5 million acres of sovereign territory with a population of approximately 11,000 people. The community surrounding the hosting facility has approximately 1,032 residents, 92.2% being American Indian (Cubit Planning, 2015). The median household income is $26,157, meaning 42.4% live in poverty. The median age of the residents is 39.8 years (Cubit Planning, 2015). The Community Hospital is the primary local healthcare facility with an Indian Health Service Station located 28 miles southeast, where medical and dental care are also offered. Indian Health Services in conjunction with Medicaid provides the main source of pediatric health services reimbursement.

Municipal water fluoridation is a major community-level factor in early childhood caries prevention. According to the Centers for Disease Control and Prevention (2015), drinking fluoridated water keeps the teeth strong and reduced tooth decay by approximately 25% in children and adults. Fluoridated water prevents tooth decay by rebuilding and strengthening the tooth's enamel through consistent exposure to low levels of fluoride. While fluoride is naturally occurring in most water, it is usually at a

concentration lower than that required to prevent caries. The Reservation involved in this project serves municipal water to approximately 7,000 of their 11,000 residents; however, the community water supply is not fluoridated.

Eligibility Criteria

All children birth – 5 years presenting to the American Indian pediatric clinic for a routine well-child visit during the dates of data collection were eligible and invited to participate. Data were collected during July-August, 2015.

Sample Characteristics

A total of 145 children were seen in the pediatric clinic during the dates of data collection. Of these, 47 caregiver/child dyads presented for well-child visits rendering them eligible for the oral health intervention. All 47 dyads consented for participation (n = 47). The sample consisted of both genders with ages ranging from 4 weeks to 67 months (M = 27.81 months, SD = 20.62).

Intervention Design

The Intervention

The evidence based, quality improvement intervention was threefold and involved: (a) a caries risk assessment through caregiver questions and an oral exam, (b) age-specific oral health promotion education, and (c) a referral for a same-day dental visit. Under the request of the local dental clinic, children who did not have visible tooth

eruption yet and those who had seen a dental provider less than 3 months prior were not sent for dental referral. This project was a non-experimental quantitative study.

The author was influenced by Pender's HPM in considering both the problems and potential solutions to poor pediatric oral health. The HPM explains that individuals interact with their environment, each serving to transform the other (Current Nursing, 2012). Nurses are part of this environment and can exert a positive or negative effect on the adoption of health promoting behavior by children and their caregivers. The end point of the HPM is improving health promoting behavior and these behaviors through nursing action.

Steps of Data Collection

During a 2 week period from July 27, 2015 – August 7, 2015 the author collected data from a convenience sample at an Indian Health Service pediatric clinic. The steps of data collection were as follows: (a) obtain informed consent from parents/caregivers of children age birth – 5 years attending an American Indian pediatric clinic for a well-child visit and provide participants with a copy of the consent form; (b) conduct a dental caries risk assessment using the American Academy of Pediatrics Oral Health Risk Assessment Tool on all children with first tooth eruption and/or at least 6 months old; (c) educate the dyads on the procedure for oral health assessment; (d) conduct knee-to-knee oral health screening on all children; (e) categorize subjects at least 6 months old and/or with first tooth eruption as low, moderate, or high risk for early childhood caries development; (f) educate the caregiver and child (age dependent) on promoting healthy oral health behaviors (e.g., caries reduction strategies, brushing teeth twice daily with fluoridated

toothpaste, cariogenic foods to avoid, high risk behaviors); (g) promote the "Get Excited About Black Teeth" campaign for silver nitrate application by the dental clinic; (h) make dental referral using referral tracking slip for those children whose first tooth has erupted and who have not been seen by a dentist in longer than 3 months; (i) in referral cases instruct the caregiver to present their referral slip to the dental clinic staff immediately after their well-child visit for the well-dental visit and inform them that same-day appointments were readily available; and (j) count the referral slips at the end of each day to determine the success rate of referral process.

It is important to note that children who did not have dental eruption yet were not excluded from the intervention; only from the referral. Oral health education and a basic oral exam were provided, but a caries risk assessment was not conducted.

Tools for Data Collection

Data collection tools included a customized data collection sheet, dental referral tracking slip, and the American Academy of Pediatrics' Oral Health Risk Assessment Tool (see Appendix A). All tools were approved by both the Montana State University and Tribal Institutional Review Boards.

The Oral Health Risk Assessment Tool was created by the American Academy of Pediatrics in 2011 to aid in the implementation of oral health risk assessment during health supervision visits. According to Academy of Pediatrics (n.d.),

> The Oral Health Risk Assessment Tool was pilot-tested in 20 pediatrician offices by multidisciplinary teams of pediatric health professionals in partnership with the Brightening Oral Health Expert Group and the American Academy of Pediatrics Quality Improvement Innovation Network. The results — a tool that over 80% of the practices found easy

> to implement and the clinician did not need to significantly alter current practice to incorporate risk assessment using this tool. The practice teams also reported that the tool enabled them to implement the Bright Futures oral health recommendations in just 2 minutes during the well child visit. (para. 2)

This screening tool is endorsed by the National Interprofessional Initiative on Oral Health and is part of the Bright Futures Initiative. Additionally, this tool increased identification and documentation of oral health risk from 11% to 75% and identification of high-risk patients for an oral health referral increased from 11% to 87.5% (American Academy of Pediatrics, n.d.).

In this project, the Oral Health Risk Assessment Tool was used to conduct an oral health screening on children age 6 months-5 years, or younger if first tooth eruption present, presenting to the pediatric clinic for a well-child visit. This tool contains 18 items using a closed response set (yes/no) assessing risk (six items) and protective factors for caries (four items), and clinical findings (eight items). The items are scored and based on the score each child is classified as low, moderate, or high risk for caries development (see Appendix A).

Expected Outcomes

The goal was to facilitate the integration of sustainable pediatric oral health initiatives into the well-child appointment. Three specific aims included: (a) conduct a caries risk assessment on 100% of the American Indian pediatric patients age 6 month-5 years, or younger with first tooth eruption, (b) increase dental home referrals of eligible children by 100% in American Indian children younger than 5 years with first tooth eruption, and (c) educate 100% of parents/caregivers of children age birth – 5 years on

pediatric oral health promotion, ECC prevention, and self-care behaviors. It was also expected that the dental referral program would result in a completed referral rate of at least 50%. Additionally, it was expected that through the HPM, the oral health education portion of the intervention would result is health promoting behavior. Though not a measureable outcome of this project, these health promoting behaviors should result in improved health, enhanced functional ability, and better quality of life at all stages of development (Current Nursing, 2012).

