

The Role of Alaska's Nurse Practitioners in Preventing Early Childhood Caries

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### Abstract

Early Childhood Caries (ECC) is the most common chronic disease of childhood despite being preventable. Because of its high prevalence, its impact on the quality of life of young children, and its potential for increasing their risk of caries in the permanent dentition, ECC is arguably one of the most serious and costly health conditions among young children. Poor access to dental services by rural Alaskans and poor dental care in general are considered the main contributing factors to the continued rise in ECC in Alaska. Primary care providers (PCPs), such as nurse practitioners (NPs), are in unique positions to complement the work of dental professionals because PCPs often provide care before a child's first dental visit. This project assessed the practice habits and perceived competence of Alaska's NPs with regards to performing pediatric oral health-related tasks as well as knowledge of current tools. Data was collected from NPs in Alaska by survey. This data was analyzed to find specific areas of educational-need and to model an information kit for NPs in the State of Alaska to improve their primary pediatric practice. The results indicated that NPs in the State of Alaska believe oral health assessments and preventative education should be included in pediatric well-child care but their frequency of actual performance and perceived confidence was low. Recommendations to improve frequency of oral health-related tasks during visits with pediatric populations focus on increasing education in these areas for Alaska's NPs.

## The Role of Alaska's Nurse Practitioners in Preventing Early Childhood Caries

### Introduction

Oral health in the United States has shown overall improvement in the past 10 years; however, cases of early childhood caries (ECC) among American children are increasing (Dye et al., 2007). A similar trend can be seen in the State of Alaska (Alaska Department of Health and Human Services [AKDHHS], 2012). ECC is the most common chronic disease of childhood, five times more likely than asthma and seven times more likely than hay fever (United States Department of Health and Human Services [USDHHS], 2007). Dental caries are considered preventable by the American Academy of Pediatric Dentistry (AAPD) (AAPD, 2013). However, poor access to dental services by rural Alaskans and poor dental care in general are considered the main contributing factors to the continued rise in ECC (AKDHHS, 2012). Because of its high prevalence, its impact on the quality of life of young children, and its potential for increasing their risk of caries in permanent dentition, ECC is arguably one of the most serious and costly health conditions among young children (Tinanoff & Reisine, 2009).

According to the American Academy of Pediatrics (AAP), primary care providers (PCPs) are in ideal positions to complement the work of dental professionals because PCPs often provide preventative care to young children years before their first dental visit (AAP, 2008). PCPs that perform well child visits in Alaska include physicians, physician's assistants (PAs), and nurse practitioners (NPs). NPs are uniquely well-qualified to provide preventative education as part of the nursing model of wellness in prenatal, postnatal, and pediatric visits. Despite recommendations by the AAP that PCPs include an assessment of caries risk in pediatric visits, few pediatricians are doing so (Lewis, Johnston, Linsenmeyer, Williams, & Mouradian, 2007).

No data previously existed for how frequently NPs perform ECC-prevention tasks or how confident they are performing these tasks.

### Significance to Nursing

Orem's theory of nursing, referred to as Self-Care Deficit Nursing Theory (SCDNT), provides an excellent framework for this project. Based on three related theories (Theory of Self-Care, Theory of Self-Care Deficit, and Theory of Nursing Systems), SCDNT states that self-care demand exists when the patient or family members are not able to provide care for him or herself and that these demands can be met by the nurse (Orem, 1991). According to the literature, children and parents in Alaska are struggling to adequately prevent ECC creating a demand for nursing interventions that include oral health-related tasks. This project investigated the extent to which Alaska's NPs are addressing self-care deficits in regards to oral health in their pediatric patients. The results guided the development of an information kit to provide Alaska's NPs with specific information for integrating oral health preventative tasks into their pediatric practice.

### Purpose Statement and Questions

The purpose of this project was to assess the practice habits, confidence, and perceived responsibility of Alaska's NPs with regards to performing oral health-related tasks in pediatric populations as well as to investigate whether Alaska's NPs were familiar with tools currently recommended by the AAPD and AAP. "Oral health-related tasks" refer specifically to identifying teeth with dental caries, identifying plaque, informing parents on the effects of bedtime bottles, informing parents on the effects of a sugary diet, applying fluoride varnish, and assessing parents' oral health. NPs were asked if they had received education in oral health, and if they were knowledgeable of two current tools for PCPs: the caries risk assessment tool (CAT)

and the online credentialing program *Smiles for Life*. The project asked the following research questions:

1. What is the perceived responsibility of Alaska's NPs in regards to performing oral health-related tasks in pediatric populations?
2. How many of Alaska's NPs have knowledge of pediatric oral health as assessed by receipt of education and familiarity with *Smiles for Life* and the CAT?
3. How often do Alaska's NP that provide well-child care perform oral health-related tasks performed during well-child visits?
4. How do Alaska's NPs that provide well-child care rate their ability to perform oral health-related tasks?

#### Literature Review

Despite ECC being considered preventable by the AAPD, poor access to dental services in rural Alaska and poor dental care in general are considered the main contributing factors to the continued rise of the disease in Alaska (AKDHHS, 2012). One of the goals of the USDHHS *Healthy People 2020* is to improve oral health, especially among children and underserved populations (healthypeople.gov). As of 2012, 41% of Alaskan children under the age of five experienced dental caries compared to 33.3% nationwide (AKDHHS, 2012). The nationwide goal, established by USDHHS *Healthy People 2020*, is 30% (healthypeople.gov).

