THE ROLE OF THE PRIMARY CARE PROVIDER IN THE ORAL HEALTH OF PEDIATRIC PATIENTS

By

RACHAEL LIEN YEOMAN

A project submitted in partial fulfillment of
The requirements for the degree of:

MASTER OF NURSING

WASHINGTON STATE UNIVERSITY
College of Nursing

May 2011
To the Faculty of Washington State University:

The members of the Committee appointed to examine the project of RACHAEL LIEN YEOMAN find it satisfactory and recommend that it be accepted.

Renee Hoeksel, R.N., M.S., Ph.D., Chair

Dawn Rondeau, R.N., M.S., D.N.P., A.C.N.P.-C.S.

Melody Rasmor, R.N., M.S., A.R.N.P., F.N.P.
ACKNOWLEDGEMENTS

To the people who made this paper and degree possible:

First, to my amazing and loving husband who has provided me with endless support and encouragement. I never would have made it through this program without your continuous love, patience, and understanding. When I was eager to put this dream on the back burner you never hesitated to push me forward and remind me why I chose this path. Thank you for believing in me and loving me unconditionally. To my mother, Lien Dretke, who has served as an inspiration and mentor. You are an incredible family nurse practitioner and I am excited to share this career with you. And, lastly, to my committee members, who have so graciously provided me with your valuable time and effort. Thank you for your continued support through both a stressful and important process that has allowed me to complete a project that not only satisfies my degree but also fulfills a personal ambition of mine.
THE ROLE OF THE PRIMARY CARE PROVIDER IN THE ORAL HEALTH OF
PEDIATRIC PATIENTS

Abstract

by Rachael Lien Yeoman
Washington State University
Spring 2011

Chair: Renee Hoeksel

Oral health in the pediatric population is a significant concern in the medical community. Dental
caries is the most common chronic childhood disease and the most preventable. While this
integral part of children’s health is assumed to be the responsibility of the specialty of dentistry,
more times than not the child will make his or her first contact with the healthcare system
through interaction with a primary care provider. This creates the need for nurse practitioners to
work collaboratively with dental colleagues to perform thorough oral assessments and provide
the necessary education to prevent oral disease. Practicing preventative medicine and
intervening when necessary is vital to reduce the significance of poor oral health in this
population. This article examines the role of the primary care provider in assessing, screening
and referring children for dental related health conditions and reviews the current guidelines and
implications for practice.
TABLE OF CONTENTS

Acknowledgements ........................................................................................................... iii
Abstract ............................................................................................................................... iv
Introduction ......................................................................................................................... 1
Scope and Significance ......................................................................................................... 1
Pathophysiology ................................................................................................................... 3
Associated Syndromes ......................................................................................................... 4
  Tooth decay ....................................................................................................................... 4
  Infection ........................................................................................................................... 5
  Nutrition .......................................................................................................................... 6
  Reduced development and self-esteem .......................................................................... 6
  Socioeconomic factors ..................................................................................................... 7
  Children with Special Needs ............................................................................................ 7
Review of Current Practice Guidelines ............................................................................... 8
  American Academy of Pediatrics ..................................................................................... 8
  American Academy of Pediatric Dentistry ........................................................................ 10
Implications for Nurse Practitioners .................................................................................. 10
  Interview and Risk Assessment ....................................................................................... 10
  Oral Examination .......................................................................................................... 13
  Oral Hygiene ................................................................................................................... 14
  Dietary Counseling ......................................................................................................... 15
  Use of Fluoride ............................................................................................................... 15
The Role of the Primary Care Provider in the Assessment of Pediatric Oral Health

A Review of the Literature

Dental caries is a chronic disease affecting children five times more frequently than asthma and seven times more commonly than hay fever. This disease has permeated to impact the oral health-related quality of life of children and their families. Through a combination of preventative measures and proper intervention, dental caries is an entirely avoidable condition. However, if left untreated the consequences of this disease are severe. The role of the primary care provider is critical in the promotion of health including oral health, particularly given that they are more frequently and easily accessed when compared to a dentist. Nonetheless there is much confusion regarding the role of the health care provider in the assessment of oral health and misunderstanding of education, intervention, and the referral process persists.

Scope and Significance

The Surgeon General released a report in the year 2000 declaring a “silent epidemic” of dental and oral disease. The report summoned the support and help of all health care practitioners to improve the oral health of Americans. Three years later the U.S. Department of Health and Human Services released a “National Call to Action to Promote Oral Health”, further emphasizing the urgent need for the medical community to work collectively to facilitate better oral health in Americans.