Analysis

Effect Size

Data collected through this project highlighted the ECC rates, oral health behaviors, and clinical findings in this population as well as the success of the quality improvement intervention. Because there was only one intervention group and variables were not compared against one another, the effect size cannot be determined.

Analytical Methods

The author focused largely on quantitative data to determine oral health risk factors, protective factors, and clinical findings in relation to early childhood caries. The quantitative questions were mostly yes/no questions and thus the results were analyzed using descriptive measures of central tendency. The successful dental referral rate was calculated. This quality improvement project did not utilize independent and dependent variables or blinding.

Fidelity of the intervention and data collection was assured by having only one investigator. Data was collected over a two week time period during which 145 pediatric patients presented to the clinic; 47 of them for well-child visits.

Assumptions

There were several assumptions made by the researcher in the completion of this project. One assumption was that the hosting clinic was able to allocate human resources to continue the project if it proved successful. It was also assumed that the project would not place a financial, work, or time burden on the hosting facility during data collection. However, it was also assumed that the benefit of project sustainability would outweigh the burden assumed by the hosting facility.

Additionally, based on national statistics the investigator assumed that the sample of caregiver/child dyads would primarily consist of those at high risk for caries development and be receptive to the intervention. According to “Oral Health in America,” the Surgeon General reported in general American Indian/Alaskan Native populations have much greater rates of dental caries and periodontal disease across all age groups when compared to the general U.S. population; specifically those ages 2 to 4 years having 5 times the rate of dental decay compared to all children (USDHHS, 2000). The intervention would not be successful without the participation of the subjects. It was assumed that the caregivers would take the knowledge gained and apply it to their other children’s oral health in order to improve their outcomes.

Conclusion

This non-experimental quality improvement project was designed to improve the oral health status of a specific American Indian pediatric population through a three-part intervention; a caries risk assessment, oral health education, and a dental referral. This project promoted early education and intervention to reduce early childhood caries. It was the purpose of this project to demonstrate the successful integration of well-child and well-dental visits into a combined same day event.

CHAPTER FOUR

RESULTS

Quality Improvement Results

The intervention was implemented and data were collected during a two week period in the summer of 2015. During data collection dates, 145 children were seen in the pediatric clinic, 47 (32.41%) of which were age birth-5 years and presented for a well-child visit (*n* = 47). All 47 caregiver/child dyads consented to participation in the project and received age appropriate oral health education. See Table B1 for graphic representation of project results.

The age range of child participants was 0.25-67 months. The mean age was 27.98 months. Gender was not specified. Of the 47 enrolled children, 38 were at least 6 months old or had first tooth eruption, rendering them eligible for a caries risk assessment (*n* = 38). Of the 38 eligible for the risk assessment, 94.74% (*n* = 36) had teeth present regardless of age.

Caries Risk Assessment Tool

Caregivers of children eligible (*n* = 38) for the caries risk assessment were assessed for their caries risk factors using the six yes/no questions. Item one found that 68.42% (*n* = 26) of caregivers reported themselves as having active decay in the past 12 months and item two found 34.21% (*n* = 13) of caregivers did not have a dentist. Children's Medicaid eligibility (*n* = 38, 100%), frequent snacking (*n* = 29, 76.32%),

continual bottle/sippy cup use with fluid other than water (*n* = 20, 52.63%), and medical special needs (*n* = 2, 5.26%) were reported by participants (*n* = 38) in response to the final four items to assess risk factors for caries development.

Four items assessed children's protective factors in ECC prevention. Children's establishment of a dental home (*n* = 19, 52.78%), application of FV treatment in the past six months (*n* = 14, 36.84%), twice-a-day brushing (*n* = 11, 28.95%), and use of fluoride supplements (*n* = 3, 7.89%) were reported by participants (*n* = 38).

Clinical findings on those with tooth eruption (*n* = 36) were as follows: White spots or visible decalcification (*n* = 23, 63.89%), visible plaque accumulation (*n* = 20, 50.56%), restorations (i.e., fillings) (*n* = 15, 41.67%), obvious decay (*n* = 9, 25%), and gingivitis (*n* = 1, 2.78%). Ten children (27.78%) were found to have healthy teeth.

Children 6 months and older and those with first tooth eruption regardless of age were classified as low, moderate, or high risk for caries development using the Academy of Pediatrics' Caries Risk Assessment Tool. There were four high risk factors that automatically classified the child as high risk for ECC. These factors included: (a) mother or primary caregiver had active decay in the past 12 months, (b) white spots or visible decalcification in the past 12 months, (c) obvious decay and, (d) restoration (fillings) present. "In the absence of high risk factors or clinical findings, the clinician may determine if the child is at high risk for caries based on one or more positive responses to other risk factors or clinical findings" (American Academy of Pediatrics, n.d.). Determining moderate versus low risk is at the discretion of the clinician based on responses to protective factors and risk factors and clinical findings observed. Children

were classified as high risk (*n* = 33, 86.84%), moderate risk (*n* = 4, 10.53%), and low risk (*n* = 1, 2.63%) for ECC.

High Risk Factors. The Oral Health Risk Assessment Tool lists four risk factors that individually place a child at high risk for ECC. These factors are: (1) mother or primary caregiver had active decay in the past 12 months, (2) white spots/decalcifications, (3) obvious decay, and (4) presence of restorations (American Academy of Pediatrics, n.d.). According to the Academy of Pediatrics (n.d.), studies have shown that children with mothers or primary caregivers who have had active decay in the past 12 months are at high risk caries development. Though visible plaque accumulation is a precursor for ECC, it does not automatically place the child at high risk. “Bacteria in the plaque are always metabolically active, causing fluctuations in the salivary pH. The fermentation of carbohydrates by cariogenic plaque bacteria produces organic acids, which act on a susceptible tooth and result in caries” (Zafar, Harnekar, & Siddiqi, 2009, p. 26). The initial lesions appear as ‘white spots’ on the facial tooth surface and as the disease process progresses, the demineralized lesions may become frank lesions or caries, causing cavities discolored by yellow, brown, and even black stains (Zafar et al., 2009). Restorations are evidence of treated caries. History of caries increased the likelihood of recurrence (Kawashita et al., 2011).

Additional Data Collected

Of the children (*n* = 36) with first tooth eruption, 29 (80.56%) were given same-day dental referrals. Seven children were not referred as they had seen a dental provider in the past three months and had no untreated dental decay. Twenty-one dental referrals were successfully completed (72.41%).