#### *Pathophysiology*

Formerly, ECC was referred to as “baby bottle tooth decay” or “nursing bottle rot” due to the correlation between excessive use of a bottle and an increased risk for ECC (Kawashita, Kitamura, & Saito, 2011). However, contemporary theories on the etiology of ECC list a number

of contributing factors including diet, habits, oral health care, bacterial colonization, parenting styles, psychosocial factors, and genetics (Seow, 2012).

According to Pinkham, Casamassimo, Fields, McTigue, and Nowak (2005), the formation of dental caries is a dietary carbohydrate-modified infectious disease in which saliva functions as a critical regulator. Dental caries is a preventable disease that can be stopped and even reversed in its early stages (Kawashita et al., 2011). The bacteria (*Streptococcus mutans* [MS]) that colonize the oral cavity are transmitted from person-to-person through salivary exchange. The acid produced by the bacteria decalcifies the inorganic portions of the tooth leading to loss of the mineral content which is followed by breakdown of the organic matrix (Pinkham et al., 2005). Continued demineralization results in rough, caviated surfaces thus potentiating rapid bacterial replication and subsequent growth of bacterial colonies (Kawashita et al., 2011).

The earliest clinical sign of the caries process is a white-spot lesion, which indicates damage to the underlying enamel and will result in a carious lesion unless aggressive preventative measures are initiated. As long as the surface layer is intact, remineralization may still occur (Pinkham et al., 2005). Many smaller caries can be managed non-invasively with fluoride varnishes because fluoride, which is naturally present in the saliva, adheres to the demineralized surface of the tooth and protects against acid dissolution (Pinkham et al., 2005). The future of a lesion depends on the balance between protective factors and pathologic factors, or the “caries balance” (Pinkham et al., 2005).

Dietary factors include frequent consumption of liquids containing fermentable carbohydrates, particularly through nursing bottles at sleep times. Juices, sodas, infant formula, and sweetened beverages have been implicated in ECC (Pinkham et al., 2005). When taken via

nipple-topped bottles while the infant sleeps or falls asleep, these liquids pool around the maxillary incisors and can cause rapidly progressive and severe destruction of tooth structure (Pinkham et al., 2005). Children with ECC typically have frequent and prolonged exposure to sugared beverages (Kawashita et al., 2011).

When left untreated, caries can result in pain, bacteremia, high treatment costs, reduced growth and development, speech disorders, premature tooth loss, compromised chewing, loss of self-esteem, harm to the permanent dentition, and, in rare cases, death (Lewis et al., 2007). Otto (2007) describes the case of a 12-year-old Maryland boy who died after an infection spread to his brain from an abscessed tooth. Pain associated with untreated dental disease can lead to poor eating, nutrition, sleeping, concentration, and learning (Lewis et al., 2007).

#### *The Role of Fluoride*

Starting in the 1970s, the U.S. saw a decline in dental caries due to community water fluoridation (Marinho, Higgins, Logan, & Sheiham, 2002). In 2012, 74.6% of Americans received optimal levels through community water systems (Centers for Disease Control and Prevention, 2012). Fluoridated water continues to be the most cost-efficient and cost-effective method of caries prevention (National Institute of Dental and Craniofacial Research, 2014).

In 2011, 45% of the Alaskan population received optimally fluoridated water; however, this was almost exclusively the urban population of the state (AKDHHS, 2012). Comparing rural villages showed that four- and five-year old children had an average of 2.6 times more decay in primary teeth in non-fluoridated villages when compared to fluoridated villages (AKDHHS, 2012). Fluoridating the water of rural Alaska is complicated by water systems used by remote towns and villages, many of which lack the appropriately certified operators or adequate infrastructure needed to implement fluoridation (AKDHHS, 2012). Additionally, many

communities since 2006 have voted to remove fluoride from the water including Juneau, Fairbanks, and Palmer (AKDHHS, 2012).

In the absence of fluoridated water, periodic topical fluoride varnish treatments are preventative. Varnish treatments were approved by the Food and Drug Administration in 1994 and are appropriate for infants and young children (Pinkham et al., 2005). Application of fluoride varnish can be performed by a trained PCP starting at nine months of age (AAPD, 2013). Children who receive one or more fluoride varnish treatments during their nine-, 12-, 15-, 18, and 24-month visits have a 35% reduction in ECC compared to children who receive no treatment (Holve, 2006). Fluoride varnish efficacy was further validated by the 2014 evidence-based guidelines of the AAPD (AAPD, 2014).

#### *Economics*

It is difficult to document the direct cost of ECC; however, the Medical Expenditures Panel Survey found that in 2006, 19.4% of children under the age of five had some kind of dental expenditure for a total expense of \$729 million in that year (Agency for Healthcare Research and Quality, 2009). The Texas Children's Hospital in Houston had 464 emergency room visits by children under the age of five for non-traumatic dental pain between 1997 and 2001 (Ladrillo, Hobdell, & Caviness, 2006). Treatment for ECC is expensive, especially if extensive restoration and/or general anesthesia is required. In Alaska, a single filling performed by a pediatric dentist in the office costs \$XXX and the cost increases with any complications such as needing sedation or surgical treatment in an operating room (K. Maixner, DMD, personal communication, August 15, 2014).