It is a frequent misconception that oral health is separate from overall health. Individuals are much more likely to seek health care for a common cold than they would a toothache. Poor oral health can have a profound affect on the development of a child and lead to devastating serious infection, gum disease, loss of teeth, increased risk of co-morbidities, impaired speech
development, low self-esteem, developmental problems, and failure to thrive.\textsuperscript{2,3,5,16,19} The Center for Disease Control recently published a report demonstrating a trend of increased incidence of tooth decay in children between two and five years old.\textsuperscript{12} The report showed that decay increased from 24 to 28 percent between 1988-1994 and 1999-2004. Dental caries is the most chronic disease affecting children in the United States.\textsuperscript{2,3,13,14}

Cruz et al. indicates that 75\% of children between 3 and 4 years of age have not made the recommended number of dental visits, whereas only 19\% have not met the equivalent recommendation for well-child visits.\textsuperscript{12} This disparity has presented an opportunity for primary care providers to assist in providing key screenings and referrals for children's dental care.

What is the role of the primary care provider in the oral health of children? A 2001 report indicated that nurse practitioners did not believe that oral health screening was within their scope of practice and only 35\% were able to correctly identify oral disease risk factors.\textsuperscript{18} Another study completed in 2000 involving 862 pediatricians revealed that 90\% of respondents had an important role in the education regarding oral health and the provision of appropriate screening.\textsuperscript{14} Similarities from respondents in these research endeavors illustrated that lack of education regarding oral health was the most significant barrier.\textsuperscript{2,3,13,16}

Despite this lack of education in the past, it is clear that primary care providers are in an excellent position to complete the appropriate education and intervention that will improve the pediatric patient's quality of life. Oral health is not cosmetic and for only appearance sake, it is vital to overall health and must be treated so by primary care providers.

Pathophysiology

Tooth eruption usually begins at around the age of 6 months.\textsuperscript{24,43} The majority of children will have a full set of teeth, called primary teeth, by the age of three.\textsuperscript{24,43} Permanent
teeth appear after the age of five or six years once the primary teeth have shed. Parents must understand the importance of the primary teeth, even though they are temporary. A common misconception is that because these teeth are considered “baby teeth” they do not need proper oral care. Infection of the primary teeth can significantly interfere with the development of the permanent teeth (ADA) and is also a risk factor for future tooth decay.\textsuperscript{13,20}

Early childhood caries is defined by Kagihara et al. as the presence of one or more decayed, missing or filled tooth surfaces in any primary tooth in a child less than 72 months old.\textsuperscript{13} The disease is the result of the interaction between oral flora and dietary carbohydrates on the tooth surface. A driving cause of the development of caries is significant sugar intake.\textsuperscript{1} The high sugar diet provides the ideal environment for cariogenic organisms to thrive.\textsuperscript{13}

Plaque is the end product of bacteria, acid, food debris, and saliva in the mouth. It is deposited as a thick sticky layer most predominately found on the back molars and edges of the gum line that eventually mineralizes to tarter.\textsuperscript{7,23,28} Bacteria begins to flourish about 20 minutes after eating and begins the process of tooth decay if not removed via brushing.\textsuperscript{7} The conditions of gingivitis and periodontitis also stem from the prolonged presence of plaque and tarter.\textsuperscript{19,23} The pH of the dental plaque is reduced which leads to demineralization of the enamel.\textsuperscript{2,13} The body’s natural defense is to remineralize but can only sustain this for a temporary period of time.\textsuperscript{23} There is a continuous process of demineralization and remineralization that eventually leads to a dental cavity once the progression has caused a distinct cavity in the tooth structure.\textsuperscript{22} Once this occurs the patient is at increased risk for the development of a tooth abscess, septicemia, permanent tooth loss, heart damage, and even death.\textsuperscript{7,15,17}
Associated Syndromes

Tooth decay

The development of tooth caries is complicated and multi-factorial. Normal flora of the mouth consists of billions of bacteria present as early as at birth. The relationship between the normal flora with the teeth and the substrate of the oral cavity creates the environment in which tooth decay can form. It’s the interaction of these individual factors that predispose a person to the development of decay. Cariogenic potential is minimal without the presence of Streptococcus mutans and Streptococcus sobrinus. These specific bacteria have been identified as the microorganisms that contribute to dental caries and can be transmitted to a child via the mother or primary care provider. The sharing of utensils or any behavior that allows a child to come into direct oral contact with an adult’s saliva increases the risk of the spread of these bacteria. The first two years of life provides the greatest risk of infectivity with these harmful organisms.

Risk factors for dental caries include feeding habits, access to fluoride or fluoridated water, special healthcare needs, lack of knowledge, socioeconomic status, and lack of access to dental care. Identification of these high risk factors require immediate intervention of the primary care provider to educate about preventative practices to stop the caries process as well as refer to a dental home if possible. Early intervention promotes a better outcome and decreases the child’s risk of requiring costly medical care in the future.