The duration of each visit ranged from 3.0-8.83 minutes (*M* = 4.73 minutes, *SD* = 1.28). All caregivers (*n* = 47, 100%) indicated they would consent to having FV applied to their children at well-child visits if this service was offered at the pediatric clinic. All caregiver/child dyads received age appropriate oral health educational material which was reviewed in the clinic. Handouts were sent home with the caregivers.

Table 1. Pediatric Oral Health Outreach Results Summary

Characteristic	*n*	*%*
Received education	47	100
Oral exam completed	47	100
> 6 months or 1st tooth	38[a]	80.85
Tooth eruption[b]	36[c]	76.60
Caries risk category		
High	33	86.84
Moderate	4	10.52
Low	1	2.63
Protective factors		
Existing dental home	19	52.78%
Fluoridated water/supplements	3	7.89%
FV in past 6 months	14	36.84%

Table 1. Continued

Teeth brushed twice daily	11	28.95%
Risk factors		
M/PCG active decay in past 12 months	26	68.42%
M/PCG doesn't have dentist	13	34.21%
Continual bottle/sippy cup with fluid other than water	20	52.63%
Frequent snacking	29	76.32%
Special healthcare needs	2	5.26%
Medicaid eligible	38	100%
Clinical findings[d]		
White spots/ visible decalcifications past 12 months	23	63.89%
Obvious decay	9	25%
Restorations present	15	41.67%
Visible plaque	20	55.56%
Gingivitis	1	2.78%
Healthy teeth	10	27.78%
Would accept FV in clinic	47	100%
Dental referrals[e]		
Not made[f]	7	19.44%
Made	29	80.56%
Completed	21	72.41%

Note. The population size was $N = 145$ and total sample size was $n = 47$. All eligible dyads consented to participation in the project. The age range was 0.25-67 months ($M = 27.81$, $SD = 20.62$). Visit duration range 3.0-8.83 minutes ($M = 4.73$, $SD = 1.28$). WCC = well child check; n = sample size; % = percent; M/PCG = mother or primary caregiver

[a] One newborn with tooth eruption

[b] Tooth eruption regardless of age

[c] Two subjects older than 6 months without first too eruption

[d] Clinical findings assessed in those with first tooth eruption ($n = 36$)

[e] Dental referral for those with first tooth eruption (n = 36)
[f] Dental referral not made if subject had seen dentist in the past 3 months and did not have any obvious signs of decay

Unexpected Results

There was one subject that served as an outlier as he/she was one week old and had four primary teeth erupted. Normally this age would not be eligible for a caries risk assessment, but due to the unusual early eruption of teeth he/she was assessed. His/her protective and risk factors may have slightly skewed the results as these questions are not directed at newborns.

Additionally, there were two subjects who were older than 6 months and did not have first tooth eruption. Protective and risk factors were assessed on these subjects but due to lack of dentition, clinical findings were not applicable. These caregivers were still provided with age-appropriate education about ECC prevention as many parents did not know they needed to take care of the teeth even before they have erupted.

Harm and Benefits

Minimal harm resulted from this project. Physical discomfort may have been experienced by the children during the oral exam. Additionally, caregivers and children may have been made aware of negative clinical findings and unintentionally made to feel bad about themselves or their oral health practices. Additionally, the children and caregivers may have misinterpreted information provided in this project.

The principle benefit to participation in this study was access to oral health education and early intervention through the dental referral process. Caregivers were able

to openly discuss age appropriate oral health practices and have their questions answered. Risk factors and protective factors for ECC were discussed.

Conclusion

The majority of children involved in this project were classified as high risk for ECC. Over half of the children were found to have visible plaque accumulation and one quarter had obvious decay. Restorations were found in more than one third of subjects and nearly two thirds had white spots or visible decalcification in the past 12 months. Caregiver's experience of active decay in the past 12 months was a prominent high risk factor for pediatric ECC in this sample population. Other common risk factors reported in over half of the subjects include continual bottle/sippy cup use with fluid other than water, frequent snacking, and being Medicaid eligible. Protective factors were less prevalent in this sample. Slightly over one quarter of children who had teeth, brushed them twice daily and just over one third have had FV applied in the past six months. All caregivers reported they would consent to FV application at well-child visits if it was offered at this venue. Nearly half of the children with first tooth eruption had never seen a dentist, and of those who had, the majorities were treated for ECC. These findings highlight the need for an ECC prevention program such as the oral health education, screening, and referral project described in this paper.

CHAPTER FIVE

DISCUSSION

Introduction

This intervention was based on the best clinical evidence, grounded in theory, and guided by community stakeholders. The primary goal of this project was to implement an oral health screening, education, and referral project into the pediatric well-child visit as a method for increasing dental attendance in a priority population. The author performed a caries risk assessment on 100% of the American Indian well-child patients age less than 5 years with first tooth eruption, provided education to 100% of their parents/caregivers on pediatric oral health promotion, ECC prevention, and self-care behaviors, and increased same-day dental referrals by 100% in eligible patients. The most important result of this project was that 72.4% of those referred were seen by the dental clinic.

According to the HPM, individuals interact with their environment, each serving to transform the other (Current Nursing, 2012) and healthcare professionals are a part of this environment. In accordance with the HPM, the healthcare professionals in this project exerted a positive effect on subjects through oral health education, a caries risk assessment, and a dental referral to improve health promoting behaviors.

Outcomes Compared to Literature

The outcomes of this project were congruent with those found in the literature. The caries risk assessment confirmed that this sample pediatric American Indian

population is at high risk for ECC development (U.S. Department of Health and Human Services, 2000, as cited in Schroth et al., 2009). This intervention also proved to be easily implemented into a routine primary care routine taking on average less than 5 minutes, as literature suggests (Pierce et al, 2012). This time may be even shorter when implemented in routine practice as introductions, rapport, and consent will not need to be reestablished as it was with the investigator.

All caregivers reported they would consent to FV application if it were offered in this clinic. This aligns with the current evidence in that ECC development can be reduced with routine FV application at 6 month intervals at well child checkups by primary healthcare provider (Holve, 2006; Arruda et al, 2010). Children ages 6 months to 5 years who are at high risk for caries development are the most beneficial recipients (Lawrence et al., 2010).

More children visit a primary care provider than they do a dental provider (American Academy of Pediatrics, 2008), placing the primary care provider at an opportune position for oral health intervention; including making dental referrals. Evidence suggests that pediatric primary care providers should routinely assess pediatric oral health status at well-child visits and facilitate dental home establishment by the first year of life (American Academy of Pediatrics, 2003; Ramous-Gomez et al, 2010). The results of this study confirmed this, in that more children present to the pediatric clinic for a well-child visit than did those who has seen a dentist.