#### *Epidemiology*



According to the National Health and Nutrition Examination Survey (NHANES), dental decay in preschool-aged children is on the rise: 28% during the 1999-2004 NHANES, an increase from 24% in the 1988-1994 NHANES (Dye et al., 2007). Data from the 1999-2004 survey also indicates that 72% of decayed tooth surfaces remain untreated in two- to five-year-olds (Dye et al., 2007). According to the Alaska Dental Assessment of 2004, 65.1% of third graders had untreated dental caries compared to the national average of 52% (AKDHHS, 2012). Nearly half (43.5%) Alaska Native children have an untreated dental decay (AKDHHS, 2012).

Research has consistently shown that children of ethnic minorities and lower socioeconomic status are more likely to have caries than children from higher income homes (Dye et al., 2007; Vargas & Ronzio, 2006). Theories for the etiology of this disparity range from lower education levels, poor dental insurance coverage, poor access to dental care, poor oral hygiene habits, and cariogenic diets (Kawashita, Kitamura, & Toshiyuki, 2011). Alaska has a similar situation with increased rates of dental decay in racial and ethnic minorities as well as all children enrolled in Medicaid/Denali Kid Care (DKC) (AKDHHS, 2012). According to the Alaska Basic Screening Survey 2010/2011, 59.3% of kindergarteners receiving DKC experienced caries compared to 48.2% of all kindergarteners in Alaska (AKDHHS 2012).

The Indian Health Services (IHS) Oral Health Surveys of 1999 and 2010 indicated an increase in ECC among American Indian and Alaska Native children aged two to five despite improved availability of fluoridated water and increased educational counseling about caries (Sekiguchi, Guay, Brown, & Spangler, 2005). According to the 2010 IHS report, Alaska Native children between the ages of two and five had, on average, 4.8 teeth with decay (IHS, 2013). Data showed that 68.2% of Alaska Native children had received treatment for decay compared to 62.2% from 1999 (IHS, 2013 & IHS, 2003). Neither dental extraction nor extensive dental

surgery have been shown to slow the progression of caries rates in American Indian and Alaska Native children (Sekiguchi et al., 2005).

### *Treatment and Prevention*

The treatment of ECC from a pathophysiological standpoint is straight-forward: recognize white-spot lesions and provide the necessary intervention (AAPD, 2013; Kawashita et al., 2011; Pinkham et al., 2005). Additionally, applying fluoride varnishes and educating parents about the risk-factors for ECC and appropriate dental hygiene can serve to reduce demineralization of existing lesions and prevent new lesions from forming (Pinkham et al., 2005). While restoration of dental caries falls strictly within the scope of practice of a licensed dentist or dental health aide, assessment, application of fluoride, and education can be performed by a PCP (AAP, 2008; AAPD, 2013).

Educating parents on the importance of good oral health should begin in the prenatal period and continue through childhood (Kawashita et al., 2011). Because parents and caregivers are typically directly responsible for a child's diet, dental appointments, and oral hygiene habits, it is important to convince them of the importance of preventing dental caries.

Oral hygiene measures should be in place at eruption of the first tooth. AAPD recommends an initial oral health consultation six months after eruption of the first tooth and no later than 12 months of age. After eruption of the first tooth and before the age of two a "smear" of fluoride-containing toothpaste is recommended twice a day for children at high risk for ECC (AAPD, 2013). Between the ages of two and five, the amount is increased to a "pea-sized" amount (AAPD, 2013). Additional recommendations by the AAPD (2013) include: limiting dietary sucrose in both frequency and quantity; eliminating night-time feedings as soon as possible after the eruption of the first tooth; ceasing use of nipple-topped bottles after the age of

one year; never using nipple-topped bottles or “sippy” cups for sugary beverages such as juice; and improving oral hygiene in caregivers to reduce the amount of MS that may be passed on to children.

### *Oral Health in Alaska*

The Alaska Dental Action Coalition (ADAC) is a voluntary interagency partnership that formed under the cooperative agreement with Alaska from the U.S. Centers for Disease Control and Prevention, Division of Oral Health in 2002 (AKDHHS, 2012). In 2008, ADAC identified a number of barriers that rural Alaskan children face when it comes to improving oral health including little or no access to a dental provider, poor oral hygiene, and little or no access to fluoridated water or fluoride varnishes. Using this information, ADAC recommended that non-dental providers (e.g., physicians, NPs, and physician assistants) be reimbursed for fluoride varnish application in young children, that training programs are developed to enhance dental screenings and counseling by non-dental providers, and that Medicaid provides reimbursement for these services (AKDHHS, 2012).

Currently, only one in three U.S. children in the program receive any dental service within a given year (Centers for Medicare & Medicaid Services and Center for Medicaid, CHIP and Survey & Certification, 2010). While data is not available for the percentage of Medicaid/Denali Kid Care (DKC) children using dental services in Alaska, ADAC believes that this number is lower than the national average and is due, in part, to the low level of dentists participating in the Medicaid program. ADAC suggests this is due to lower reimbursement rates and concerns with missed or “no-show” appointments (AKDHHS, 2012).

In 2011, the Alaska Division of Corporations, Business, and Professional Licensing reported there were 516 Alaska dentists, most of which practice in urban areas (AKDHHS,

2012). The U.S. Health Resources and Services Administration estimates about 144,115 Alaskans living in dental shortage areas (AKDHHS, 2012). While most Alaska dentists are enrolled in the Medicaid program, in 2010 only 295 were actively seeing Medicaid patients on a regular basis; most of whom were either pediatric dentists and/or dentists employed by tribal dental programs or community health centers (AKDHHS, 2012).