A non-cavitated lesion appears opaque and white in color and can affect both the crown and root of the tooth. Signs of breakdown in the enamel appear along the gum line and may feel soft if palpated with an instrument. There are no physical symptoms that a child may
complain of during this time, which contributes to the unlikelihood that a provider would intervene.

Discoloration of the enamel and deterioration of the tooth is not obvious until the later stages of decay.24 It is at this point that a child may complain of pain and/or physical symptoms may be noticeable such as swelling, redness, and irritation of the gum line.25 It is also at this time that the patient is at greatest risk of infection.25

**Infection**

Gingivitis and periodontitis are the most common infections associated with poor oral health.25 Plaque accumulation leads to irritation of the gum line which can lead to redness, bleeding, and swelling.33,43 Pain is not a symptom therefore the gingivitis usually goes unnoticed.24 Improved oral hygiene and professional attention can easily treat the condition, however, if medical treatment is not obtained, gingivitis progresses to periodontitis, a more serious oral infection.26

Periodontitis occurs when the infection is no longer contained in gum line and invades the ligaments and bones of the teeth.17,26,43 Infectious pockets are created permitting the infected tooth to become loose and possibly expel itself.43 Upon examination, the gum line appears soft, swollen, and red.24,25,43 Pockets may be present at the base of the teeth as well as evidence of plaque deposits.26 The patient may complain of tenderness along the gum line but unless the infection has progressed to an abscess, symptoms are mild.17,26 Periodontitis further exposes the patient to the risk of the development of a tooth abscess or osteomyelitis.26 The treatment regimen consists of reducing inflammation, eliminating infectious pockets, and addressing the underlying causes.26 Referral to a dentist is necessary to receive professional cleaning and attention.1,2,17
Nutritional impact

An individuals’ nutritional intake is one of the most significant factors to impact the development of dental caries.\textsuperscript{1,13} Studies have shown that nutritional habits are established early and likely to continue through early childhood, therefore maintaining high-risk dietary practices only further increases the probability that the child will have oral health complications in the future.\textsuperscript{1,13,20,37} Dietary counseling is a fundamental step in the promotion of oral health. The consumption of sucrose has profound effects on the tooth if proper oral hygiene is not maintained.\textsuperscript{1,24,28,37} Carbohydrates produce acid which breakdowns the enamel of the tooth increasing the risk of dental caries formation. This risk depends on the frequency in which sugar is eaten and how long it remains in the mouth.\textsuperscript{1} Frequent snacking, prolonged bottle use, intake of juice and sugary drinks, and the ingestion of fermentable carbohydrates are factors that should be addressed when providing dietary counseling.\textsuperscript{1,27,28,37} Breast milk alone does not contribute to the development of caries, however if breast milk is alternated with another sugar source such a formula, the risk of dental caries actually increases.\textsuperscript{24,29,30}

Reduced development and self-esteem

The presence of oral disease can have a profound effect on a child’s development, social aptitude, and self-esteem.\textsuperscript{3,24} Research studies estimate that an annual loss of 52 million hours of school occurs due to dental problems in school-aged children.\textsuperscript{17,24} Oral pain interferes with the child’s ability to concentrate, complete schoolwork, and participate in activities.\textsuperscript{24} A child suffering from pain is less likely to perform as well on a test compared to his peers.\textsuperscript{24}

A child’s willingness to smile, insecurity about appearance, and limited interaction with other children were all consequences of severe dental caries according to a study completed by
Feitosa et al. 31 Delay in language development, sleep disturbance, and changes in eating patterns were also related to poor oral health.24,31

Socioeconomic factors

The literature reviewed strongly supports the indication that the prevalence of poor oral health is directly associated with low socioeconomic status. According to the Surgeon General, one out of four children in America is born into poverty and this population has twice as many dental caries compared to their more affluent peers.4 Furthermore their dental problems most likely will never be treated.4,12 At ages 2-4 years, caries rates of poor children are 34.1% vs. 14.5% for children above 200% the poverty level; ages 6-11 years, 28.3 vs 16.3%; and ages 12-19 years, 65.6% vs 54%.2 Access to dental care is greatly dependent on the ownership of medical insurance.4 Even with the aid of public insurance, only 1 out of every 5 children actually uses the dental services provided by Medicaid.12

Ethnicity has also shown to be a predictor of the presence of dental caries.2,12,14,15 According to the CDC Non-Hispanic Blacks, Hispanics, American Indians, and Alaska Natives have highest caries incidence rates and the poorest oral health of any racial group in the United States.32 The greatest ethnic disparity in children is observed in Non-Hispanic Blacks and Mexican Americans.24