Findings from this project add to the growing body of evidence that interprofessional education improves oral health. A study by Braun et al., (2015) using

the Reach Effectiveness Adoption Implementation Maintenance framework found that a similar oral health education program for non-dental professions increased the proportion of young, low-income children receiving oral health prevention services from a medical professional increased 16-fold.

Implications and Suggestions for Future Studies

This project has laid the ground work for a comprehensive pediatric oral health intervention that can easily be implemented into the routine practice of pediatric primary care providers. This was largely a quantitative study and future studies should address the impact of caries rates as well as the long-term sustainability of better integration of oral health into pediatric visits.

It is recommended that further work on this project focus on the effectiveness of the study, "the extent to which an intervention, service, policy, or procedure of known efficacy (the devised intervention as noted above) and deployed under routine circumstances, produces a beneficial result to the target population" (Clark & Riddle, 2011, p. S126). Routine circumstances refer to the intervention being delivered by the intended end-users, to a broadly defined population, with sound measurement of outcomes (Clark & Riddle, 2011). This would mean monitoring the devised intervention application by the pediatric and dental clinics, without the facilitation of the author. Fluoride varnish is not currently applied at the pediatric clinic, but additional studies could examine FV rates in the dental clinic and consideration of FV application in the pediatric clinic, if appropriate.

The suggested final phase of this project should include the efficiency of the study which considers long-term sustainability, acceptability to key stakeholders, while monitoring fidelity. Efficiency research is defined as “the extent to which an intervention, service, policy, or procedure of known efficacy and effectiveness can be successfully delivered to the target population using the least amount of resources” (Riddle and Clark, 2011, p. S217). A policy should be developed outlining the proper procedure for this intervention.

Additionally, policy work could be addressed on a larger scale. Prior to this quality improvement project, only physicians were reimbursed by Montana Medicaid (Code D1206) for FV application to children under 21 at well-child appointments (Montana Department of Public Health and Human Services, 2011). However, effective January 1, 2016 mid-level practitioners will now be reimbursed (Montana Department of Public Health and Human Services, 2016). Further policy work to promote similar reimbursement by private insurance companies is encouraged.

Advocating for community water fluoridation is another aspect of ECC prevention from a community-based perspective. The HPM states “Situational influences in the external environment can increase or decrease commitment to or participation in health-promoting behaviors” (Pender, 2011). Campaigning for community water fluoridation would demonstrate a community wide promotion and value of oral health. This could foster a culture that promotes and supports achieving optimal oral health. “Community water fluoridation has been identified as the most cost-effective method of

delivering fluoride to all members of the community, regardless of age, educational attainment, or income level" (Centers for Disease Control and Prevention, 2015, para. 3).

A variety of long-term studies could further explore the HPM ideal that "persons are more likely to commit to and engage in health-promoting behaviors when significant others model the behavior, expect the behavior to occur, and provide assistance and support to enable the behavior" (Pender, 2011). An education campaign that focuses on measuring caregiver knowledge could be executed. This could be effective in reducing ECC as "Caregivers' infant and early childhood oral health knowledge is of paramount importance because oral health behaviors are the exclusive domain of the caregiver during the early years of life" (Vann Jr. et al., 2010, p. 2). A study of this magnitude could assess diet, self-care behaviors, and oral health literacy. Including qualitative aspects to the study may lend further insight into interpersonal influences such as norms, beliefs, cultural influences, and barriers to action in achieving healthy promoting oral health behaviors, as discussed in the HPM (Pender, 2011).

Financial Implications

This quality improvement project posed minimal budgetary implications for the American Indian tribe involved in the project. The time and services of the investigator were at no cost to the hosting facility. The time spent with each dyad did not affect the number of patients who received care in the pediatric clinic each day. The investigator provided the caries risk assessment forms, the educational handouts, and the dental referral slips. Only the time the author spent with the pediatric nurse practitioner and

Chief of the Dental Program in arranging the project came at the cost of the hosting facility.

According to Riddle and Clark (2011), “sustainability involves determining the extent to which interventions work when used in real-world setting, and understanding the necessary factors that promote the effective use of interventions once external research funds have been removed” (p. S126). Cost consideration may impact sustainability (Riddle and Clark, 2011). Sustaining the project based on the positive findings would involve a financial commitment from the institution. The facility would need to supply the referral slips, caregiver education materials, and the staff time to integrate oral health screening, education, and referral into well-child visits.

The dental clinic may experience an increase in demand for FV application related to increased well-dental visit referrals. This service is already offered by the dental clinic but with increased dental referrals, this office may expect an increase in cost related to increased FV application. However, FV application in the dental setting is a billable procedure with Medicaid reimbursement and thus the increase in demand may result in an increase in revenue for the hosting facility.

Strengths

Application of current evidence into a three-part pediatric oral health intervention is an important strength of this quality improvement project. This project was created to meet the needs of this community and clinic while applying current evidence. The three-part intervention (education, caries risk assessment, and dental referral) addressed three

separate areas of oral health promotion and prevention and was based upon a needs assessment conducted with key stake holders. Stakeholder involvement in designing the intervention was expected to facilitate the long-term integration of pediatric oral health initiatives in the non-dental setting.

The proximity of the dental clinic and pediatric clinic, in addition to same-day appointments, allowed for same-day dental referrals to be executed. Close interprofessional collaboration is imperative to facilitate timely referrals and appointments.

There was only one investigator for this project which resulted in continuity of intervention implementation and avoided internal variability. Additionally, the same investigators conducted data analysis contributing to strong internal validity. This is congruent with the efficacy phase of research, “the extent to which an intervention, service, policy, or procedure produces a beneficial result under ideal circumstances in the target population” (Riddle & Clark, 2011, p. S126). This phase of the project was delivered with strict adherence to the designed intervention, by trained interventionists, to a well-defined population, with a sound measurement of outcomes (Riddle & Clark, 2011).

Another strength was the sample size. “If the aim of a pilot study is to demonstrate intervention efficacy in a single group, a sample in the range of 20–25 will probably be adequate when population effect sizes are likely to be moderate or larger” (Hertzog, 2008, p. 190). All caregiver/child dyads consented to participate in this study. This resulted in a large and comprehensive sample population that can be generalized to

the entire population of children less than 5 years with scheduled well-child visits in this setting. Caregivers were receptive to the information presented and all interactions were completed in their entirety; none needing to be discontinued during the intervention.