DKC and some private insurance plans currently reimburse physicians, NPs, and physician assistants for up to a maximum of four topical fluoride varnish applications per calendar year (AKDHHS, 2012). Additionally, providers may perform two oral evaluations per calendar year for patients under three years of age (AKDHHS, 2012). Current Procedural Terminology codes and International Classification of Diseases codes for oral health assessments, counseling, and fluoride application by the PCP can be found in *Appendix A*. “*Smiles for Life*” is a program providing comprehensive oral health curriculum for health care providers. The curriculum was developed to enhance the role of PCPs in the promotion of oral health ([smilesforlife.org](http://smilesforlife.org)). Online continuing education courses are offered free of charge and cover a variety of oral health topics including pediatric oral assessments, fluoride application, family education, and counseling. Certification for billing DKC for oral assessments, counseling, and fluoride application in Alaska requires the completion of certain *Smiles for Life* courses (AKDHHS, 2012).

#### *The Role of the Primary Care Provider*

The workforce of dentists in the United States is inadequate to meet the needs of children and the dentist-to-population ration continues to decline (Davis, 2000). In 2000, the Surgeon General estimated that 25 million individuals reside in areas that lack adequate dental care services (USDHHS, 2000). Unfortunately, this data has not been updated according the

USDHHS website. Children almost always have access to pediatric well-child care even when they do not have access to dental care (Lewis et al., 2007). Hallas and Shelley (2009) suggest that expanding the role of the primary care medical and nursing professionals is an important strategy to address the lack of dental providers. National data from 2008 revealed that 89% of infants and one year-olds had office-based physician visits annually, compared with only 1.5% who had dental visits (AAP, 2008). Infants and one year-olds visited physicians 250 times as often as they visited dentists (AAP, 2008).

While the AAPD (2013) recommends that the first dental visit occur between the ages of six months and one year, this is unrealistic for children living in some rural areas. In 2003, the American Academy of Pediatrics (AAP) released a policy statement recommending that all PCPs incorporate a oral health assessment, education, and risk assessment into their practice beginning at the age of six months (AAP, 2003). In 2008, this was reinforced by the AAP: “Because caries is a nonclassic infectious process (arising from shifts in subpopulation ratios of established normal flora), pediatricians have an opportunity to prevent, intervene, and, in collaboration with dental colleagues, manage this disease” (AAP, 2008). Despite these recommendations, of 698 post-residency pediatricians in a nation-wide survey, only 23% reported high confidence in their ability to perform an oral health examination (Lewis et al., 2007). Nearly all the pediatricians surveyed (91%) agreed that they should be evaluating children for dental caries but only 36% reported any previous oral health training, most of which was from journal articles. Only 8% of the pediatricians surveyed were confident in their ability to apply fluoride varnish (Lewis et al., 2007).

According to Kagihara, Niederhauser, and Stark’s 2009 review of the PCP’s role in ECC prevention, it is essential that PCPs be aware of the pathophysiology and associated risk factors

for dental caries in very young patients so they can make appropriate decisions during well-child visits. Current data is lacking regarding the skill level of NPs and their comfort level with pediatric oral health. In 2006, the AAPD created the Caries Risk Assessment Tool (CAT) (*Appendix B*) for PCPs to accurately identify and minimize causative ECC factors while optimizing protective factors (Nainer & Straffon, 2006). The AAPD recommends the CAT be included in all pediatric charts. Current data does not exist on whether NPs are using this tool during well-child exams.

The literature demonstrates that ECC is a prevalent, costly, and preventable disease. Additionally, the literature suggests that PCPs, such as NPs, are in unique positions to prevent ECC by implementing oral health-related tasks in their pediatric practices.

## Methods

### *Design*

The research design for this study was a quantitative descriptive. A cross-sectional survey approach was used.

### *Instrument*

The instrument (*Appendix C*) used for data collection was a four-part questionnaire adapted from a broader survey developed and used by the American Academy of Pediatrics, (AAP, Periodic Survey #70, 2008). Permission was granted for modification and use of the survey for this project (K. O'Connor, personal communication, November 19, 2013). The AAP developed the original survey through a collaboration of topic-specific experts and survey staff in the AAP Department of Research (K. O'Connor, personal communication, February 12, 2014).

Survey modifications were made for this project by removing items that were not pertinent to this project's purpose and research questions. Two questions were added to assess knowledge of tools for pediatric oral care. Before use, the modified instrument was reviewed by a local pediatric dentist and a family NP for content validity. A panel of NP students was used to test the survey for clarity of questions. Modifications were made per recommendations by the topic experts and the panel.

The survey was two-part: the first part was to be filled out only by NPs that provide well-child care and the second was for all NPs. NPs that provide well-child care were asked how often they performed specific oral health-related tasks and how confident they felt performing the tasks. The remaining sections asked all NPs whether they believed it was the responsibility of NPs to perform oral health-related tasks, whether they had received any kind of oral health education, their knowledge of specific oral health-prevention tools, and whether their practice was primarily rural or urban. The survey can be found in its entirety in *Appendix C*.

#### *Distribution and Data Collection*

Data was collected over a six-week period. The survey (*Appendix C*) was mailed to the 816 NPs with active licenses in the State of Alaska. Included with the survey was an introduction to the study (*Appendix D*) and a return envelope addressed to a post office box owned by the primary researcher. Participants who wished to be included in a 25-dollar gift-card drawing and/or receive an information packet for ECC prevention could fill out a form with their contact information (*Appendix E*). The optional form had its own envelope to be returned separately from the survey. Of the 816 surveys that were mailed, 24 were returned as undeliverable without forwarding addresses.