Children with Special Needs

Children with special health needs are considered to be a population at highest risk for developing oral disease and complications.2,33 Oral health is the number one unmet need for children in this group.24,35 Down Syndrome, autism, congenital heart defect, and cerebral palsy are conditions that pose a significant barrier to maintaining good oral health.2,34 Oral care is
difficult to sustain due to numerous factors including physical limitations, difficulty with brushing and flossing, reduced saliva flow, medications, and restricted diets.\textsuperscript{33}

Emphasis on preventative practices and early referral to a dental home are essential when working with this population. Providers must take the initiative to stress the importance of oral health since compared to the child’s chronic conditions, oral health tends to be the last priority.\textsuperscript{24} Children with special needs are at an increased risk for developing conditions systemic complications if oral conditions are left untreated, especially those with congenital heart defects.\textsuperscript{12,24}

Review of Current Guidelines

\textit{American Academy of Pediatrics}

The American Academy of Pediatrics (AAP) introduced the Oral Health Initiative in 2001 in response to the Surgeon General Report on the State of Oral Health in America. The establishment of this program has united multiple organizations including the American Academy of Pediatric Dentistry, Maternal and Child Health Bureau, Centers for Disease Control and Prevention, and several others to acknowledge the importance of oral health.\textsuperscript{39} The initiative develops educational programs and provides information to primary care practitioners on oral health issues.\textsuperscript{24} The project is overseen by a 12-member group of pediatricians and pediatric dentists who have created several guidelines in reference to pediatric oral health.\textsuperscript{39}

The AAP endorses the assistance of all pediatric primary care providers to assess oral health and considers it the responsibility of these providers to be competent in diagnosing early dental caries as well as risk factors and providing the necessary education to prevent this condition.\textsuperscript{36,37} The guidelines established by the AAP include:
Establishment of a dental home

A dental home is equivalent to the term “medical home” used by the AAP. The AAP defines the medical home, as “the medical care of infants, children, and adolescents ideally should be accessible, continuous, comprehensive, family centered, coordinated compassionate, and culturally effective. It should be delivered or directed by well-trained physicians who provide primary care and help to manage and facilitate essentially all aspects of pediatric care.” The dental home is a fairly new term and one that is being adopted to reference a dental facility in which a child would receive his or her oral care. It is recommended that this home be established 6 months after the first tooth erupts or by 12 months of age.

Oral health risk assessment and identification of high-risk patients

The AAP recommends that a pediatric health care professional perform an oral health risk assessment on patients starting at the age of 6 months. The tool recommended is called the “Caries Risk Assessment Tool,” also known as “CAT,” created by the American Academy of Pediatric Dentistry. It evaluates a patient’s risk using the categories of clinical conditions, environmental characteristics, and general health conditions.

In addition to this assessment tool, questions should be directed to the parent about dietary practices, oral hygiene, utilization of dental care, and fluoride exposure to determine the child’s risk of the development of dental caries. If the child is deemed high-risk, immediate referral to a dental home should follow. Because the CAT is not able to identify all those at risk, the AAP identifies specific high-risk criteria that require special attention and prompt referral to a dental home. This includes children with special needs, children of mothers with a high caries rate, children with demonstrable caries, plaque, demineralization, and/or staining; children who sleep with a bottle or breastfeed throughout the night, later order offspring, and children of
families of low socioeconomic status.  

*Anticipatory guidance and parent and patient education*

The AAP has determined key preventative practices that should be discussed with the parent or caregiver during a well child visit. Dietary counseling, fluoride exposure, oral hygiene, counseling regarding nonnutritive oral habits, and dental injury prevention are recommended topics of discussion.  

*The American Academy of Pediatric Dentistry*

The American Academy of Pediatrics Dentistry (AAPD) provides similar oral health guidelines to the American Academy of Pediatrics. The AAPD recognizes the importance of including pediatric health care practitioners in the movement aimed to decrease the incidence of dental caries and oral conditions. This organization recommends practice guidelines to achieve this goal. These guidelines address the significance of parent/child education in oral health, anticipatory guidance, risk assessment by 6 months of age, use of fluoride, and the establishment of a dental home by at least 6 months after the eruption of the first tooth.  