Limitations

The data collection and project implementation time frame was only two weeks. Though the sample size was ample, two weeks of data collection remains a limitation. The time frame was limited due to constraints of the DNP program and remote location away from the home of the investigator.

While only having one investigator can be a strength, it can also be a limitation. Investigator bias is a variable that must be considered. Although measures were taken for this to be avoided, it is human nature and inherent in any study. The selection of reviewed literature, the interpretation of caregiver responses, the oral health clinical findings, and the way data was interpreted may have been influenced by personal bias.

An additional limitation of this project was using a paper method to track completed referrals. Follow-up using integrated medical and dental records would be a superior approach. The dental staff also reported when referrals were made near the end of the day, it was challenging to achieve a same day visit and in these cases the slips were collected and the subjects were rescheduled for a different day. This data was not specifically collected and thus the rates of those seen the day of referral and those that were rescheduled for a different day is a limitation of this study.

A final limitation of this study is its external validity and generalizability. The hosting institution was in a rural setting and residents of rural areas fare worse than residents of more urbanized areas on many key measures of health, including oral health, due to demography and socioeconomic characteristics, health risk factors, and health care access (Eberhardt & Pamuk, 2004). While the results of this study are only applicable to this particular venue, the elements of the intervention are not. The interventions should be taken and tailored to each practice setting in order to meet the needs of the patients and providers. The work by Braun et al., (2015) demonstrated a similar oral health education initiative for primary care providers and increased dissemination of oral health interventions 16-fold in their target pediatric population. In many cases, same-day dental referrals may not be feasible but the healthcare provider needs to work closely with the dental providers to facilitate this or appointments within the same week.

Practical Application

The results of this study have verified that this pediatric oral health promotion and prevention project in a non-dental, American Indian setting is both feasible and effective for delivering three elements of ECC prevention. If sustained, this interprofessional intervention has the potential to improve oral health status in this high-risk population.

The author and project stakeholders were pleased to see that findings in this rural, American Indian setting were similar to those reported by Pierce et al. (2012), Braun et al. (2015), and recommendations from the Academy of Pediatrics (n.d., 2003, 2008, 2011, 2013), demonstrating that interprofessional collaboration may be essential to

solving the problem of ECC. The findings are also congruent with the Indian Health Service Early Childhood Caries Initiative. The results of this project lend further support to the model proposed by the IHS. Primary care providers should be completing oral health assessments, as they do a physical assessment, at well-child visits.

Well-child visits provide an essential time for caregiver education and oral health education should be included in this. Inquiring about the establishment of a dental home should also be assessed at well-child visits. Referring for a same-day dental visit is in more cases not feasible. However, encouraging caregivers to establish a dental home prior to the child's first birthday is feasible (American Academy of Pediatrics, 2013). For those parents who are unsure of who to contact or who have questions, a referral can and should be made for them. For those children who are found to have untreated dental decay and caries, an immediate referral should be implemented (American Academy of Pediatrics, 2013).

Providing oral health prevention services in the medical setting offers the advantage of obtaining this care from a previously established provider who is familiar with the patient. An oral health exam, risk assessment, anticipatory guidance, application of FV, and referral to a dental home by age 1 are critical to preventing early childhood caries (American Academy of Pediatrics, 2013). These early prevention strategies are less invasive and more cost effective than reactive interventions. Oral health is part of total health, and thus should be incorporated into routine well-child visits.

Conclusion

The end point of the HPM is health promoting behavior and these behaviors can be modified through nursing action. This quality improvement project served to meet this objective through a three-part intervention. Despite stated limitations with this study, this intervention was successful in demonstrating the integration of well-dental visits into the well-child appointment. This intervention was an effective way to implement education and early intervention in this high-priority population to increase access to oral health care.

Adequately addressing ECC requires interprofessional collaboration, and the burden cannot be placed solely on one discipline. “Since access to dental care is often difficult (overall, less than 25% of Native Americans/Alaska Natives are able to access dental care), medical providers are often the ones who do see children at an early age” (Indian Health Service, n.d.). According to the American Academy of Pediatric Dentistry (n.d.), “Fifty percent of American children have never visited a dentist” (p. 2). The number of children who routinely visit primary care providers is much higher. Thus, pediatric primary care providers are in an opportune position to provide oral health screenings, promotion, interventions, and dental referrals. Even with a dental home established, routine oral health assessments should be included at well-child visits.

Results of this project found the sample population was at high risk for ECC and integrating well-child and well-dental visits was a successful approach to increasing dental attendance. The intervention was well received by caregiver/child dyads and age appropriate oral health education was provided to all participants. Implementing this

intervention in a pediatric clinic helped integrate oral health and primary care, to promote overall total health. This project demonstrated the utility of interprofessional collaboration for addressing persistent health disparities.

REFERENCES CITED

American Academy of Pediatrics. (n.d.). O*ral health risk assessment tool.* Retrieved from: http://brightfutures.aap.org/Oral_Health_Risk_Assessment_Resources.html

American Academy of Pediatrics. (2003). Policy statement: Oral health risk assessment timing and establishment of the dental home. *Pediatrics 111*(5), 1113-1116.

American Academy of Pediatrics. (2008). Preventive oral health interventions for pediatricians. *Pediatrics 122*, 1387-1394. doi: 10.1542/peds.2008-2577.

American Academy of Pediatrics. (2011). Early childhood caries in Indigenous communities. *Pediatrics 127*, 1190-1198.

American Academy of Pediatrics. (2013). More state Medicaid programs pay for children's oral health prevention services in doctors' offices. Retrieved from: http://www2.aap.org/oralhealth/docs/CelebratingOurWins.pdf

American Academy of Pediatric Dentistry. (n.d.). *Early childhood caries (ECC).* Retrieved from: http://www.aapd.org/assets/2/7/ECCstats.pdf

American Academy of Pediatric Dentistry. (2014). Guideline on fluoride therapy. *Clinical Guidelines 36*(6), 171-174.

American Academy of Pediatric Dentistry. (2015). Definition of dental home. *Oral Health Policies 37*(6), 12. Retrieved from: http://www.aapd.org/media/policies_guidelines/d_dentalhome.pdf

American Dental Association Council on Scientific Affairs. (2006). Professionally applied topical fluoride: Evidence-based clinical recommendations. *The Journal of the American Dental Association 137*(8), 1151-1159.

Bonnell, W. & Smith, K. (2014). *Proposal writing for nursing capstones and clinical projects*. New York, NY: Springer Publishing Company.