#### *Rights and Protection of Human Subjects*

The project was approved by the University of Alaska Anchorage Institutional Review Board (IRB) as an expedited review. The principle investigator and chairperson were the only persons with access to the data. The survey itself did not contain any identifying information.

## Results

### *Characteristics of Respondents*

The number of usable surveys returned was 277 which represents 34% of the currently licensed advanced practice nurses in the State of Alaska. The majority (95.3%,  $n = 277$ ) provided direct patient care and of those, roughly half (45.7%,  $n = 277$ ) provided pediatric well-child care. Most providers reported their primary setting as urban (60.7%,  $n = 277$ ) while 34.7% ( $n = 277$ ) reported rural and 4.6% ( $n = 277$ ) reported both.

### *Responsibility*

Nearly all of respondents agreed that NPs are responsible for informing parents about the effects of bedtime bottles (98.5%,  $n = 265$ ) and dietary sugar (98.5%,  $n = 261$ ) on oral health. Seventy-seven percent ( $n = 261$ ) responded that NPs should be identifying caries in well-child visits. When it came to the NP's responsibility in identifying plaque and assessing parents' oral health, the answers were divided almost evenly between "yes" and "no" ( $n = 256$ ). Most respondents (72%,  $n = 246$ ) answered it was not the responsibility of the NP to apply fluoride varnish. Table 1 is a summary of the responses to questions on responsibility.



**Table 1.** *Perceived Responsibility of NPs to Perform Oral Health-Related Tasks*

Task	NP is Responsible
ID caries	77%
ID plaque	59.4%
Inform parents on effects of bedtime bottles	98.5%
Inform parents on effects of sugar	98.5%
Apply fluoride varnish	27.6%
Assess parents' oral health	50.8%

### *Education and CAT/Smiles For Life*

Most of the respondents (63.8%,  $n = 271$ ) reported they had never received education in oral health. For the 36.2% that indicated they had received education in oral health, the most frequently reported methods were “during NP school/clinical” and “continuing education.” Only 14.4% ( $n = 271$ ) of respondents reported having heard of the *Smiles for Life* program and only 9.3% ( $n = 270$ ) had heard of the CAT.

### *Performing Pediatric Oral Health-Related Tasks*

Only NPs that provide well-child visits were asked to answer question on the frequency of performing oral health-related tasks. Of the 119 respondents who performed pediatric well-child exams, the majority reported educating parents on the effects of a bedtime bottle (63%), informing parents on the effects of sugar on oral health (67.2), not identifying plaque (70.9%), not applying fluoride varnish (92.3%), and not assessing parents' oral health (75.5%) in more than 75% of well-child visits. Roughly half reported they identified caries (47%) in more than 75% of visits. Application of fluoride varnish had the lowest frequency of performance with 83.3% of participants reporting they never performed the task during well-child visits. For more details on the results of performing these tasks, see Table 2.

**Table 2.** *Performance Frequency of Oral Health Tasks in Well Child Visits by AK's NPs*

Task	Performed in less than 26% of visits ( <i>n</i> = 119)	Performed in more than 75 % of visits ( <i>n</i> = 119)
ID caries	27.7%	47%
ID plaque	51.2%	29.1%
Inform parents on effects of bedtime bottles	13.4%	63%
Inform parents on effects of sugar	9.3%	67.2%
Apply fluoride varnish	85.5%	7.7%
Assess parents' oral health	53.4%	24.5%

### *Confidence*

As with the questions on performance of tasks, only NPs who performed well-child exams were asked to answer question regarding their confidence in performing these tasks. A Likert scale asked respondents to rank their confidence. Pediatric providers were considered “confident” in performing a task if they ranked themselves as either “very good” or “excellent.” When it came to identifying dental caries, 36.6% (*n* = 123) of respondents were confident in their ability to do so and 27.1% (*n* = 122) were confident at identifying plaque. Informing parents on the effects of a bedtime bottle and dietary sugar on oral health had the highest confidence levels with 76.2% (*n* = 122) and 79.4% (*n* = 121), respectively. Only 19 respondents (*n* = 114) rated their ability to apply fluoride varnish as “very good” or “excellent” and 69.3% (*n* = 114) ranked their ability as “poor.” When it came to assessing parents’ oral health, 38.1% (*n* = 118) of respondents were confident in their ability to do so. More details can confidence levels can be found in Table 3.

**Table 3.** *Confidence Levels of Performing Oral Health-Related Tasks by NPs*

Task	Confidence “poor” or “fair” (n = 119)	Confidence “very good” or “excellent” (n = 119)
Identify caries	27.7%	36.6%
Identify plaque	43.4%	27.1%
Inform parents on effects of bedtime bottles	4.9%	76.2%
Inform parents on effects of sugar	3.3%	79.4%
Apply fluoride varnish	76.3%	16.7%
Assess parents’ oral health	33.9%	38.1%

A summation of the aforementioned results regarding responsibility, frequency of performing tasks, and confidence in performing tasks can be seen in Table 4.