**Implications for Nurse Practitioners**

*Interview and Risk Assessment*

To help determine the child’s risk of the development of oral health problems it is important that the provider first obtain the oral health history of the mother or guardian. Research has shown a strong correlation between the caregiver’s oral health and the child’s risk of dental caries. Straightforward questions establishing whether or not the caregiver receives professional oral care, history of cavities, and previous dental work are sufficient to assist in the risk assessment of the pediatric patient.
The next piece of the interview should focus on the patient’s oral history. Some example questions include the following: 1, 24, 36, 42

- How often do you brush your child’s teeth? Do you allow your child to brush independently?
- Do you have access to fluoridated water? Do you use fluoridated toothpaste?
- Has your child had any dental problems?
- Do you have any concerns about your child’s oral health?
- Does your child still use a bottle? How often? Does your child take the bottle to bed for naptime and at night?
- What is your child’s diet like? What kinds of foods does he/she frequently eat? What are his/her favorite snack foods?
- Does your child use a pacifier or suck his/her thumb?
- Has your child seen a dentist?

Obtaining this information does not have to be extensive and can easily be incorporated in a well child exam.

The Caries Assessment Tool (CAT) is used by both the AAP and AAPD to determine caries risk in the patient.13, 24, 43 The CAT is divided into three categories; low risk, moderate risk, and high risk. Each category has a list of risk factors. The child’s risk is determined by the highest risk category where a risk indicator exists.41 Use of the assessment tool requires the provider to be familiar with the clinical presentation of caries and how these specific risk indicators relate to caries development.13, 41
Caries Assessment Tool (CAT):

<table>
<thead>
<tr>
<th>Caries-risk Indicators</th>
<th>Low risk</th>
<th>Moderate risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Clinical conditions</strong></td>
<td>□ No carious teeth in past 24 mos.</td>
<td>□ Carious teeth in past 24 mos.</td>
<td>□ Carious teeth in past 12 mos.</td>
</tr>
<tr>
<td></td>
<td>□ No enamel demineralization</td>
<td>□ 1 area of enamel demineralization</td>
<td>□ More than 1 area enamel</td>
</tr>
<tr>
<td></td>
<td>□ No visible plaque; no gingivitis</td>
<td>□ Gingivitis</td>
<td>□ Demineralization (enamel caries &quot;white-spot lesion&quot;)</td>
</tr>
<tr>
<td><strong>Environmental characteristics</strong></td>
<td>□ Optimal systemic and topical fluoride exposure</td>
<td>□ Suboptimal systemic fluoride exposure with optimal topical exposure</td>
<td>□ Suboptimal topical fluoride exposure</td>
</tr>
<tr>
<td></td>
<td>□ Consumption of simple sugars or foods strongly associated with caries initiation primarily at meal times.</td>
<td>□ Occasional (ie, 1-2) between-meal exposures to simple sugars or foods strongly associated with caries</td>
<td>□ Frequent (ie, 3 or more) between-meal exposures to simple sugars or foods strongly associated with caries</td>
</tr>
<tr>
<td></td>
<td>□ High caregiver socioeconomic status</td>
<td>□ Midlevel caregiver socioeconomic status (ie eligible for school lunch program or SCHIP)</td>
<td>□ Low-level caregiver socioeconomic status (ie, eligible for Medicaid)</td>
</tr>
<tr>
<td></td>
<td>□ Regular use of dental care in an established dental home</td>
<td>□ Irregular use of dental services</td>
<td>□ No usual source of dental care</td>
</tr>
<tr>
<td><strong>General health conditions</strong></td>
<td></td>
<td></td>
<td>□ Active caries present in the mother</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Children with special health care needs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>□ Conditions impairing saliva composition/flow</td>
</tr>
</tbody>
</table>

Oral Health
The interview and risk assessment component of the oral health screening is imperative and allows the provider to gain an accurate idea about the child’s risk of oral health problems. Attaining this important information allows for early intervention and referral if necessary. Preventative care via education is essential to oral health and significantly reduces the child’s dental caries risk.

**Oral examination**

The oral exam should occur as soon as the first tooth erupts, usually between 6 and 8 months. The provider can either place the child in a “knee to knee” position in which the patient’s head lies on provider’s lap and the legs rest on the caregiver or if the child is older, the child can lie in a supine position on the exam table. The provider should lift the upper and lower lip, examining the gum line and teeth for plaque, inflammation, white spots, and dental decay. A good light source is a necessity and if available, a small mirror can be very helpful. Normal findings of a pediatric oral exam include white and opaque primary teeth with smooth surfaces and grooved and pitted surfaces of the posterior teeth. Oral mucosa should be pink and clear of any signs of inflammation or bleeding. Decay appears as a dull white band along the gum line of the tooth. If this progresses, discoloration will follow and eventually lead to cavitation of the tooth. The discoloration appears brown and eventually moves downward to the chewing surface of the tooth. This is followed by complete deterioration of the tooth causing tooth loss, leaving only a stump. Early identification of the caries process requires immediate referral to a dental professional to avoid the latent stages of tooth decay and the consequences that can arise.
Oral Hygiene

Counseling patients and their families about how to maintain proper oral hygiene is one of the most obvious methods to prevent dental caries. The AAP recommends brushing a child’s teeth twice daily. Parents should be encouraged to wipe the gums with a wet washcloth of infants after feedings, even prior to tooth eruption. When tooth eruption occurs, a small toothbrush with a large handle may be used. Parents should not allow a toddler to brush his or her teeth independently to ensure proper cleaning. The use of an electric toothbrush can be beneficial because they allow the caregiver to reach difficult areas of the mouth and effectively remove plaque and debris.