Bridges, S. M., Parthasarathy, D. S., Wong, H. M., Yiu, C., Au, T. K., & McGrath, C. P. (2014). The relationship between caregiver functional oral health literacy and child oral health status. *Patient Education and Counseling 94*(3), 411-416. doi: 10.1016/j.pec.2013.10.018

Braun, P. A., Racich, K. W., Ling, S. B., Ellison, M. C., Savoie, K., Reiner, L., & Westerfall, J. M. (2015). Impact of an interprofessional oral health education program on health care professional and practice behaviors: A Re-AIM analysis. *Pediatric Health, Medicine, and Therapeutics* (6), 101-109.

Centers for Disease Control and Prevention. (2014). *Dental caries (tooth decay).* Retrieved from: http://www.cdc.gov/healthywater/hygiene/disease/dental_caries.html

Centers for Disease Control and Prevention. (2015). *Community water fluoridation.* Retrieved from: www.cdc.gov/fluoridation/index.htm

Chu, M., Sweis, L. E. Guay, A. H., & Manski, R. J. (2007). The dental care of U.S. children: Access, use, and referrals by nondental providers, 2003. *Journal of the American Dental Association 138*(10), 1324-1331.

Cubit Planning. (2015). *Browning demographics summary*. Retrieved from: montana-demographics.com/browning-demographics#

Current Nursing. (2012). *Nursing theories: A companion to nursing theories and models*. Retrieved from: http://currentnursing.com/nursing_theory/nursing_theories_overview.html

de la Cruz, G. G., Rozier, R. G., & Slade, G. (2004). Dental screening and referral of young children by pediatric primary care providers. *Pediatrics 114*(5), e642-e652. doi: 10.1542/peds.2004-1269

Douglass, J. M., Douglass, A. B., & Silk, H. J. (2015). A practical guide to infant oral health. *American Family Physician 70*(11), 2113-2120.

Duderstadt, K. G. (2012). Impact of Affordable Care Act on children's oral health: States hold the key. *Journal of Pediatric Health Care 28,* 565-567.

Eberhardt, M. S. & Pamuk, E. R. (2004). The importance of place of residence: Examining health in rural and nonrural areas. *American Journal of Public health 94*, 1628-1686.

Hertzog, M. A. (2008). Considerations in determining sample size for pilot studies. *Research in Nursing and Health 31*, 180-191.

Hilton, L. (2013). Children's oral health: Prevention and treatment. *Contemporary Pediatrics Oct 01,* 38-42.

Holve, S. (2006). Fluoride varnish applied at well child care visits can reduce early childhood caries. *The Indian Health Service Primary Care Provider 31*(10), 243-246.

Gonzalo, A. (2011). *Nola Pender: Health Promotion Model.* Retrieved from: http://nursingtheories.weebly.com/nola-pender.html

Indian Health Service. (n.d.) *The medical provider's role in early childhood caries prevention.* Retrieved from: http://www.ihs.gov/DOH/documents/ecc/CommunityDocs/MedicalProviderRoleECCPreventionAndEarlyIntervention.pdf

Kawashita, Y., Kitamura, M., & Saito, T. (2011). Review article: Early childhood caries. *International Journal of Dentistry*, 1-7.

Kranz, A. M., Rozier, R. G., Preisser, J. S., Steams, S. C., Weinberger, M., & Lee, J. Y. (2014). Comparing medical and dental providers of oral health services on early dental caries experience. *American Journal of Public Health 104*(7), e92-e99.

Lawrence, H. P., Binguis, D., Douglas, J., McKeown, L., Switizer, B., Figueiredo, R., & Laporte, A. (2008). A 2-year community-randomized controlled trial of fluoride varnish to prevent early childhood caries in Aboriginal children. *Community Dentistry and Oral Epidemiology 36*, 503-516.

Lee, J. Y., Divaris, K., Baker, A. D., Rozier, R. G., Lee, S. Y., & Vann Jr., W. F. (2010). Oral health literacy levels among a low-income WIC population. *Journal of Public Health Dentistry 71*, 152-160.

Lewis, C. W., Grossman, D. C., Domoto, P. K., & Deyo, R. A. (2000). The role of the pediatrician in oral health of children: A national survey. *Pediatrics 106*(e84), 1-7. doi: 10.1542/peds.106.6.e84

Lewis, C., Lynch, H., & Richardson, L. (2005). Fluoride varnish use in primary care: What do providers think? *Pediatrics115*(1), e69-e76. doi: 10.1542/peds.2004-1330

Miller, E., Lee, J., DeWalt, D. A., & Vann, W. F., Jr. (2010). Impact of caregiver literacy on children's oral health outcomes. *Pediatrics*, *126*(1), 107-114. doi: 10.1542/peds.2009-2887

Montana Department of Public Health and Human Services. (2011). Dental and denturist program. Retrieved from: http://www.pasconnect.org/wp-content/uploads/2013/07/Fluoride-varnish-Medicaid.pdf

Montana Department of Public Health and Human Services. (2016). *Montana healthcare programs notice: Dentists, dental hygienists, denturists, and mid-levels*. Retrieved from: https://medicaidprovider.mt.gov/Portals/68/docs/providernotices/2015/changestomontanamedicaid12312015.pdf

Moran, K., Burson, R., & Conrad, D. (2015). *The doctor of nursing practice scholarly project.* Burlington, MA: Jones & Bartlett Learning.

Nowak, A. J., & Casamassimo, P. S. (2002). The dental home: A primary care oral health concept. *Journal of American Dental Association 133,* 93-98.

Nursing Theory. (2012). *Health promotion model*. Retrieved from: http://www.nursing-theory.org/theories-and-models/pender-health-promotion-model.php

Pender, N. (2011). *The health promotion model: Manual.* Retrieved from University of Michigan, School of Nursing Web site: http://deepblue.lib.umich.edu/bitstream/handle/2027.42/85350/HEALTH_PROMOTION_MANUAL_Rev_5-2011.pdf

Pierce, K. M., Rozier, R. G., & Vann Jr., W. F. (2002). Accuracy of pediatric primary care providers' screenings and referral for early childhood caries. *Pediatrics 109*(5), 1-7.

Plutzer, K., & Keirse, M. (2010). Incidence and prevention of early childhood caries in one- and two-parent families. *Child: Care, Health, and Development 37*(1), 5-10. doi: 10.1111/j.1365-2214.2010.01114.x

Quinonez, R. B., Stearns, S. C., Talekar, B. S., Rozier, R. G., Downs, S. M. (2006). Simulating cost-effectiveness of fluoride varnish during well-child visits for Medicaid-enrolled children. *Archives of Pediatrics and Adolescent Medicine 160,* 164-170.