**Table 4.** *Characteristics of AK’s NPs Regarding Oral Health in Well-Child Visits*

Task	Asked of all NPs (n = 277)	Asked of NPs who perform well-child exams (n = 119)	
	Believed NP should perform in well- child visit	Performed in more than 75% of well- child visits	Confident in ability to perform
Identify teeth with dental caries	77.0%	47.0%	36.6%
Identify plaque	59.4%	29.1%	27.1%
Inform parents on the effects of bedtime bottles	98.5%	63.0%	76.2%
Inform parents on oral effects of sugar	98.5%	67.2%	79.4%
Apply fluoride varnish	27.6%	7.7%	16.7%
Assess parents’ oral health	50.8%	24.5%	38.1%

## Discussion

The results of this study indicated that NPs in the State of Alaska believe oral health care-related tasks should be included in pediatric well-child care; however, the corresponding frequency of task performance and level of confidence in these tasks was low. Alaska's NPs appear to place a high importance on counseling parents about the detrimental effects of sugary diets and bedtime bottles on oral health; these areas received the highest scores in responsibility, performance frequency, and confidence levels. Identifying teeth with cavities was also considered high on the NP's responsibility list; however, only half of the pediatric NPs reported performing this task in more than 75% of well-child visits and only one third of pediatric NPs indicated they were confident with identifying cavities. Identification of plaque had lower scores across the board which is likely related to a lack of education in this specific oral health area. The task with the lowest scores in all three areas was fluoride varnish application. Interestingly, the most frequently marked response for performance was "never" and the second most frequent response was "100%" indicating that pediatric NPs fall into two categories in regards to applying fluoride varnish: either all or none. It could be that many providers are unaware that fluoride varnish is both within their scope of practice and a billable task. Interestingly, the seven respondents who stated they performed fluoride varnish in 100% of their well-child visits all believed it was the NPs responsibility to do so.

Low levels of confidence in performing certain oral health-related tasks is likely related to the low reported rates of education in oral health care. Only one third of NPs reported having ever had any education in oral health care and it was common for respondents to list some form of independent study (such as from visiting dentists or through continuing education

opportunities) as the source. Overall poor knowledge of the CAT and the credentialing program *Smiles for Life* also likely contributes to lower levels of confidence with identifying caries and plaque and the application of fluoride. It is reasonable to suggest that this in turn leads to low levels of performance of these three tasks by NPs in pediatric well-child exams.

The results of this study are similar to results from nationwide surveys of pediatricians (Lewis et al., 2009; Lewis et al., 2000) which identified high proportions of pediatricians that believe oral health assessments, preventative education, and interventions should be included in pediatric well-child care with corresponding low levels of performance and confidence.

“Although pediatricians clearly support preventative oral health, their involvement in oral health activities continues to lag their commitment” (Lewis et al., 2009, pg. 460). Results from a 2012 study on the subject by the AAP are currently pending publication (K. O’Connor, personal communication, February 4, 2014).

Lewis et al (2009) suggest that practicing pediatricians face many logistical barriers to application of fluoride, the biggest of which are education and reimbursement. Since then, many states have started reimbursing PCPs for oral health assessments and fluoride varnish application, including Alaska. According to a spokesman from AKDHHS, under preventative provisions of the Affordable Care Act, oral assessments and application of fluoride varnish by a PCP should be covered by private insurance companies although current data on whether this is occurring in Alaska does not exist (B. Whistler, personal communication, August 15<sup>th</sup>, 2014). The AKDHHS is currently working to expand PCP-reimbursement for oral health-related tasks (B. Whistler, personal communication, August 15<sup>th</sup>, 2014).

The questions regarding an NP’s responsibility towards the oral health care of their pediatric population are part of an important nationwide debate on the advanced practice nurse’s

scope of practice. The State of Alaska's Board of Nursing does not currently mandate the performance of an oral health exam and/or the application of fluoride varnish with well-child exams. Despite pediatric oral health being paramount to overall health both in the short-term and the long-term and the continuing rise of ECC in Alaska, it appears that many NPs in Alaska still believe the assessment of dentition, the application of fluoride varnish, and performance of a comprehensive oral health risk-assessments is not their responsibility. The AAPD has historically pushed for these tasks to be strictly within the realm of a skilled dental provider. However, the persistent high prevalence rate of ECC nationwide has lead to collaboration between the AAPD, the AAP, and the U.S. Preventative Services Task Force (USPSTF) to educate and encourage PCPs to include oral health assessments and fluoride varnish as part of routine well-child exams. These regulatory bodies recommend that all PCPs increase their knowledge and henceforth performance of these tasks (AAP, 2008; AAPD, 2013; Chou, Cantor, Zakher, Mitchell, & Pappas, 2013).

The results of this study indicated that NPs in the State of Alaska have strong feelings of responsibility towards the oral health of our pediatric populations. However, the implementation of oral health assessments and interventions in primary practice does not match these sentiments. The abysmal level of education in oral health that NPs in Alaska report receiving is likely the source of the reported low levels of confidence in performing oral health assessments and interventions.

#### Limitations

The sample used for this study was a convenience sample of NPs who responded to the survey. It is possible that those providers who were interested in the topic of oral health care and/or education were more likely to respond to the survey thereby making the results less

representative of NPs as a whole. Further, some providers may not have updated their address with the Alaska State Board of Nursing which would result in surveys being lost or not reaching their intended participants. Finally, the instrument used should have psychometric testing to improve validity and reliability.