Caregivers should be instructed to brush their child’s teeth twice daily. A pea-sized amount of toothpaste containing fluoride may be used starting at the age of 2 years old. It has been found that children under the age of two swallow 60 percent of the toothpaste with tooth brushing which results in the ingestion of a dangerous amount of fluoride, called fluorosis. A pea-size amount after the age of two no longer poses a risk and at the age of six, when the child can reliably spit out the toothpaste, the risk of fluorosis diminishes. Parents should also be advised that natural toothpastes often do not contain fluoride, therefore checking the ingredient list is recommended.

Flossing is also a necessary part of maintaining good oral hygiene that should be discussed with the caregiver. Flossing is advisable when two teeth touch, usually around the age of 2 years. It should occur once a day, preferably before bedtime. Parents are responsible for completing this task since children are not coordinated enough to do a sufficient job.
Dietary counseling

A patient’s caries risk is largely related to the exposure of sugar on a regular basis. Providers must take the opportunity to discuss how a high carbohydrate diet has a significant impact on a child’s oral health and the formation of dental caries. Common dietary practices that increase a child’s risk should be addressed during the well child visit.

The frequency in which a child is exposed to high carbohydrate foods is a strong predictor of the development of caries. Providers should inquire about what foods are being consumed, how frequently, and in what combination. Parents should be advised that bottles containing fruit juice, milk, formula, and powdered sweetened drinks should never go to bed with a child and if necessary, water is the only substance allowed. This not only increases the risk of tooth decay but can also increase the risk of the development of ear infections. Carbonated beverages should be avoided until after the age of 30 months.

The AAP recommends that children 1 year and younger should not be given juice and children between the ages of one and six years should only be allowed 4-6 ounces a day. After the age of six, the maximum amount recommended is 12 ounces. Foods that stick to the teeth and gums should be avoided such as gummy candies, fruit snacks, and caramel. Caregivers should be advised to never dip pacifier in sugary substances such as honey, syrup, or sugar.

Fluoride use

Fluoride is a natural occurring mineral that prevents tooth decay by promoting remineralization of the tooth enamel as well inhibiting demineralization. Because of its beneficial properties, supplementation of fluoride is a popular method of decreasing the risk of dental caries in children, however the decision to supplement must not be taken lightly due to the risk of fluorosis. Fluorosis is a condition that is caused by an excessive intake of
fluoride during tooth development. Children under the age of 6 years are at greatest risk because of enamel development while children over the age of 8 no longer pose a risk. \textsuperscript{1,24,43,44} Fluorosis causes white specks to appear on the enamel of the tooth and is irreversible.\textsuperscript{24,43} In rare cases, the condition maybe so severe that the affected teeth appear brown and pitted.\textsuperscript{24,43} The condition is considered purely cosmetic. In fact, the APA reports that fluorosis actually makes the tooth less susceptible to dental caries.\textsuperscript{24}

It has been determined that fluoride exposure is necessary starting at the age of 6 months until the age of 16 years to prevent dental caries.\textsuperscript{38,43} Sources of fluoride can be either systemic by ingesting fluoridated water, foods, toothpaste, and supplements; or applied topically by a health professional.\textsuperscript{1,24,43} The decision to supplement depends on whether or not the patient has access to an adequate source of fluoridated water.\textsuperscript{1,24,44} The CDC website provides the public with information about city fluoride content to determine if it is a sufficient amount.\textsuperscript{24,43} The most inexpensive and effective method of delivering fluoride to the public is via fluoridated water.\textsuperscript{1} The CDC and the United States Task Force on Preventative Health Care support the utilization of fluoridated water as an effective means of preventing dental caries.\textsuperscript{1,43}

If it is determined that a patient requires supplementation, a liquid or tablet form of fluoride may be prescribed. The dose is dependent on the age of the patient.\textsuperscript{24,43} Fluoride should only prescribed if the city water content of this mineral is known.\textsuperscript{24,43} The American Dental Association recommends that supplementation is only required if the patient is deemed to be a high caries risk while the United States Preventative Services Task Force recommends fluoride supplementation to all pediatric patients over the age six months if the water supply is deficient.\textsuperscript{43} It is the responsibility of the provider to consider the patient’s individual risk and make the ultimate decision of whether or not fluoride supplementation is necessary.
Topical forms of fluoride also exist and may be an alternative to the systemic route of supplementation. Toothpaste is the most recognizable form of topical fluoride and is recommended to all patients, even if the person is not considered a high caries risk. The Cochrane Collaboration found a 24 percent reduction in dental caries, missing, and filled tooth surfaces with the regular use of fluoridated toothpaste. Fluoride rinses are also available but only recommended to patient populations believed to be of high risk. These are available without a prescription and found over the counter. The Cochrane Collaboration found a 26 percent reduction in dental caries, missing, and filled tooth surfaces with the daily use of fluoride rinse.