Ramos-Gomez, F., Crystal, Y. O., Wai Ng, M., Tnanoff, N., & Featherston, J. D. (2010). Caries risk assessment, prevention, and management in pediatric dental care. *Academy of General Dentistry, 505-516.*

Reisine, S. & Douglass, J. M. (1998). Psychological and behavior issues in early childhood caries. *Community Dentistry and Oral Epidemiology 26*(1), 32-33.

Riddle, M. & Clark, D. (2011). Comments from the co-guest editors: Behaviors and social intervention research at the National Institute of Dental and Craniofacial Research (NIDCR). *Journal of Public Health Dentistry 71*, S123-S129.

Savage, M. F., Lee, J. Y., Kotch, J. B., Vann Jr., W. F. (2004). Early preventive dental visits: Effects on subsequent utilization and costs. *Pediatrics 114*(4), e418-e423. doi: 10.1542/peds.2003-0469-F

Slade, G. D., Bailie, R. A., Roberts-Thomson, R., Leach, A. J., Raye, I., Endean, C., Simmons, B., & Morris, P. (2011). Effect of health promotion and fluoride varnish on dental caries among Australian Aboriginal children: Results for a community-randomized controlled trial. *Community Dentistry and Oral Epidemiology 39*, 29-43. doi: 10.1111/j.1600-0528.2010.00561.x

Schroth, R. J., Harrison, R. L. & Moffatt, M. E. K. (2009). Oral health of indigenous children and the influence of early childhood caries on childhood health and well-being. *Pediatric Clinics of North America 56*(6), 1481-1499. doi: 10.1016/j.pcl.2009.09.010

US Department of Health and Human Services: National Institute of Dental and Craniofacial Research, National Institutes of Health. (2000). *Oral health in America: A report of the Surgeon General*. Retrieved from: http://silk.nih.gov/public/hck1ocv.@www.surgeon.fullrpt.pdf

Vann Jr., W. F., Lee, J. Y., Baker, D., & Divaria, K. (2010). Oral health literacy among female caregivers: Impact on the oral health outcomes in nearly childhood. *Journal of Dental Research 89*(12), 1395-1400. doi: 10.1177/0022034510379601.

Warren, J. J., Weber-Gasparoni, K. W., Marshal, T. A., Drake. D. R., Dehkordi-Vakil, F., Dawson, D. V., & Tharp, K. M. (2009). A longitudinal study of dental caries risk among very young low SES children. *Community Dentistry and Oral Epidemiology 37*(2), 116-122.

Watkins, R. (2008). *Your complete resource site on needs and needs assessments.* Retrieved from: needsassessment.org

Weintraub, J. A., Ramos-Gomez, F., Jue, B., Hoover, C. I., Featherstone, J. B., & Gansky, S. A. (2006). Fluoride varnish efficacy in preventing early childhood caries. *Journal of Dental Research 85*(2), 172-176.

Yu, Z., Martin, K., Terpak, C., & Curtis, M. (2009). *Ambulatory surgery for early childhood caries in California, 2005.* Retrieved from: https://www.cdph.ca.gov/programs/MCAHOralHealth/Documents/MO-OHP-AmbulatorySurgery.pdf

Zafar, S., Harnekar, S. V., & Siddiqi, A. (2009). Early childhood caries: Etiology, clinical considerations, consequences and management. *International Dentistry South Africa 11*(4), 24-36.

APPENDIX A

CARIES RISK ASSESSMENT TOOL

Oral Health Risk Assessment Tool

The American Academy of Pediatrics (AAP) has developed this tool to aid in the implementation of oral health risk assessment during health supervision visits. This tool has been subsequently reviewed and endorsed by the National Interprofessional Initiative on Oral Health.

Instructions for Use

This tool is intended for documenting caries risk of the child, however, two risk factors are based on the mother or primary caregiver's oral health. All other factors and findings should be documented based on the child.

The child is at an absolute high risk for caries if any risk factors or clinical findings, marked with a ⚠ sign, are documented yes. In the absence of ⚠ risk factors or clinical findings, the clinician may determine the child is at high risk of caries based on one or more positive responses to other risk factors or clinical findings. Answering yes to protective factors should be taken into account with risk factors/clinical findings in determining low versus high risk.

Patient Name:_____ Date of Birth:_____ Date:_____

Visit: ☐6 month ☐9 month ☐12 month ☐15 month ☐18 month ☐24 month ☐30 month ☐3 years ☐4 years ☐5 years ☐6 years ☐Other_____

RISK FACTORS

⚠ Mother or primary caregiver had active decay in the past 12 months
☐Yes ☐No

- Mother or primary caregiver does not have a dentist
  ☐Yes ☐No

- Continual bottle/sippy cup use with fluid other than water
  ☐Yes ☐No
- Frequent snacking
  ☐Yes ☐No
- Special health care needs
  ☐Yes ☐No
- Medicaid eligible
  ☐Yes ☐No

PROTECTIVE FACTORS

- Existing dental home
  ☐Yes ☐No
- Drinks fluoridated water or takes fluoride supplements
  ☐Yes ☐No
- Fluoride varnish in the last 6 months
  ☐Yes ☐No
- Has teeth brushed twice daily
  ☐Yes ☐No

CLINICAL FINDINGS

⚠ White spots or visible decalcifications in the past 12 months
☐Yes ☐No

⚠ Obvious decay
☐Yes ☐No

⚠ Restorations (fillings) present
☐Yes ☐No

- Visible plaque accumulation
  ☐Yes ☐No
- Gingivitis (swollen/bleeding gums)
  ☐Yes ☐No

- Teeth present
  ☐Yes ☐No
- Healthy teeth
  ☐Yes ☐No

ASSESSMENT/PLAN

Caries Risk:
☐Low ☐High

Completed:
☐Anticipatory Guidance
☐Fluoride Varnish
☐Dental Referral

Self Management Goals:

☐Regular dental visits	☐Wean off bottle	☐Healthy snacks
☐Dental treatment for parents	☐Less/No juice	☐Less/No junk food or candy
☐Brush twice daily	☐Only water in sippy cup	☐No soda
☐Use fluoride toothpaste	☐Drink tap water	☐Xylitol

Treatment of High Risk Children

If appropriate, high-risk children should receive professionally applied fluoride varnish and have their teeth brushed twice daily with an age-appropriate amount of fluoridated toothpaste. Referral to a pediatric dentist or a dentist comfortable caring for children should be made with follow-up to ensure that the child is being cared for in the dental home.