#### Conclusion/Recommendations

Due to the continued rise in ECC and the nationwide decline in dentist to patient ratios, especially in rural areas such as those found throughout Alaska, the USDHHS has turned its focus towards PCPs such as physicians, nurse practitioners, and physicians assistants to help fight this disease. The agency is imploring PCPs to implement oral health assessments, prevention, and interventions into routine well-child care. In addition, data has shown that the pediatric patients visit their PCP far more frequently than the dentist. Therefore, it is critical that PCPs be knowledgeable about ECC and how to perform oral health-related tasks to prevent the disease. Based on the results of this project, recommendations to improve oral health care in pediatric well-child visits by NPs in Alaska include:

1. Increasing education on oral health in NP schooling.
2. Adding clinical hours with a local pediatric dentist for NP students during their pediatric rotations.
3. Encouraging all NPs to complete oral health continuing education such as the online program by *Smiles for Life*.
4. Sending informational packets to interested providers on performing a caries risk assessment, counseling parents, applying fluoride varnish, continuing education opportunities, and billing codes.

5. Lobbying for increased reimbursement by private insurance companies and by every state's Medicaid program for oral health assessments and fluoride varnishes performed by PCPs.

6. Inviting dentists to present at conferences and working to collaborate with local dental chapters.

One hundred and twenty-four participants requested an information kit on preventing ECC in primary care. Based on the results of the study, the perceived needs of AK's NPs are an introduction to the CAT and its use, application of fluoride varnish, and resources for continuing education and credentialing. A trifold brochure was developed to address these needs and contained CATs for various ages (*Appendix B*), instructions on their use, billing codes for oral health assessments and fluoride varnish application, internet addresses to the website *Smile for Life* for credentialing and oral health education, internet addresses for current practice guidelines, and an outline on fluoride varnish application. The brochure can be found in *Appendix F*.

According to the American Association of Nurse Practitioners (AANP), "the role of the NP continues to evolve in response to changing societal and health care needs. As leaders in primary and acute health care, NPs combine the roles of providers, mentors, educators, researchers and administrators" (AANP, 2014). The recommendations by the USDHHS to improve oral health in pediatric populations include implementing oral health core competencies in providers' education and developing an infrastructure for oral health in primary care practice. The AAP has been pushing for improvement of oral health education for family practice physicians and pediatricians since 2003. NPs, especially those in Alaska with our "frontier spirit" and valued independence, are the perfect group of PCPs to champion the advancement of oral health care in our pediatric populations and set an example for PCPs nationwide.



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## Appendix A: CPT Codes and ICD-9 Codes for Oral Health Tasks by the PCP

From AKDHHS, Alaska Medical Assistance Provider Billing Manual (2013)

CPT Code	ICD-9-CM Code
<p><b>D0120</b> Periodic oral evaluation</p> <p><b>D0145</b> Oral evaluation for patient under three and counseling with primary caregiver</p> <p><b>99420</b> Oral health risk assessment</p> <p><b>D9999</b> Unspecified adjunctive dental procedure</p>	<p><b>V20.2</b> Routine infant or child health check (over 28 days old)</p>
<p><b>99429</b> Unlisted preventative medicine service</p> <p><b>D1206</b> Fluoride varnish application</p>	<p><b>V07.31</b> Prophylactic fluoride varnish application</p> <p><b>V07.8</b> Other specified prophylactic measure (eg, sealant application)</p>

Appendix B: Example of a Caries Risk Assessment Tool (CAT)

Caries-risk Indicators	Low Risk	Moderate Risk	High Risk
Clinical conditions	<ul style="list-style-type: none"> <li>■ No carious teeth in past 24 mos.</li> <li>■ No enamel demineralization</li> <li>■ No visible plaque; no gingivitis</li> </ul>	<ul style="list-style-type: none"> <li>■ Carious teeth in past 24 mos.</li> <li>■ 1 area of enamel demineralization</li> <li>■ Gingivitis</li> </ul>	<ul style="list-style-type: none"> <li>■ Carious teeth in past 12 mos.</li> <li>■ More than 1 area enamel demineralization (enamel caries “white-spot lesion”)</li> <li>■ Visible plaque on anterior (front) teeth</li> <li>■ Radiographic enamel caries</li> <li>■ High titers of mutans Streptococci</li> <li>■ Wearing dental or orthodontic appliances</li> <li>■ Enamel hypoplasia</li> </ul>
Environmental characteristics	<ul style="list-style-type: none"> <li>■ Optimal systemic and topical fluoride exposure</li> <li>■ Consumption of simple sugars or foods strongly associated with caries initiation primarily at meal times.</li> <li>■ High caregiver socioeconomic status</li> <li>■ Regular use of dental care in an established dental home</li> </ul>	<ul style="list-style-type: none"> <li>■ Suboptimal systemic fluoride exposure with optimal topical exposure</li> <li>■ Occasional (i.e., 1-2) between-meal exposures to simple sugars or foods strongly associated with caries</li> <li>■ Midlevel caregiver socioeconomic status (i.e. eligible for school lunch program or SCHIP)</li> <li>■ Irregular use of dental services</li> </ul>	<ul style="list-style-type: none"> <li>■ Suboptimal topical fluoride exposure</li> <li>■ Frequent (i.e., 3 or more) between meal exposures to simple sugars or foods strongly associated with caries.</li> <li>■ Low-level caregiver socioeconomic status (i.e., eligible for Medicaid)</li> <li>■ No usual source of dental care</li> <li>■ Active caries present in the mother</li> </ul>
General health conditions			<ul style="list-style-type: none"> <li>■ Children with special health care needs</li> <li>■ Conditions impairing saliva composition / flow</li> </ul>