The most potent form of topical fluoride is the application of fluoride varnish. This is done in a supervised environment and applied by a health professional. The Federal Drug Administration (FDA) considers the application of fluoride varnish to reduce the risk of dental caries an “off label” use. The FDA only permits the use as a cavity liner or root desensitizer, however, the Cochrane Collaboration found a 33 percent reduction in dental caries, missing, and filled tooth surfaces of primary teeth and a 46 percent reduction in permanent teeth with the use of fluoride varnish 2 to 4 times a year as an caries prevention measure. The AAPD and the AAP both support the application of fluoride varnish by a health professional in the primary care setting. In fact, Medicaid currently reimburses primary healthcare providers for the application of fluoride varnish in the majority of the United States. Treatment is preserved for patients deemed to be of high risk for the development of dental caries and may begin at the age of 9 months. Frequency of application ranges from 2 to 6 times a year.
Fortunately, there are several training opportunities available to practitioners on how to apply fluoride varnish. Several of the educational programs also offer providers CME’s for completion of the course which can be obtained on-line, video-streamed, or in a conference setting. Here is a list of a few organizations and their links that offer this learning opportunity:

<table>
<thead>
<tr>
<th>Organization</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Academy of Pediatrics</td>
<td><a href="http://www.aap.org/healthtopics/oralhealth.cfm">http://www.aap.org/healthtopics/oralhealth.cfm</a></td>
</tr>
<tr>
<td>Online Oral Health Assessment Training with CME Credit</td>
<td><a href="http://www.aap.org/oralhealth/cme/">http://www.aap.org/oralhealth/cme/</a></td>
</tr>
<tr>
<td>Fluoride Resources</td>
<td><a href="http://www.aap.org/commpps/doch/oOralHealth/fluoride.cfm">http://www.aap.org/commpps/doch/oOralHealth/fluoride.cfm</a></td>
</tr>
<tr>
<td>Oral Health Risk Assessment: Training for Pediatricians and Other Health Professionals endorsed by the AAP</td>
<td><a href="http://www.aap.org/oralhealth/cme/index.htm">http://www.aap.org/oralhealth/cme/index.htm</a></td>
</tr>
</tbody>
</table>

The AAP further helps the process of attaining the product by providing a list of vendors of potential suppliers of the fluoride varnish as well as the cost as shown below: 46
<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer Telephone</th>
<th>Distributor Telephone</th>
<th>Pricing*</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Solutions Fluoride Varnish</td>
<td>Denstply Professional 800-989-8826</td>
<td>Sullivan Schein Caligor Division 800-472-4346</td>
<td>Pkt 50 = $80 (Unit cost = $1.60)</td>
</tr>
<tr>
<td>0.25ml unidose</td>
<td></td>
<td>Patterson 860-257-8310</td>
<td>Pkt 50 = $88 (Unit cost = $1.76)</td>
</tr>
<tr>
<td>Cavity Shield Varnish</td>
<td>Omni International 800-445-3386</td>
<td>Patterson 860-257-8310</td>
<td>Pkt 32 = $32 (Unit cost = $1.00)</td>
</tr>
<tr>
<td>0.25ml unidose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duraflor</td>
<td>Medicom 800-361-2862</td>
<td>Sullivan Schein Caligor Division 800-472-4346</td>
<td>Pkt 32 = $43 (Unit cost = $1.35)</td>
</tr>
<tr>
<td>0.25ml unidose</td>
<td></td>
<td>Patterson 860-257-8310</td>
<td>Pkt 200 = $172 (Unit cost = $0.86)</td>
</tr>
<tr>
<td>Enamel Pro Varnish</td>
<td>Primier</td>
<td>Sullivan Schein Caligor Division 800-472-4346</td>
<td>Pkt 35 = $63 (Unit cost = $1.80)</td>
</tr>
<tr>
<td>0.25ml unidose</td>
<td></td>
<td>Patterson 860-257-8310</td>
<td>Pkt 35 = $66 (Unit cost = $1.88)</td>
</tr>
<tr>
<td>Flor-Opal Varnish</td>
<td>Ultradent Products 800-552-5512</td>
<td>Order direct from manufacturer</td>
<td>Call for price</td>
</tr>
<tr>
<td>0.25ml unidose</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vanish</td>
<td>Omni International 800-445-3386</td>
<td>Sullivan Schein Caligor Division 800-472-4346</td>
<td>Pkt 50 = $119 (Unit cost = $2.38)</td>
</tr>
<tr>
<td>0.25ml unidose</td>
<td></td>
<td>Patterson 860-257-8310</td>
<td>Pkt 50 = $118 (Unit cost = $2.36)</td>
</tr>
</tbody>
</table>