Adapted from Ramos-Gomez FJ, Crystal YO, Ng MW, Crall JJ, Featherstone JD. Pediatric dental care: prevention and management protocols based on caries risk assessment. *J Calif Dent Assoc.* 2010;38(10):746–761; American Academy of Pediatrics Section on Pediatric Dentistry and Oral Health. Preventive oral health intervention for pediatricians. *Pediatrics.* 2003; 122(6):1387–1394; and American Academy of Pediatrics Section of Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. *Pediatrics.* 2003;111(5):1113–1116.

The recommendations in this publication do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate. Copyright © 2011 American Academy of Pediatrics. All Rights Reserved. The American Academy of Pediatrics does not review or endorse any modifications made to this document and in no event shall the AAP be liable for any such changes.

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Bright Futures.

National Interprofessional Initiative on Oral Health
engaging clinicians eradicating dental disease

Oral Health Risk Assessment Tool Guidance

Timing of Risk Assessment

The Bright Futures/AAP "Recommendations for Preventive Pediatric Health Care," (ie, Periodicity Schedule) recommends all children receive a risk assessment at the 6- and 9-month visits. For the 12-, 18-, 24-, 30-month, and the 3- and 6-year visits, risk assessment should continue if a dental home has not been established. View the Bright Futures/AAP Periodicity Schedule—http://brightfutures.aap.org/clinical_practice.html.

Risk Factors

⚠ **Maternal Oral Health**

Studies have shown that children with mothers or primary caregivers who have had active decay in the past 12 months are at greater risk to develop caries. **This child is high risk.**

Maternal Access to Dental Care

Studies have shown that children with mothers or primary caregivers who do not have a regular source of dental care are at a greater risk to develop caries. A follow-up question may be if the child has a dentist.

Continual Bottle/Sippy Cup Use

Children who drink juice, soda, and other liquids that are not water, from a bottle or sippy cup continually throughout the day or at night are at an increased risk of caries. The frequent intake of sugar does not allow for the acid it produces to be neutralized or washed away by saliva. Parents of children with this risk factor need to be counseled on how to reduce the frequency of sugar-containing beverages in the child's diet.

Frequent Snacking

Children who snack frequently are at an increased risk of caries. The frequent intake of sugar/refined carbohydrates does not allow for the acid it produces to be neutralized or washed away by saliva. Parents of children with this risk factor need to be counseled on how to reduce frequent snacking and choose healthy snacks such as cheese, vegetables, and fruit.

Special Health Care Needs

Children with special health care needs are at an increased risk for caries due to their diet, xerostomia (dryness of the mouth, sometimes due to asthma or allergy medication use), difficulty performing oral hygiene, seizures, gastroesophageal reflux disease and vomiting, attention deficit hyperactivity disorder, and gingival hyperplasia or overcrowding of teeth. Premature babies also may experience enamel hypoplasia.

Protective Factors

Dental Home

According to the American Academy of Pediatric Dentistry (AAPD), the dental home is oral health care for the child that is delivered in a comprehensive, continuously accessible, coordinated and family-centered way by a licensed dentist. The AAP and the AAPD recommend that a dental home be established by age 1. Communication between the dental and medical homes should be ongoing to appropriately coordinate care for the child. If a dental home is not available, the primary care clinician should continue to do oral health risk assessment at every well-child visit.

Fluoridated Water/Supplements

Drinking fluoridated water provides a child with systemic and topical fluoride exposure, a proven caries reduction intervention. Fluoride supplements may be prescribed by the primary care clinician or dentist if needed. View fluoride resources on the Oral Health Practice Tools Web Page http://aap.org/oralhealth/PracticeTools.html.

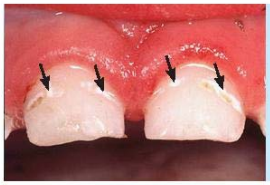
Fluoride Varnish in the Last 6 Months

Applying fluoride varnish provides a child with highly concentrated fluoride to protect against caries. Fluoride varnish may be professionally applied. For online fluoride varnish training, access the Child Oral Health and Fluoride Varnish Modules in the Smiles for Life National Oral Health Curriculum, www.smilesforlifeoralhealth.org.

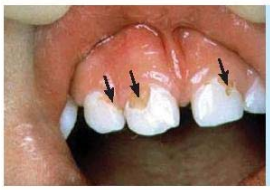
Tooth Brushing and Oral Hygiene

Primary care clinicians can reinforce good oral hygiene by teaching parents and children simple practices. Infants should have their mouths cleaned after feedings with a wet soft washcloth. Once teeth erupt it is recommended that children have their teeth brushed twice a day. For children under the age of 2 determined to be at moderate or high risk for caries, it is appropriate to recommend a smear of fluoridated toothpast twice per day. Children older than 2 years old should use a pea-sized amount of fluoridated toothpaste twice a day. View fluoride resources in the AAP Protecting All Children's Teeth Curriculum Fluoride Module http://www.aap.org/oralhealth//pact/ppt/Fluoride.ppt.

Clinical Findings



⚠ **White Spots/Decalcifications**
This child is high risk.
White spot decalcifications present—immediately place the child in the high-risk category.



⚠ **Obvious Decay**
This child is high risk.
Obvious decay present—immediately place the child in the high-risk category.

⚠ **Restorations (Fillings) Present**
This child is high risk.
Restorations (Fillings) present—immediately place the child in the high-risk category.

Visible Plaque Accumulation
Plaque is the soft and sticky substance that accumulates on the teeth from food debris and bacteria. Primary care clinicians can teach parents how to remove plaque from the child's teeth by brushing and flossing.

Gingivitis
Gingivitis is the inflamation of the gums. Primary care clinicians can teach parents good oral hygiene skills to reduce the inflammation.

Healthy Teeth
Children with healthy teeth have no signs of early childhood caries and no other clinical findings. They are also experiencing normal tooth and mouth development and spacing.

For more information about the AAP's oral health activities email oralhealth@aap.org or visit www.aap.org/oralhealth.

The recommendations in this publication do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate. Copyright © 2011 American Academy of Pediatrics. All Rights Reserved. The American Academy of Pediatrics does not review or endorse any modifications made to this document and in no event shall the AAP be liable for any such changes.

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN™

Bright Futures.

National Interprofessional Initiative on Oral Health
engaging clinicians eradicating dental disease