<http://shapingthefutureofdentistry.org/programs-systems/>



Appendix C: Survey

1. Do you provide direct patient care?                      Yes              No -Please go to question 5

2. Do you provide health supervision for pediatric populations (ie, preventative or well-child care)?

Yes              No - Please go to question 5

3. During health supervision visits with patients under 3 years old, how often do you perform the following assessments/tasks at least once? *Mark one response for each item*

<b>For patients birth - 3 years:</b>	<b>0%</b>	<b>1-25%</b>	<b>26-50%</b>	<b>51-75%</b>	<b>76-99%</b>	<b>100%</b>
Identify teeth with dental caries						
Identify plaque						
Inform parents on the oral health effects of putting their child to bed with a bottle						
Inform patients and parents on the oral health effects of sugary food and drink						
Apply (or have staff apply) fluoride varnish						

<b>For patients birth - 3 years:</b>	<b>0%</b>	<b>1-25%</b>	<b>26-50%</b>	<b>51-75%</b>	<b>76-99%</b>	<b>100%</b>
Assess parents' oral health						

4. How would you rate your ability to perform the following? *Mark one response for each item*

<b>For patients birth - 3 years</b>	<b>Poor</b>	<b>Fair</b>	<b>Good</b>	<b>Very Good</b>	<b>Excellent</b>
Identify teeth with dental caries					
Identify plaque					
Inform parents on the oral health effects of putting their child to bed with a bottle					
Inform parents on the oral health effects of sugary food and drink					
Apply (or have staff apply) fluoride varnish					
Assess parents' oral health					

5. During pediatric health supervision visits, do you believe NPs should:

<b>For patients birth - 3 years</b>	<b>Yes</b>	<b>No</b>
Identify teeth with dental caries		
Identify plaque		
Inform parents on the oral health effects of putting their child to bed with a bottle		
Inform parents on the oral health effects of sugary food and drink		

For patients birth - 3 years	Yes	No
Apply (or have staff apply) fluoride varnish		
Assess parents' oral health		

6. Are you familiar with the AAPs *Smiles for Life* program?      Yes    or    No

7. Are you familiar with the AAPD's *Caries Risk Assessment Tool*? Yes or No

8. Have you had training in oral health care? Yes or No

If Yes, please circle all that apply

During NP school/clinicals    Continuing education    Workshops/seminars/lectures/conferences

Journal articles    Guidelines    CDs, videotapes, textbooks, or other self-instructional material

Other: \_\_\_\_\_

9. Would you consider your primary practice site to be *urban* or *rural*?

Thank you for your time and input!

#### Appendix D: Provider Letter and Consent Statement

Dear Provider,

You are being asked to participate in a graduate-level research project on the role of the nurse practitioner in early childhood caries prevention. By completing and returning the attached survey (in the provided self-addressed and stamped envelope), you will be helping to answer important questions about this disease. Even if you do not currently provide direct pediatric primary care, your responses are extremely valuable. You are being asked to take part in this research study because you are licensed as an Advanced Practice Nurse with the State of Alaska Board of Nursing. Please read this letter carefully before agreeing to take part in this study.

**What the study is about:** The purpose of this study is to describe the practice habits, confidence, and perceived responsibility of NPs in Alaska in regards to oral health care in pediatric populations.

**What is asked of you:** If you agree to be in this study please complete the enclosed survey and return it in the provided envelope. If you complete and return the survey, your consent will be implied.

**Risks:** There is the risk that you may find some of the questions about your job conditions to be sensitive.

**Benefits:** The information gathered will be used to develop an informational packet specific to the needs of Alaska's NPs. You may receive this packet free of charge.

**Compensation:** Respondents will be entered in a drawing for a \$25 gift card to Alaska Mountaineering and Hiking.

**Your answers will be confidential.** The records of this study will be kept private. The survey does not contain any directly identifying information. Research records will be kept in a locked file for three years and only the researchers will have access to the records.

**Taking part is voluntary:** Participation in this study is completely voluntary. You may skip any questions that you do not want to answer. If you decide to participate, you are free to withdraw at any time. Entry in the gift-card drawing and/or receipt of an informational packet are not contingent on survey completion.

**If you have questions:** The primary researcher for this study is Margaret Maixner, BSN, FNP-S. The research is being conducted under the supervision of Dr. Naomi Torrance. If you have any questions, you may contact Margaret Maixner at [mlmaixner@alaska.uaa.edu](mailto:mlmaixner@alaska.uaa.edu) or (919) 452-1650. You can reach Dr. Torrance at [nctorrance@uaa.alaska.edu](mailto:nctorrance@uaa.alaska.edu) or (907) 786-6375. If you have any

questions or concerns regarding your rights as a subject in this study, you may contact the Institutional Review Board (IRB) at (907) 786-1099 or email [uaa\\_ric@uaa.alaska.edu](mailto:uaa_ric@uaa.alaska.edu).

**Statement of Consent:** By completing and returning this survey, you are consenting to participate in this study and to have your answers recorded and reported.

#### Appendix E: Optional Contact Form

Four gift cards to Alaska Mountaineering and Hiking in Anchorage will be awarded to interested respondents. If you would like a chance to win, please fill out this page and return it separately from your survey in one of the included envelopes. This information will not be used to identify your survey answers. This contact information will also be used to send out information packets on early childhood caries. You are not required to complete a survey to be entered in the drawing and/or to receive an information packet.

Name

Address

Email

Are you interest in receiving educational materials on early childhood caries prevention? *Yes!*

Appendix F: Information Packet Outline

Please see attached