* These prices are list prices as of January 2009. Note, greater quantity order sizes may be available at a reduced cost per unit.

It is the responsibility of the provider to consider the patient’s individual risk and make the ultimate decision of whether or not fluoride therapy is necessary. The balance between the risk of the harmful consequences of tooth decay and the risk of fluorosis must be evaluated and given thoughtful deliberation.
Anticipatory Guidance

The term anticipatory guidance refers to the practice of counseling parents about children's health and developmental milestones. It encourages the healthcare professional to form a personal and trusting relationship with patients and their families to promote health and prevent disease. The topic of oral health is no exception as anticipatory guidance should be a continuous issue addressed during each well child visit. Oral hygiene, dietary counseling, fluoride use, establishment of a dental home, nonnutritive habits, and safety are all recommended topics of discussion to encourage optimal oral health. Anticipatory guidance is an important tool because it focuses on prevention rather than treatment of dental caries and its complications.

Implications for Research

There have been numerous research studies that examine existing barriers to the effective identification, treatment, and referral of pediatric dental caries in the primary care setting. Such studies have demonstrated a positive correlation between a lack of oral health training and a low frequency of oral health screenings. Those same studies also show that additional training can be effective in increasing the frequency of such screenings. However, there has been limited research conducted to verify the subsequent impact on pediatric oral health. Additional research should be conducted to verify the effectiveness of additional training on not just the inclusion of oral health-screenings in practice, but also the long-term effectiveness of those screenings.

Research studies have indicated that there is a disconnection between effectively identifying early childhood caries and referring such cases to a dentist. The establishment of a dental home is crucial to a child’s long-term oral health prospects. Therefore it is the primary care practitioner’s responsibility to facilitate this process. Thus far, research has offered either
anecdotal supposition to explain the poor referral rate or studies have conflicted in their conclusions.² For example the US Preventative Services Taskforce Reported that the number of dental visits was not significantly impacted by referral from a primary care provider while another study showed that dentists were more likely to see pediatric patients following a PCP referral.¹ Additional research should be completed to identify the factors that influence the referral process following the detection of dental caries or a high-risk patient.

Conclusion

The review of literature has confirmed that tooth decay is the single most significant dental related concern for infants and children.¹⁵ Unfortunately, while primary care providers identified themselves as able to offer screenings and referrals for dental related conditions, they were concerned with their ability to do so accurately and efficiently.¹⁴

Barriers for primary care practitioners to provide this service included difficulty in incorporating dental screenings into everyday practice, resistance by staff members and difficulty applying fluoride varnish.⁸ Additional research demonstrated it was possible to alleviate the concern that it would be difficult to integrate a dental screening into a well-child check but at the same time confirmed concerns that primary care providers may not currently be prepared to accurately diagnose the disease or effectively refer patients to specialist dental care.¹⁶ Research has also indicated that current caries risk assessment strategies need to improve and that additional technological advances should be made in order to more effectively diagnose the disease.⁹

The reviewed literature has shown that primary care providers are positioned as frequently the only contact infants and young children have with the healthcare system. Dental-care services provided by pediatric dentists are severely under-utilized. As a result primary care
providers must be encouraged to perform basic dental screenings and subsequent referrals to pediatric dentists as well as taking responsibility to educate their patients' and patients' families in appropriate dental care.

To facilitate this action it is imperative that dental screenings are seamlessly integrated into existing provider-patient interactions. Patient medical records maintained and constructed by primary care providers should include specific dental related information. Well-child checks should automatically incorporate a dental screening. In order to raise the accuracy of diagnosis, additional training should be provided for primary care providers on oral health. Additional training should take the form of controlled evaluations rather than traditional academic methods.

In the absence of direct dental care, the primary care provider is in a pivotal position to impact the oral health of pediatric patients. While there are still areas of additional research to complete, there are existing guidelines in place that can be incorporated into the primary care setting. Given the severity of dental caries and relative ease of treatment, it is imperative that educational establishments, professional associations and primary care practitioners themselves embrace oral health as a key component of standard medical practice.
References:


