Abstract

Dental caries, or tooth decay, is experienced by 60-90% of children. The incidence increases in high-risk children, such as those from low socio-economic backgrounds who have limited access to dental care. A quasi-experimental, non-randomized quality improvement project was conducted to increase positive oral health habits in preschool aged children, specifically twice daily brushing and reduction of sugary drink consumption, by promoting standardized oral health education in primary care, in order to reduce the disease burden of dental caries experienced by this population. This evidence-based project involved children aged 2-5 years old and their caregivers. The intervention of this project was to provide a standardized oral health care education bundle to families (Healthy Teeth, Healthy Me), consisting of a child-friendly video, educational information for caregivers, and child-focused activities. The intervention was provided to 54 families at a pediatric primary care office. The outcome measures were to increase the number of children who are brushing their teeth twice daily and to decrease the number of sugary drinks consumed by the child, when compared to children who are receiving standard education. After statistical analysis, the results of this project showed significant improvement in increasing teeth brushing and decreasing sugary drink consumption.

Keywords: dental caries, primary care, pediatric, children, family, caregiver, fluoride varnish, oral health, topical fluoride, anticipatory guidance
Oral health care in the pediatric population is an integral part of comprehensive and holistic health care. Poor oral health can negatively influence a child’s development of speech, sufficient nutrition and growth, and school attendance (Abanto, Carvalho, Mendes, Wanderley, Bonecker, & Raggio, 2011; Golinveaux et al., 2012; Mahat, Lyons, & Bowen, 2014). In adulthood, poor oral health has been linked to systemic health problems such as diabetes mellitus, chronic kidney disease, and cardiovascular disease (Shetty, Dua, Kumar, Dhapapal, Astekar, & Shetty, 2014; Stanko & Izakovicova Holla, 2014; Wahid, Chaudhry, Ehsan, Butt, & Khan, 2013). Vulnerable individuals, such as children in low socio-economic households, experience greater levels of tooth decay (Grembowski, Spiekerman, & Milgrom, 2009; Kumar, Kroon, & Laloo, 2014; Marinho, Worthington, Walsh, & Clarkson, 2013). This may be due to the shortage of dentists who treat patients with Medicaid insurance, or the fact that individuals who struggle with poverty are less likely to seek preventive care services, such as dental cleanings (Golinveaux et al., 2012; Kumar et al., 2014; Melbye, Huebner, Chi, Hinderberger, & Milgrom, 2013). Regardless of socio-economic status, the development of tooth decay, or dental caries, is experienced by 60-90% of children (Clark & Slayton, 2014; Mahat et al., 2014; Marinho et al., 2013; Tinanoff & Reisine, 2009; Warren, Weber-Gasparoni, Marshall, Drake, Dehkordi-Vakil, Dawson, & Tharp, 2009). Current research states that dental caries is the most common disease experienced in childhood and has been identified as a silent epidemic (Jablonski, Mertz, Featherstone, & Fulmer, 2014; Kramer, Feldens, Helena Ferreira, Bervian, Rodrigues, & Peres, 2013; Mahat et al., 2014; Marinho et al., 2013; Moyer, 2014). It is clear that oral hygiene is a relevant and important topic in the health of children, especially those in low socio-economic households who have decreased access to dental care.

Significance
Adequate oral care, such as regular dental visits and fluoride treatments, helps to prevent tooth decay and associated health problems (Azarpazhooh & Main, 2008; Berger, Bachman, Casalone, Farberman, & Fish, 2014; Clark & Slayton, 2014; Chou, Canton, Zakher, Mitchell, & Pappas, 2013; Kohn, Maas, Malvitz, Presson, & Shaddix, 2001). Because children in low socio-economic households are a vulnerable population with limited access to dental care, it is essential for nurse practitioners to assess the oral health of these children and take steps toward preventing dental caries and improving overall well-being (Kumar et al., 2014; Martins-Junior, Vieira-Andrade, Correa-Faria, Oliverira-Ferreira, Marques, Ramos-Jorge, 2012; Kohn et al., 2001). Current recommendations include the administration of fluoride treatments by healthcare professionals in a primary care setting (Clark & Slayton, 2014; Rolnick, Jackson, DeFor, & Flottemesch, 2015). Providing dental care by way of fluoride varnish (FV) has been shown to decrease the incidence of dental caries by 25-45% (Bonetti & Clarkson, 2016; Marinho et al., 2013). Nurse practitioners have the opportunity to improve both the oral and overall health of at-risk children through preventive oral care in the primary care setting.

Local Issue

The problem of dental caries in the pediatric population is of concern on both a local and national level. The Centers for Disease Control and Prevention report from 2015 states that 17.4% of children aged 5-17 had untreated dental caries. Information from 2011-2012 reveals that 23% of children age 2-5 to five had dental caries in primary teeth (Dye, Evans, Li, & Iafolla, 2015). Despite efforts to prevent dental caries in the pediatric population, an increase from 24% to 28% has been seen between 1988 and 2004 (Dye et al., 2015). Healthy People 2020 has identified oral health as a primary objective with a goal of decreasing the number of dental caries and untreated dental decay in children age three to five years.
In Missouri, 10.6% of children age five and younger and 20.2% of children age 5-12 displayed unsatisfactory oral hygiene (Missouri Department of Health and Senior Services (MHDSS), 2014). In Missouri, up to 97% of children are at medium or high risk of the development of dental caries (Berger et al, 2014; MDHSS, 2014). Currently, Missouri Medicaid will reimburse both the biannual application of FV, as well as the oral health exam separate from a well-child visit, which should encourage practitioners to provide these services (Berger et al., 2014; Canadian Agency for Drugs and Technologies in Health (CADTH), 2016; Lewis et al., 2009). Preventing early childhood dental caries is more cost-effective when compared to treating advanced dental disease and caries (Ramos-Gomez, Crystal, Ng, Crall, & Featherstone, 2010). By offering oral health promotion programs and interventions, insurance companies may experience a 32% cost savings over episodes requiring higher levels of care (Stearns, Rozier, Kranz, Pahel, & Quinonez, 2012).

**Diversity Considerations**

This project was implemented at an urban pediatric primary care clinic. This clinic consists of several federally funded, non-profit, safety net clinics, which provide health care to underserved populations regardless of ability to pay. The clinic is draws families from the urban core. Significant portions of the children who are served at this clinic are covered by Medicaid insurance and live at or below the poverty line. Additionally, large populations of minority children, especially African-American and Mexican-American children, seek care at these clinics. As previously discussed, these populations are at high risk for developing dental caries.

**Problem and Purpose**

**Problem Statement**
Despite recommendations by the American Academy of Pediatric Dentistry and the American Dental Association that all children age 2-5 years should receive topical fluoride varnish every three to six months, many children do not regularly visit a dental provider for this treatment, creating the need for primary care clinicians to provide oral health anticipatory guidance and recommendations in order to prevent the development of dental caries.

**Intended Improvement**

The student investigator spent significant time at this pediatric primary care clinic during clinical rotation. It is encouraging that the clinic is offering and performing fluoride varnish application on many children; however, anticipatory guidance is often inconsistent among individual providers and clinics.

Evidence is clear that fluoride varnish improves the oral health of children. Evidence also supports providing oral health anticipatory guidance in multiple forms, such as visual, written, and verbal (American Academy of Pediatric Dentistry (AAPD), 2013). The purpose of this DNP project was to increase positive oral health habits in preschool aged children, such as twice daily brushing and reduction in sugary drink consumption, by focusing on oral health in the primary care setting with fluoride varnish application and anticipatory guidance, in order to reduce the disease burden of dental caries experienced by this population.

**Facilitators and Barriers**

The facilitators for this project was the facility, a staff pediatrician who is passionate about improving pediatric oral health in primary care, and the patients and families who seek care at these clinics. The economic component of this project also serves as a facilitator. The project itself required minimal cost, as the materials are available at no cost through the Healthy
Teeth, Healthy Me program. Additionally, the project has the potential for cost savings as more children participate in preventive, rather than reactive, oral health care.

One potential barrier to change includes the investment in the project by other health care providers. This facility is a teaching hospital, which results in many projects, trials, and pilots occurring frequently. Additionally, the time constraints of providers may negatively affect the outcomes of this project. Offering patients and families the anticipatory guidance bundle interrupts the providers’ normal workflow, which may result in decreased compliance.

**Review of the Evidence**

**PICOTS**

The PICOTS for this project is as follows: In children age 2-5 years old, does the provision of a standardized anticipatory guidance bundle from Healthy Teeth, Healthy Me result in increased twice daily brushing compliance and decreased consumption of sugary drinks over a three month period when compared to children who do not receive standardized anticipatory guidance by their primary care provider?

**Search Strategies**

A comprehensive literature search was conducted in order to understand the current research concerning fluoride varnish application and caries prevention. Key words used were nurse practitioner, primary care, low socioeconomic status, dental caries, prevention, fluoride varnish, oral health, oral hygiene, children, pediatrics, family, caregiver, and dental health (see Appendix A for definition of terms). Searches were conducted using GoogleScholar, PubMed, Cochrane Database of Systematic Reviews, and CINAHL. Highest yields of relevant material were found with the combination of primary care and dental caries prevention. Relevant literature was also gained by searching fluoride varnish and dental caries. Search limits of
English language only, human subjects, peer-reviewed, scientific articles published within the last 10 years (2007-2017) were applied when possible. Search results from the four databases returned over 15,000 results. After removing duplicate articles and screening for eligibility and relevance, 43 studies were included in the synthesis of evidence. The level of evidence was appraised for each article and revealed 11 Level I studies, two Level II studies, four Level III studies, six Level IV studies, and 20 Level V-VII studies (Melnyk & Overholt, 2015, adapted). Five systematic reviews and evidence-based guidelines, six randomized controlled trials and quasi-experimental trials, and 14 qualitative studies and authoritative reports were utilized in the synthesis of evidence (see Appendix B for evidence table).

**Evidence**

**Fluoride varnish.** Extensive literature has shown that fluoride varnish application is recommended for routine use in children (Azarpazhooh & Main, 2008; Berger et al., 2014; CADTH, 2016; Clark, Kent, & Jackson, 2016; Kohn et al., 2001; Marinho et al., 2013). Thirteen studies on fluoride varnish efficacy have been used in this synthesis of evidence. Fluoride varnish is effective by remineralizing weakened tooth enamel, in turn slowing the metabolism of carbohydrates that result in plaque build-up (Kohn et al., 2001; Mahat et al., 2014). When fluoride resides in the dental plaque and saliva of a patient, demineralization is inhibited (Clark et al., 2016; Kohn, 2001; Marinho et al., 2013). Additionally, cariogenic bacterial growth is hindered when fluoride is present (Kohn, 2001). The regular application of fluoride varnish has shown a reduction of dental caries by 25-50% (Bonetti & Clarkson, 2016; Berger et al., 2014; Chou, 2015; Marinho et al., 2013). FV has also shown an 81% reduction in dental caries in children who do not have access to fluoridated water sources (Clark, 2015). Additionally, patients who participate in an oral health program that promotes positive oral hygiene and
fluoride varnish application see a 49% reduction in caries-related dental treatment (Pahel, Rozier, Stearns, & Quinonez, 2011). FV application substantially decreases dental caries, especially when applied every six months (Azarpazhooh & Main, 2008; CADTH, 2016; Marinho et al., 2013; Weyant et al., 2013). Studies show that multiple applications of FV provide the most benefit to patients (Kohn, 2001; Pahel et al., 2011; Weyant et al., 2013). Only one double-blind randomized controlled trial showed no significant difference in caries prevalence or increment when interventions of supervised tooth brushing and fluoride varnish application were administered (Agouropoulos, Twetman, Pandis, Kavvadia, & Papagiannoulis, 2014).

Application of fluoride varnish is a Grade 1 recommendation by the Centers for Disease Control and Prevention and the American Dental Association; however, fluoride varnish should not be used in infants before 6 months of age (Clark et al., 2016; Kohn et al., 2001; Mahat et al., 2014).

**Impact on family.** Systematic reviews have shown that oral health of children affect the family in several ways (Barbosa & Gaviao, 2008). Fifteen different articles are used in this synthesis of evidence. One study that looked at oral health interventions such as tooth brushing demonstrated that children who were helped by an adult to brush and care for their teeth were less likely to have dental caries (Rogers, Pawlak, Mason, Mayze, Sharp, & Smith, 2016). Additionally, literature shows that children who attend a higher number of well-child exams visit a dentist sooner than those who do not have frequent appointments, which may be related to parent’s involvement in the child’s health status (Chi, Momany, Jones, Kuthy, Askelson, Wehby, & Damiano, 2013; de Silva-Sanigorski, Ashbolt, Green, Calache, Keith, Riggs, & Waters, 2013).

Literature reveals that children have significantly higher levels of dental caries if their caregiver has a low literacy level (Miller, Lee, DeWalt, & Vann, 2010; Saied-Moallemi, Virtanen, Ghofranipour, & Murtomaa, 2008; Warren et al., 2009). Family education level has
been linked to oral health behaviors such as frequent snacking and juice consumption, which in turn affects oral health and increases the development of dental caries (Divaris, Lee, Baker, & Jr, 2011). Parents with higher levels of self-efficacy resulted in children with positive oral health habits, such as frequent tooth brushing and regular visits to a dental provider (de Silva-Sanigorski et al., 2012).

The oral health status of a child also affects their ability to effectively learn and attend school (Blumenshine, Vann, Gizlice, & Lee, 2008). Children with poor oral and overall health were more likely to have caregivers rate their school performance as poor (Blumenshine et al., 2008; Miller et al., 2010). These children are nearly three times more likely to miss school due to dental pain than children with good oral health (Jackson, Vann, Kotch, Pahel, & Lee, 2011). One study showed that children with poor oral health missed an average of 0.49 days of school for oral health reasons alone (Jackson et al., 2011). It is nearly four times more likely for children who experience toothaches to have a lower grade point average than children without dental pain (Seirawan, Faust, & Mulligan, 2012). Eleven percent of children who do not have a dental home and may experience difficulty in accessing dental care miss days of school, compared to four percent of children who are able to access dental care more easily (Seirawan et al., 2012). As a result of missed school days caused by dental problems, caregivers missed, on average, 2.5 days of work (Seirawan et al., 2012). The function and structure of a family is often affected because of a child’s dental health condition (Blumenshine et al., 2008; Jackson et al., 2011; Seirawan et al., 2012). In order to care for these children and provide proper dental care, parents may need to miss days of work, creating a stressful home environment (Jackson et al., 2011).
Children whose families had a higher income level, education level, and family economy were more likely to have a positive oral health quality of life rating (Kumar et al., 2014). Interestingly, children who live with their biological two-parent set have improved oral health when compared to children who live with step or adoptive parents (Listl, 2011). Family nutritional habits, such as sugary beverages and frequent snacking, are significant predictors of early childhood caries, especially in low socio-economic populations (Warren et al., 2009). In summary, the scientific evidence presented by Kumar et al. (2014), Listl (2011), and Warren et al. (2009) concerning family influence on children’s oral health status suggests that interventions should focus on the entire family when possible.

Quality of life. Eleven sources detail the impact of dental caries on a child’s quality of life. Dental caries result in systemic health problems, such as difficulty speaking, failure to thrive, pain, and difficulty chewing (Bradbury-Jones, Innes, Evans, Ballantyne, & Taylor, 2013; Jablonski et al., 2014). Dental pain and poor oral health also result in weight loss, difficulty sleeping, irritability, low self-esteem, school absenteeism, and poor school performance (Abanto et al., 2010; Martins-Junior et al., 2012). This, in turn, can negatively affect the quality of life of the child (Abanto et al., 2010; Martins-Junior et al., 2012). Parents also perceive that children who experienced dental caries have a poor quality of life (Kramer et al., 2013). When parents and children were surveyed regarding their quality of life, a positive score (indicating poor quality of life) was three times more likely in children with dental caries (Kramer et al., 2013).

Oral health recommendations. Thirteen sources regarding oral health recommendations were used in the synthesis of evidence. Current recommendations state that children should receive regular oral health screenings and the application of topical fluoride varnish at least twice a year (Azarpazhooh & Main, 2008; Marinho et al., 2013; Moyer, 2014;
Ramos-Gomez et al., 2010). Because regular application of FV in primary care has been shown to significantly decrease the incidence of dental caries, it is recommended that primary care providers apply FV during well-child checks as a way to decrease the risk for dental caries and improve the oral health of the child (Clark et al., 2014; Kagihara, Niederhouse, & Stark, 2009; Marinho et al., 2013; Moyer, 2014). Even for children who are regularly exposed to fluoride, such as in water sources, fluoride varnish is recommended at least every six months (Ramos-Gomez et al., 2010). Beginning preventive efforts at a young age has been shown to be highly effective (Warren et al, 2009).

Pediatricians and primary care providers are ideal practitioners to implement oral health interventions in their practice because of the frequency at which they care for children during their first three years of life (Chou et al., 2013; Lewis et al., 2009; Mahat et al., 2013; Pahel et al., 2010; Segura et al., 2014). It may be difficult for families to find a dentist who treats children under the age of 4 years, further necessitating oral health care in the primary setting (Lewis et al., 2009). It is preferable that FV be applied every three months, starting with the first tooth eruption and ending when the child has established a dental home (Clark et al., 2014; Moyer, 2014; Ramos-Gomez et al., 2010). In order to effectively provide FV in a primary care setting, the provider must understand risk factors for caries development and indications for administration (Clark et al., 2014).

Continuing to educate families and patients on oral health has shown significant benefit in plaque reduction and gingival health, oral health-related behavior, and tooth-brushing skills (Habbu & Krishnappa, 2015). Children and families should also receive oral health interventions apart from fluoride varnish, such as anticipatory guidance, education regarding tooth-brushing, nutritional habits to promote positive oral hygiene, and referral to dental
professionals when necessary (Ramos-Gomez et al., 2010). Children who regularly see a primary care provider who offers oral health anticipatory guidance and interventions have fewer dental caries (Kranz, Preisser, & Rozier, 2015). It is recommended that anticipatory guidance for both the child and caregiver be provided regularly, along with FV application (Segura et al., 2014).

Literature also shows that fluoride varnish programs can be successfully implemented and sustained in primary care setting (Habbu & Krishanppa, 2015; Rolnick et al., 2015). Nurse practitioners in particular are in a perfect position to provide oral health interventions, such as anticipatory guidance and fluoride varnish, to children in a primary care setting (Jablonski et al., 2014). The Institute of Medicine recommends that non-dental health professionals assess oral health status and provide education and preventive care in a primary care setting (Jablonski et al., 2014).

**Theory**

**Orem’s Self-Care Deficit Theory**

One theoretical framework that influences the application of fluoride treatments in primary care is Dorothy Orem’s self-care deficit theory (see Appendix C). The underlying premise of the self-care theory is that when a human’s capacity for self-care is exceeded, nursing intervention is required (McEwen & Wills, 2014). This is particularly relevant to the provision of oral care in family practice because patients are unable to care for or receive the appropriate care for their teeth, resulting in the need for further intervention (Chi, Masterson, Carle, Mancl, & Coldwell, 2014). One example of this is the lack of adequate dental coverage. Currently, there is also a shortage of dentists who treat patients with Medicaid insurance, necessitating intervention in the primary care setting (Golinveaux et al., 2013). The absence of comprehensive
oral care complicates the ability to receive adequate anticipatory guidance and interventions and reinforces the self-care deficit that exists for many of these patients. The student investigator was unable to find application of this theory in similar studies; however, that does not decrease the theory’s relevance to this DNP project.

Methods

IRB and Site Approval

This project was categorized as a not-human subjects quality improvement project by the facility’s Institutional Review Board (see Appendix D for logic model). Application of fluoride varnish is currently part of routine clinical practice at these clinics, there is virtually no risk to patients, and generalizable information was generated from this project. Additionally, the addition of an anticipatory guidance bundle in a parallel comparison project does not deny patients standard of care. These reasons support this project as evidence-based quality improvement work (Melnyk & Fineout-Overholt, 2015). Surveying is a portion of this project; however, it involved a minimal number of questions that do not require specific patient health information. The information did not identify particular patients, further supporting this project as not-human subjects quality improvement (Terry, 2015).

Ethical Issues

Major research ethics aspects to this project involve, as one would expect, benefit and harm, privacy, and nondiscrimination and nonstigmatization (Melnyk & Fineout-Overholt, 2015). Patients who declined fluoride varnish application will still receive thorough care, including anticipatory guidance regarding oral health. In this project, the benefit of receiving standardized anticipatory guidance outweighed any possible harm. The identity of patients was disconnected from survey information or data collection.
Funding

One of the benefits of this program was that it required virtually no funding (see Appendix E for cost table). The Healthy Teeth, Healthy Me program is sponsored by MetLife Foundation and Sam’s Club and is available for complimentary use by families and providers. Printed materials and iPads for family surveys and educational videos were furnished by the facility. Expansion to other organizations may require further funding, depending on that organization’s level of resources.

Setting and Participants

The setting for this project was a primary care clinic at an urban facility. Inclusion criteria included English-speaking caregivers and their children age 2-5 years old who presented to this clinic for a well-child check (see Appendix F for recruitment materials). Exclusion criteria were any children with non-English speaking caregivers, due to the follow-up phone call component of the project. The sampling method utilized for this project was a non-randomized convenience sample, as information about a specific patient population was desired. Though the convenience sample is considered to be weak in terms of generalizability, it allows for information to be gathered from the most willing participants (Terry, 2015). The sample number for this project was 43 families. A total of 54 families received the intervention, but the student investigator was unable to reach 11 of the families during the follow-up phone call portion of the project.

EBP Intervention

Patients in the intervention group of this project received an oral health anticipatory guidance bundle (see Appendix G for intervention flow diagram and Appendix H for interventional materials). This bundle consisted of education written at an easily understood
level, a video for the child to watch on an iPad during the appointment, and a tooth-brushing chart, which corresponds to evidence based guidelines to provide anticipatory guidance in different formats for best understanding and improved health (AAPD, 2013).

Participants for this project were recruited automatically upon check-in to the intervention clinic (Clinic A) for the well child exam (see Appendix I for project timeline). A handout detailing aspects of this project was given to families at arrival. As a not-human subjects quality improvement project, consent was unnecessary. Once the patient and family were roomed, the care assistant or registered nurse showed the patient the oral health video on an iPad. After participants had viewed the video, the provider entered the room to complete the well child check. Included in this process was the provision of anticipatory guidance, which involved reviewing the Healthy Teeth, Healthy Me materials. The provider discussed the importance of twice daily brushing and encouraged families to use the tooth-brushing chart. The provider also utilized the materials to emphasize the importance of limiting sugary drinks, such as juice and soda. All providers received education regarding this project and the importance of reviewing the anticipatory guidance by the student investigator at a staff meeting. The student investigator emphasized providing standardized education to families during the appointment. Additionally, the care assistants and nurses received education regarding this project and the important role that they played in its success.

Approximately one month after the well child appointment, the families received follow up phone calls to inquire about oral health habits (see Appendix J for measurement tool). This survey was used as the measure for this project’s outcomes. Questions for the survey included: “How many times per day does your child brush his or her teeth?”, “How many sugary drinks does your child drink each day?”, and “How helpful was the educational packet in improving
your child’s mouth care?”. The student investigator conducted these surveys. This data was compared against baseline data, which consisted of the same questions being asked to all children age 2-5 years old who presented to the Clinic A and Clinic B between August 14th, 2017 and September 11th, 2017.

The standard care clinic (Clinic B) received care and anticipatory guidance according to the clinic’s standards. Similar to the intervention clinic, the caregivers of children seen in the standard clinic received a follow-up phone post well-child check. This information was used as a comparison to the intervention clinic to measure success of the standardized anticipatory guidance, as well as to the baseline data previously described.

**Change Process and EBP Model**

The change process used for this project is Prosci’s ADKAR model. Created by Jeff Hiatt, the ADKAR model involves awareness, desire, knowledge, ability, and reinforcement to spur and sustain change (Hiatt, 2006). This model can be used on both an individual level and with organizations, which will be important for this particular change project.

The evidence based practice model used is the Johns Hopkins Nursing Evidence Based Practice Model. This model incorporates research, practice, and education to guide problem solving (Dearholt & Dang, 2012). This model also takes into account internal and external factors that can affect the process and outcomes (Dearholt & Dang, 2012). This evidence based practice model is particularly relevant to this project because of the emphasis on education of the patient and family.

Sustainability of this project is possible with little increase in workload. Previous discussions with providers at the primary care clinic revealed a desire to improve patient and family education, indicating potential investment in a project like this one. Considering the
positive outcomes, interest in the project, and low cost, it is expected that this project can continue as standard of care.

**Study Design**

This quasi-experimental evidence based quality improvement initiative involved a comparison between two groups: one that received the proposed intervention and one that did not. To improve validity, this project also used baseline data gathered by the clinic registered nurses prior to the initiation of interventions. This baseline data consisted of the same questions that were asked by the student investigator during the follow-up phone call. The participants were included based on convenience, rather than random sampling. Measurement of sugary drink consumption and frequency of tooth brushing was gathered after the child’s appointment by the student investigator.

**Validity**

Internal validity of this project was strengthened by the fact that this project was conducted at one location within the clinic’s facility. Internal validity may have been affected due to the different providers at the two clinics involved in the project. Self-reporting by parents may also have affected validity. Regarding external validity, it is possible that the project outcomes can be generalized to the greater population. However, the clinic is in the urban core, which may cause different results when enacted in a more rural population.

**Outcomes and Measurement Instruments**

The primary outcome of this project was to increase the number of patients who brush their teeth twice daily. The secondary outcome of this project was to decrease the number of sugary drinks consumed by the child each day. These outcomes were measured by parental responses to survey questions asked during a follow up phone call. There is not a validated
instrument that is applicable to this project; therefore, survey questions were created that measured oral health habits, such as daily tooth brushing. This survey was limited to five questions written at a fourth grade reading level. This survey was compared to individuals in the non-intervention group, which consisted of patients who receive standard oral health anticipatory guidance. The student facilitator conducted the surveys one week after the well child check of 2-5 year old patients seen in the intervention clinic, as well as in the standard care clinic, comparing the outcomes of both groups.

Quality of Data

This was a non-randomized, evidence-based quality improvement project, with one group receiving expected level of care anticipatory guidance and one group receiving the intervention of standardized anticipatory guidance. The outcome data was compared between the intervention clinic and the standard clinic to determine a difference from the intervention, as well as to the baseline data. There is not currently benchmark data for a similar project. This may weaken the quality of the data of this project, as there is no comparison study.

Data was de-identified of protected health information prior to storage. Data was stored in REDCap database system, which is password-protected. This data was also used in its de-identified state in SPSS statistical software during the data analysis process.

Analysis Plan

A Mann-Whitney U test was used for all comparisons, with the group (intervention or standard care clinic) or time (pre or post intervention) as the independent variable and the outcome (teeth brushing and consumption of sugary drinks) as the dependent variable. SPSS is the statistical software that was used for this project (see Appendix L for statistical analysis table).
Results

Setting and Participants

All data were collected from August 2017 through February 2018. This includes pre-data collected from both standard and intervention clinic patients and caregivers, post-intervention data collected by the student investigator through follow up phone calls, and additional data collection in the standard care clinic, also conducted through follow up phone calls. Seventy-one families were asked for baseline data (30 from the standard care clinic and 41 from the intervention clinic). A total of 54 families were called to collect post-intervention data for the intervention clinic. However, due to an inability to reach some families, only 43 families completed the follow up phone call questionnaire. Thirty families were reached with a follow up phone call from the standard care clinic for additional data collection.

Intervention Course

Baseline data were gathered from both clinics between August 14\textsuperscript{th}, 2017 and September 11\textsuperscript{th}, 2017. Children aged 2-5 years who had a well-child appointment in the intervention clinic from September 28\textsuperscript{th} through October 11\textsuperscript{th}, 2017 received the educational intervention, totaling 54 children. These families were then contacted from October 25\textsuperscript{th}, 2017 to December 20\textsuperscript{th}, 2017 for the follow up phone call questionnaire. Only 43 families could be contacted. Families from the standard care clinic who had a child aged 2-5 years attend a well-child check from December 1\textsuperscript{st}, 2017 through January 31\textsuperscript{st}, 2018 were also contacted and asked the same follow up phone call questions in order to gain more comparison data.

Outcomes

The standard care clinic included 30 families in the pre-intervention group and 30 families in the post-intervention group. In the pre-intervention group, eight caregivers (26.7%)
reported that their child brushed his or her teeth once a day and 17 caregivers (56.7%) reported that tooth brushing occurred twice a day. Only four caregivers (13.3%) reported tooth brushing more than twice a day. Twenty-one families (70%) reported that their child drinks one to cups of sugary drinks per day, six families (20%) reported zero cups, and three families (10%) reported three to four cups per day. In the post-intervention group, 17 caregivers (56.7%) reported that tooth brushing occurred once a day, 12 (40%) reported tooth brushing twice a day, and one (3.3%) reported tooth brushing more than twice a day. Regarding sugary drink consumption, eight families (26.7%) reported that their child drinks three to four cups of sugary drinks a day and eight families (26.7%) reported a consumption of five or more cups per day.

Forty-one families in the pre-intervention Clinic A were interviewed. Twenty caregivers (48.8%) reported that their child brushes his or her teeth twice a day and twenty families (48.8) reported that their child brushes his or her teeth once a day. Only once caregiver (2.4%) reported brushing more than twice a day. Twenty-seven families (65.9%) reported that their child consumes one to two cups of sugary drink each day, with eleven families (26.8%) reporting three to four cups a day. Three families (7.3%) stated that their child does not drink any sugary drinks.

Post-intervention in the Clinic A, forty-three families were contacted. In this group, twelve caregivers (27.9%) reported that their child brushed his or her teeth once a day, thirty families (69.8%) reported that their child brushed his or her teeth twice a day, and one (2.3%) reported brushing more than twice a day. Six families (14%) reported zero sugary drinks are consumed a day, twenty-nine families (67.4%) reported one to two cups of sugary drinks, seven families (16.3%) reported three to four cups of sugary drinks, and one family (2.3%) reported five or more cups a day.
The Clinic A, as the intervention group, also received an additional question to measure the helpfulness of the standardized educational packet. Nineteen families (44.2%) found the packet to be very helpful and eighteen families (41.9%) found it to be somewhat helpful. Only three families (7%) found it to be not helpful, and three families (7%) did not use the packet at all.

After intervention, pre- and post-intervention data were compared using a Mann-Whitney U test. When post-intervention Clinic A outcomes were compared to post-intervention Clinic B outcomes, significant improvements were seen in both teeth brushing and consumption of sugary drinks (p<.022, p<.014). Pre-intervention data were also compared with post-intervention data in both clinics. When comparing pre- and post-intervention data for the intervention clinic, there was a statistically significant difference in consumption of sugary drinks (p<.0005) with no change seen in teeth brushing. When comparing pre- and post-intervention data for the standard care clinic, there was a statistically significant increase in teeth brushing (p<0.37). This is an interesting finding as the standard care clinic served as the non-intervention clinic.

**Discussion**

**Successes**

Successes for this project include a fairly large sample size and ability to contact the majority of families who received the intervention. Additionally, having multiple points of comparison (pre-data in the intervention clinic as well as data from the standard care clinic) improves the strength of the results. The involvement of the providers at both clinics to assist with data collection and implementation of the intervention is one of the biggest reasons for this project’s success.

**Strengths**
Again, a strength of this project was the involvement of the providers, from the care assistants who collected pre-intervention data, to the physicians and nurse practitioners who reviewed the educational packet with each family and emphasized the importance of oral health care. This facility has a strong quality improvement culture and supports many projects throughout the year. There is support for conducting literature searches and reviews through library services, opportunity to meet with statistical advisors, and numerous avenues to present findings after project completion.

The most difficult aspect of implementing the intervention components was knowing that providers’ time is already very short. It was important that the intervention required minimal effort and time on the part of the provider while still providing value to the family. Throughout the project, there was no evidence that the interventions were difficult for the provider to apply.

Results Compared to Literature

At this time, there is no current literature to support the implementation of a standardized oral health education bundle in the primary care setting. However, project findings do align with the recommendation to provide education to families at an easy-to-understand level and in multiple modalities, including written, spoken, and video. Prior to implementation of this intervention, there was no standard delivery of oral health education in the primary care clinics.

Limitations

Validity

Internal validity of this project was affected during data collection with questionnaires. It is possible that caregivers were less or more honest depending on how each question was presented and if the questions were asked in person or over the phone. If caregivers felt like their answers may affect the care provided, they may be more inclined the give the “right”
answer, rather than the true answer. There may also have been variation in how the education packet was presented by each provider. While there was education provided prior to implementation of the interventions, each provider has an individual style of teaching families. Using participants from one organization and one location strengthened internal validity. It may be difficult to generalize results to another organization, given that the facility is located in an urban core; however, this project may be successfully replicated in an urban, outpatient setting.

**Sustainability**

The improvements observed when standardized oral health education is provided have the potential to weaken over time. As providers become more comfortable with the information, it is likely that it will not be delivered as thoroughly or consistently. Additionally, future initiatives may take priority over this project. Providers may also not understand the significance of continuing the intervention once data collection ceases. It is hopeful that because this is a low-cost, low-stress intervention, providers will continue to utilize it to improve oral health for as many children as possible.

**Study Limitations**

One limitation for this project was that the intervention was conducted at only one clinic. This organization has several primary care clinics, all of which see children aged 2-5 years for well-child checks. Additionally, there were several families who were unable to be reached for follow up after receiving the intervention. While the overall follow up phone call rate was ultimately fairly high, many families needed to be called multiple times due to not answering. This increased the time required for the student investigator to gather data. Both of these limitations have the potential to decrease the accuracy or generalizability of project results and present a barrier to sustainability.
Interpretations

Expected and Actual Outcomes

Expected results were that children seen in the intervention clinic who received the education bundle would display an increase in positive oral health habits when compared to children who did not receive this intervention. The oral health habits that were measured included daily teeth brushing and consumption of sugary beverages. These expected outcomes were reflected in the actual project outcomes when results were compared in both pre- and post-intervention in the intervention clinic and between Clinic A and Clinic B (intervention and standard care clinic). An unexpected result was that there was an improvement in teeth brushing in the standard care clinic. One possibility for this is perhaps providers were more aware of oral health care in general, as providers work in both clinics, and therefore emphasized oral health habits in the standard care clinic without providing the education packet.

Intervention Effectiveness

Strengths of the intervention included that it is easy to use for providers and requires minimal equipment. Oral health was already being discussed with caregivers at these well-child checks; however, there was no standard or guideline to help providers. By providing standardized oral health education, families were equipped with the information they need to know to improve their child’s oral health. There are other initiatives regarding oral health that are ongoing in the primary care clinics, which makes providers more open to continuing this work. Due to the nature of this organization being a teaching facility, staff is accustomed to frequent quality improvement projects. This project may be effective in a similar setting where continual improvement is a part of the culture and care of the child is priority. One intervention modification is to have the education be specific to the organization’s branding. Much of the
educational handouts or resources are branded specifically with organization’s information, which helps to reinforce to families that this facility is the expert in pediatric healthcare.

**Impact to Health System, Costs, and Policy**

The expected impact of this project matched the actual impact in several areas. The estimated costs were accurate and required only the cost of printing the educational packet, as the organization already had iPads allotted for patient education purposes. If this project is accepted as standard of care, the educational packets can be printed at the organization’s print center as a cost of the department. As anticipated, this project did show significant improvement regarding oral health habits of children in both teeth brushing and consumption of sugary drinks. There is potential for this project to impact policy at this organization’s pediatric primary care clinics with the expansion to provide this education as standard at all primary care clinics.

**Conclusion**

**Usefulness**

As previously discussed, dental caries in children is a serious health issue. Primary care providers often feel ill-equipped to provide comprehensive anticipatory guidance to families regarding oral health (Herndon, Tomar, Lossius, & Catalanotto, 2010). Children, especially those from low socioeconomic backgrounds, are at a high risk for developing dental caries. These children experience decreased access to dental care, yet have regular visits with a primary care provider (Berger et al., 2014). This creates an opportunity for primary care providers to assess oral hygiene, educate the patient and caregiver, and apply topical fluoride varnish as a preventive measure. By incorporating Healthy Teeth, Healthy Me into a well child visit, providers are able to educate children and families on the importance of adequate dental care. This, in turn, improves the overall health of the patient.
**Further study**

The topic of providing fluoride treatments in the primary care setting still requires further research. Current data shows that this intervention is beneficial to high-risk children; however, few practices have actually implemented the recommendations. Some barriers to implementation include Medicaid reimbursement for providers other than physicians and lack of education and training in administration of fluoride (Kranz et al., 2015; Mahat et al., 2014). Recommendations from expert committees and current evidence supports the use of topical fluoride varnish application, coupled with family-centered anticipatory guidance, in the primary care setting as effective interventions to reduce the oral health disease burden on children.

**Dissemination**

This project showed favorable results in the number of children who are brushing their teeth twice daily and limiting sugary drinks. The results of this project will be shared with this facility’s providers and project facilitator. The synthesis of evidence was shared at an advanced practice conference as a poster presentation in the fall of 2017. By properly disseminating this information, other providers may learn of ways to improve pediatric oral health in the primary care setting.
References


https://doi.org/10.1111/cdoe.12035


https://doi.org/10.1186/1477-7525-12-41


https://doi.org/10.1111/j.1752-7325.2010.00205.x

https://doi.org/10.1016/j.nurpra.2013.10.015


## Appendix A

### Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Dental caries</td>
<td>Tooth decay caused by the breakdown of tooth enamel</td>
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<td>Fluoride varnish</td>
<td>Highly concentrated form of fluoride applied to the tooth’s surface to prevent decay</td>
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<td>Anticipatory guidance</td>
<td>A counseling technique that provides education to families regarding a child’s approaching developmental milestones</td>
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<td>Oral health</td>
<td>The absence of disease of the mouth and gums and the avoidance of tooth decay or loss that limits an individual’s ability to speak, eat, or interact</td>
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</table>
Appendix B
Synthesis of Evidence Table
**PICOTS:** In children age 3-5 years old, does the application of topical fluoride varnish (FV) by their primary care provider result in improved identification of self-management goals over a 3 month period when compared to children who do not receive fluoride varnish by their primary care provider?

<table>
<thead>
<tr>
<th>First author, Year, Title, Journal</th>
<th>Purpose</th>
<th>Level</th>
<th>Sample &amp; Sampling, Setting</th>
<th>Measure &amp; Reliability (if reported)</th>
<th>Results &amp; Analysis Used</th>
<th>Limitations &amp; Usefulness</th>
<th>Theme</th>
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<tr>
<td>Missouri Department of Health and Senior Services (2014). Oral Health in Missouri</td>
<td>To describe oral health trends and disparities in Missouri</td>
<td>3</td>
<td>Random sampling of Missouri citizens from 115 counties</td>
<td>Oral health interventions (school programs, FV)</td>
<td>The percent with poor oral hygiene was lower among younger children in general but higher among males of all ages</td>
<td></td>
<td>Current practices</td>
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<tr>
<td>Herndon (2010). Preventive Oral Health Care in Early Childhood: Knowledge, Confidence, and Practices of Pediatricians and Family Physicians</td>
<td>To examine the relationships among pediatricians' and family physicians' oral health training, knowledge, confidence, and practice patterns</td>
<td>6</td>
<td>Physician’s of AFP</td>
<td>Survey</td>
<td>Although training was not directly associated with performing recommended practices, there were positive associations between training</td>
<td></td>
<td>Current practices</td>
</tr>
<tr>
<td>Lewis (2009). Oral Health and Pediatricians: Results of a National Survey</td>
<td>To assess pediatricians' current attitudes and practices related to oral health of children 0–3 years old.</td>
<td>6</td>
<td>Survey to 1618 pediatricians from AAP</td>
<td>4% regularly apply FV</td>
<td>Current practices</td>
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<td>Clark (2015). Open Mouth, Open Mind: Expanding the Role of Primary Care Nurse Practitioners</td>
<td>To reduce the barriers and knowledge gaps identified in recent pediatric oral health research and educate primary care nurse practitioners on the application of fluoride varnish to reduce the risk of the development of dental caries in young children under age 5 at well-child visits</td>
<td>7</td>
<td>FV application</td>
<td>Up to 81% reduction in dental caries in the absence of fluoridated water</td>
<td>Not a formalized scientific study</td>
<td>Effectiveness of fluoride</td>
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<td>Citation</td>
<td>Description</td>
<td>Summary</td>
<td>Effectiveness of fluoride varnish</td>
<td>Effectiveness of fluoride varnish</td>
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<td>Canadian Agency for Drugs and Technologies in Health (2015). Fluoride Varnishes for Dental Health: A Review of the Clinical Effectiveness, Cost-effectiveness and Guidelines</td>
<td>The aim of this review is to examine the effectiveness, cost-effectiveness, and guidelines for use of fluoride varnishes compared with no treatment or other topical fluoride products.</td>
<td>1 Not reported</td>
<td>Fluoride varnish is recommended for routine use in children</td>
<td>Five systematic reviews and meta-analyses, nine randomized controlled trials, one economic evaluation and four evidence-based guidelines were identified regarding the use of fluoride varnishes for dental health.</td>
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<tr>
<td>Marinho (2014). Fluoride varnishes for preventing dental caries in children and adolescents</td>
<td>To determine the effectiveness and safety of fluoride varnishes in preventing dental caries in children and adolescents, and to examine factors potentially modifying caries increment</td>
<td>22 randomized or quasi-randomized controlled trials with blind outcome assessment with 12,455 participants; study</td>
<td>Substantial caries-inhibiting effect of fluoride varnish</td>
<td>Cochrane review; moderate quality of evidence; no trials were low risk of bias; large sample size; expansive search method; little evidence</td>
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<td>Study</td>
<td>Objective</td>
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<td>Effect Size</td>
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<td>Agouropoulos (2014)</td>
<td>To evaluate the effect of biannual fluoride varnish applications in preschool children as an adjunct to school-based oral health promotion and supervised tooth brushing with 1000 ppm fluoride toothpaste.</td>
<td>328 preschool children, 2-5 years old from 10 different preschools</td>
<td>2</td>
<td>No significant difference in caries prevalence or increment; independent sample test for continuous variables and x2 test for categorical variables using Stata 13.1 software</td>
<td>Well-designed study with little risk for bias (double-blind, fluoride applied by the same dentist for each child, exams done by one examiner); high and low risk stratification used; only 17 children received dental care during the study</td>
<td>Effectiveness of fluoride</td>
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<td>Berger</td>
<td>To describe</td>
<td>6 40</td>
<td>Oral</td>
<td>Many</td>
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<td>Effectiveness</td>
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<tr>
<td>Weyant (2013). Topical fluoride for caries prevention</td>
<td>To assist practitioners with decision-making about the use of topical fluoride caries preventive agents.</td>
<td>1</td>
<td>71 studies included in 82 citations; inclusion of RCT or NRCT with fluoride varnish application and dental caries reported</td>
<td>Caries increment as primary measure</td>
<td>Fluoride varnish application decreases dental caries based on levels of evidence</td>
<td>Low evidence from limited number or size of studies, flaws in study design, inconsistency</td>
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<tr>
<td>Pahel (2010). Effectiveness of Preventive Dental Treatment by Physicians</td>
<td>To estimate the effectiveness of a medical office–based preventive dental program (Into the Mouths of Babes)</td>
<td>4</td>
<td>Longitudinal claims and enrollment data for all children aged 72 months</td>
<td>Participation in Into the Mouth of Babes</td>
<td>49% reduction in caries-related treatment for patients with &gt;3 visits</td>
<td>Effectiveness of fluoride</td>
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<tr>
<td>Azarpazhooh (2008). Fluoride Varnish in the Prevention of Dental Caries in Children and Adolescent: A Systematic Review</td>
<td>To develop a scientifically current and evidence-based protocol for the use of fluoride varnish for the prevention of dental caries among high-risk children and adolescents.</td>
<td>Database search from 2000-2007 from MEDLINE, CINAHL, Cochrane, EMBASE, etc. 7 studies used</td>
<td>Fluoride varnish every 6 months with significant reduction of dental caries</td>
<td>Older article; strong recommendations</td>
<td>Effectiveness of fluoride</td>
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<td>Kohn (2001). Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States</td>
<td>To guide dental and other healthcare providers, public health officials, policy makers, and the public in the use of fluoride to achieve maximum protection against dental caries</td>
<td>1</td>
<td>Efficacy of fluoride varnish is Grade I</td>
<td>Large scale review, may be outdated, yet information remains relevant</td>
<td>Effectiveness of fluoride</td>
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<tr>
<td>Rogers (2016). The prevalence of caries free deciduous teeth upon visual examination in kindergarten settings: a preventive approach to oral health for children in a regional/rural community in southwest Victoria</td>
<td>To investigate the condition of preschool children’s teeth in our regional/rural area as a guide to the success or failure of oral health messages reaching remote regions.</td>
<td>3</td>
<td>29,173 kindergarten students with Medicaid in North Carolina</td>
<td>Outreach program to promote oral health education and dental screenings</td>
<td>Children who received help from an adult were less likely to have dental caries</td>
<td>Individual risk profile of children is unknown; weak referral process after identification of oral disease</td>
<td>Family</td>
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<tr>
<td>Listl (2011). Family composition and children's dental</td>
<td>To assess whether children's dental health behavior differs between</td>
<td>3</td>
<td>13,904 German children under 14 years old</td>
<td>Oral health exam; survey; interviews</td>
<td>Children who grew up with adoptive parents or step-parents</td>
<td>Time durations of where a child lived were not taken into</td>
<td>Family</td>
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<td>Objective</td>
<td>Sample</td>
<td>Design</td>
<td>Data</td>
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<tr>
<td>Chi (2013). Relationshi p Between Medical Well Baby Visits and First Dental Examinations for Young Children in Medicaid</td>
<td>To examine the relationship between preventive well baby visits (WBVs) and the timing of first dental examinations for young Medicaid-enrolled children</td>
<td>4</td>
<td>Number and timing of well-baby visits</td>
<td>Higher number of well-baby visits significantly affected first dental exams</td>
<td>Children may visit dentist due to disease, not prevention</td>
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<tr>
<td>de Silva-Sanigorski (2012). Children may visit dentist due to disease, not prevention</td>
<td>To advance understanding of the influence of psychosocial factors on oral health by examining how parental self-efficacy (with regard to acting on their child's oral health needs) and oral health knowledge relate to parental and</td>
<td>6</td>
<td>Survey</td>
<td>Higher parental self-efficacy was associated with more frequent toothbrushing (by parent and child), and more frequent visits to a dental profession</td>
<td>Parents perceived the children had a poor quality of life; did not discuss who was performing dental exams</td>
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<td>Study</td>
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<td>Saied-Moallemi (2012)</td>
<td>To evaluate the influence of mothers’ oral health-related knowledge and attitudes on the toothbrushing behaviour and dental health of their children and to compare the effect of these maternal aspects on child’s oral health.</td>
<td>457 mother/child pair in Taiwan</td>
<td>Survey</td>
<td>Higher parental self-efficacy was associated with more frequent toothbrushing (by parent and child), and more frequent visits to a dental professional</td>
<td>Family</td>
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<tr>
<td>Dye (2011)</td>
<td>To describe the relationship between the oral health of young children and that of their mothers.</td>
<td>1,184 mother/child pairs</td>
<td>Survey</td>
<td>Children of mothers who had high levels of untreated caries were more than 3 times as likely to have higher</td>
<td>Family</td>
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<td>Study Title</td>
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<td>Kranz (2015). Effects of Physician-Based Preventive Oral Health Services on Dental Caries</td>
<td>To evaluate the impact of comprehensive preventive oral health services, which includes screening and risk assessment, fluoride varnish applications, and parental oral health counseling, provided in medical offices by nondental providers, on dental caries</td>
<td>4</td>
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<td>Rolnick (2015). Fluoride varnish application in the primary care setting: a clinical study</td>
<td>To examine how an intervention to apply fluoride varnish in a primary health setting to all young, low-income children was implemented and sustained</td>
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<td>Habbu</td>
<td>To assess the</td>
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</table>

**Levels of caries experience**

- Patients with and without POHS (≥3) had fewer dental caries than those with 0 visits.
- Individual risk profile of children is unknown.

**Oral health recommendations**

- Fluoride varnish programs can be implemented in the primary care setting and sustained.
- Older article; strong recommendations.
<table>
<thead>
<tr>
<th>Reference</th>
<th>Type</th>
<th>Recommendation Statement</th>
<th>Database for Articles</th>
<th>Measures of Evidence</th>
<th>Synthesis of Education for Oral Health</th>
<th>Oral Health Recommendations</th>
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<tr>
<td>Moyer (2014). Prevention of Dental Caries in Children From Birth Through Age 5 Years: US Preventive Services Task Force Recommendation Statement</td>
<td>To provide recommendations for screening of caries, assessment of risk for future caries, and the effectiveness of various interventions that have possible benefits in preventing caries</td>
<td>1</td>
<td>Children receiving care by primary care clinicians and those receiving care from dental providers or not at all</td>
<td>Primary care clinicians should apply fluoride varnish to primary teeth of all infants and children starting at the age of primary tooth eruption</td>
<td>Grade B recommendations; does not recommend a risk-based approach to FV application</td>
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<tr>
<td>Title</td>
<td>Description</td>
<td>Page</td>
<td>Recommendations</td>
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<tr>
<td>Maintain and Improving the Oral Health of Young Children</td>
<td>Maintain oral health across the life span</td>
<td>7</td>
<td>Nurse practitioners (NPs) are in a prime position to improve the oral health of their patients and to address these health disparities</td>
<td>Oral health recommendations</td>
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<tr>
<td>Jablonski (2014). Maintain oral health across the life span</td>
<td>To provide NPs with concrete information regarding caries risk assessment for children and adults, chemical therapy to prevent progression of the dental caries process, and appropriate patient education to prevent caries.</td>
<td>7</td>
<td>Recommendations: know how to assess caries risk, know how to assess a child's exposure</td>
<td>Clinical report only</td>
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<td>Clark (2014). Fluoride Use in Caries Prevention in the Primary Care Setting</td>
<td>To clarify the use of available fluoride modalities for caries prevention in the primary care setting and to assist pediatricians</td>
<td>7</td>
<td>Recommendations: know how to assess caries risk, know how to assess a child's exposure</td>
<td>Oral health recommendations</td>
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<td>Author</td>
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<td>Chou (2013)</td>
<td>Preventing Dental Caries in Children &lt;5 Years: Systematic Review</td>
<td>1</td>
<td>Medline and Cochrane databases</td>
<td>Oral fluoride supplementation is effective at reducing caries incidence</td>
<td>Only 2 databases used</td>
<td></td>
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<tr>
<td>Mahat (2013)</td>
<td>Early Childhood Caries and the Role of the Pediatric Nurse Practitioner</td>
<td>7</td>
<td>Medline and Cochrane databases</td>
<td>Only 2 databases used</td>
<td>Oral health recommendations</td>
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<tr>
<td>Author/Title</td>
<td>Methodology</td>
<td>Findings</td>
<td>Recommendations</td>
<td>Notes</td>
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<tr>
<td>Stearn (2012). Cost-effectiveness of Preventive Oral Health Care in Medical Offices for Young Medicaid Enrollees</td>
<td>To estimate the cost-effectiveness of a medical office–based preventive oral health program in North Carolina called Into the Mouths of Babes (IMB)</td>
<td>Likely to have 32% cost savings for hospital episodes</td>
<td>Not randomized; did not account for indirect costs</td>
<td>Oral health recommendations</td>
<td></td>
<td></td>
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<tr>
<td>Kagihara (2009). Assessment, management</td>
<td>To discuss the role of primary care health providers in</td>
<td>&quot;The importance of early identification&quot;</td>
<td>Poor explanation of search strategies</td>
<td>Oral health recommendations</td>
<td></td>
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<tr>
<td>Study</td>
<td>Objective</td>
<td>Sample Size</td>
<td>Data Collection Method</td>
<td>Findings</td>
<td>Inclusion/Exclusion Criteria</td>
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<tr>
<td>Apkabio (2008). Mothers'/Guardians' Knowledge about Promoting Children's Oral Health</td>
<td>To explore what mothers know about promoting good oral health in their children and which information they need, and to identify whether factors such as age, years of education, and number of children in the family</td>
<td>6</td>
<td>Survey/interview</td>
<td>Only 25.7% of the respondents gave correct answers to a question concerning the age at which children should start seeing a dentist, and only 32.4%</td>
<td>Not a validated survey</td>
<td>SES</td>
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<td>Study</td>
<td>Methodology</td>
<td>N</td>
<td>Outcome</td>
<td>Findings</td>
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<tr>
<td>Kumar (2014).</td>
<td>To conduct a systematic review of the published literature to assess the influence of parental Socio-Economic Status (SES) and home environment on children’s OHRQoL</td>
<td>1</td>
<td>Early Childhood Oral Health Impact Scale and Children’s Percepti on Questionnaire</td>
<td>Findings from majority of the studies suggest that the children from families with high income, parental education and family economy had better OHRQoL</td>
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<tr>
<td>Kramer (2013). Exploring the impact of oral diseases and disorders on quality</td>
<td>To assess the impact of oral health outcomes on Oral Health-Related Quality of Life (OHRQoL) in a school-based survey</td>
<td>4</td>
<td>Prevalence for at least one positive score was 3x higher for children with high income</td>
<td>Quality of life</td>
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<tr>
<td>Study</td>
<td>Methodology</td>
<td>Findings</td>
<td>Cross-sectional design</td>
<td>Quality of life</td>
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<tr>
<td>Seirawan (2012). The Impact of Oral Health on the Academic Performance of Disadvantaged Children</td>
<td>To measure the impact of dental diseases on the academic performance of disadvantaged children by sociodemographic characteristics and access to care determinants. 1495 disadvantaged elementary and high school students from Los Angeles County public schools (includes children age 2-5 in WIC programs)</td>
<td>Students with toothache were almost 4 times more likely to have a low grade point average. Disadvantaged children in one county only; 68% of parents declined to participate.</td>
<td>3</td>
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<td>Martins-Junior (2012). Impact of Early Childhood Caries on the Oral Health-Related Quality of Life of Preschool Children and Their Parents</td>
<td>To evaluate the impact of ECC on the oral health-related quality of life of preschool children and their parents/caregivers. 638 children aged 2-5 years. Oral health exam; ECOHIS and SES survey.</td>
<td>The findings of this present study confirm the hypothesis that ECC adversely affects the OHRQoL of preschool children and their families.</td>
<td>6</td>
<td></td>
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</table>
### Divaris (2011). Caregivers' oral health literacy and their young children's oral health-related quality-of-life

To investigate the association of caregivers' oral health literacy (OHL) with their children's oral health related quality of life (C-OHRQoL) and explore literacy as a modifier in the association between children's oral health status (COHS) and C-OHRQoL.  

| 6 | 203 caregiver s of children aged 3-5 years | Oral health exam; survey | Poor oral health habits resulted in lower quality of life scores | Only female caregivers included |

### Jackson (2011). Impact of Poor Oral Health on Children's School Attendance and Performance

To determine the relationship between children's oral health status and school attendance and performance.  

<p>| 6 | 2,120 school children in North Carolina | Survey | Children with poor oral health status were nearly 3 times more likely than were their counterparts to miss school as a result of dental pain | Most children were male, white, and had private health insurance; school performance may be overestimated; no oral health exam | Quality of life |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Sample Size</th>
<th>Methods</th>
<th>Findings</th>
<th>Quality of life</th>
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</thead>
<tbody>
<tr>
<td>Miller (2010). Impact of Caregiver Literacy on Children's Oral Health Outcomes</td>
<td>To examine the relationship of primary caregivers' literacy with children's oral health outcomes.</td>
<td>6</td>
<td>Children &lt;7 years old who presented for first dental examination and their caregiver (86% bio moms)</td>
<td>Caregiver literacy is significantly associate with children's dental disease status.</td>
<td>Cross-sectional design; questionnaire only in English</td>
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<tr>
<td>Abanto (2010). Impact of oral diseases and disorders on oral health-related quality of life of preschool children</td>
<td>To assess the impact of early childhood caries (ECC), traumatic dental injuries (TDI) and malocclusions on the oral health-related quality of life (OHRQoL) of children between 2 and 5 years of age adjusted by socioeconomi factors.</td>
<td>6</td>
<td>Survey of 260 preschool children Oral health exam and ECOHIS survey</td>
<td>Dental caries measureably affective quality of life of parent and child</td>
<td>Strong statistical analysis</td>
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<tr>
<td>Grembowski (2009). Linking mother access to dental care and child oral health</td>
<td>To examine whether low-income mothers, who have a regular source of dental care (RSDC), rate the dental health of their children</td>
<td>6</td>
<td>Mothers of Medicaid-enrolled 3-6 year olds Measure dental rating of child oral health, regular source of dental care, family</td>
<td>Across racial/ethnic groups, low-income mothers who have a regular source of care</td>
<td>Disproportionate stratified random sampling; unable to generalize due to survey nonrepso</td>
</tr>
<tr>
<td>Young children higher than mothers without an RSDC.</td>
<td>and place characteristics, and child characteristics</td>
<td>Dental care rate the dental health of their young children higher than mothers without an RSDC.</td>
<td>Barbosa (2008). Oral health-related quality of life in children: Part III. Is there agreement between parents in rating their children’s oral health-related quality of life? A systematic review. To identify the literature on the nature, extent and the pattern of agreement/disagreement between parent and child reports about child OHRQoL and assess the association between them.</td>
<td>5 articles from MEDLINE, ISI, Lilacs and Scielo</td>
<td>Oral health impacts child and family</td>
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<td>---</td>
<td>---</td>
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<td>---</td>
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<tr>
<td>Blumenshine (2008). Children's School Performance: Impact of General and Oral</td>
<td>To examine the impact of poor oral health status on school performance</td>
<td>6</td>
<td>3,973 respondents (kindergarten or higher) in North Carolina</td>
<td>Survey</td>
<td>Children with poor general health, poor oral health, and both poor oral</td>
</tr>
</tbody>
</table>
Health and general health were significantly related to parent perception of poor school performance; school performance may be overestimated; no oral health exam.

| Warren (2009). A longitudinal study of dental caries risk among very young low SES children | To assess baseline risk factors for 18-month caries prevalence as part of a longitudinal study of high-risk children | 2 | 212 children in Iowa | Oral health exam | Sugar beverages are a significant predictor of ECC in high-risk populations | Limited sample by demographic | SES |
Appendix C
Dorothy Orem’s Self-Care Deficit Nursing Theory

Self-care – tooth brushing, preventive dental care visits

Deficit – lack of knowledge, inadequate anticipatory guidance

Self-care agency – ability to find a dental provider, ability to have transportation to appointments

Nursing agency - healthcare providers

Self-care demands – need for comprehensive oral and dental health care

Conditioning Factors

Conditioning Factors
**Appendix D**

**Logic Model for DNP Project**

**Student: Katie Hansen**

**Inquiry, PICOTS:** In children age 2-5 years old, does the application of topical fluoride varnish by their primary care provider, along with a family-centered anticipatory guidance bundle from Healthy Teeth, Healthy Me, result in increased twice daily brushing compliance and increased preventive visits to a dental provider over a 3 month period when compared to children who do not receive fluoride varnish and comprehensive anticipatory guidance by their primary care provider?

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Intervention(s)</th>
<th>Outputs</th>
<th>Outcomes -- Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence, sub-topics</td>
<td>EBP intervention which is supported by the evidence in the Input column</td>
<td>The participants</td>
<td>Outcome(s) to be measured</td>
</tr>
<tr>
<td>1. Effectiveness of fluoride varnish</td>
<td>Fluoride varnish application and family centered anticipatory guidance</td>
<td>Children presenting for well-child check age 2-5 years</td>
<td>Increase in patients brushing teeth twice daily</td>
</tr>
<tr>
<td>2. Impact of family</td>
<td></td>
<td>Site</td>
<td>Outcome to be measured</td>
</tr>
<tr>
<td>3. Socio-economic status</td>
<td></td>
<td>Pediatric primary care clinic</td>
<td>Consumption of sugary drinks</td>
</tr>
<tr>
<td>4. Quality of life</td>
<td></td>
<td>Time Frame</td>
<td></td>
</tr>
<tr>
<td>5. Current practice</td>
<td>6 months</td>
<td>Consent or assent needed</td>
<td>No</td>
</tr>
<tr>
<td>6. Oral health recommendations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Major Facilitators or Contributors**

1. Faculty advisors
2. Clinical preceptor
3. Facility provider

**Major Barriers or Challenges**

1. Site selection
2. Outcome measurement
3. Retention and follow-up

**Major steps of the intervention**

1. Well child check
2. Anticipatory guidance/ FV application
3. Follow up phone call in 1 month to see if patient has decreased sugary drink consumption
4. Discuss frequency of tooth brushing during phone call
5. Comparison of patients who received interventions

**Measurement tool(s)**

1. Follow up phone calls
2. Medical record reports

**Statistical analysis to be used**

1. Mann-Whitney U
2. SPSS software

**Outcomes**

- Fewer days of missed school and work due to dental complaints
- Financial savings in UC and ED visits for dental complaints
- Outcome(s) to be measured (Consumption of sugary drinks)
- Outcomes to be measured (Decrease in patients brushing teeth twice daily)

**Consent or assent needed**

- No

**Other person(s) collecting data**

- No

**Others directly involved in consent or data collection**

- No
with those who did not
## Appendix E
### Budget Table

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Equation</th>
<th>Cost</th>
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<tbody>
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<td>Printed educational materials</td>
<td>Operational</td>
<td>$0.39/page x 11 pages x 100 copies</td>
<td>$429</td>
</tr>
<tr>
<td>iPad</td>
<td>Operational</td>
<td>$300 (facility already has an iPad available for use)</td>
<td></td>
</tr>
<tr>
<td>Educational time for providers</td>
<td>Salary</td>
<td>$50/hr x 20 providers for 30 minutes</td>
<td>$500</td>
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<tr>
<td>Student investigator time</td>
<td>Salary</td>
<td>$25/hr x 165 hours</td>
<td>$2,062.50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>$5,354.00</td>
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</table>
Hello!

As a Doctor of Nursing student, I am working on a project to improve the health of your child's mouth and teeth. At your child's appointment, your child's provider will talk to you about ways to improve your child's mouth and teeth health, including brushing your child's teeth regularly and limiting sugary drinks.

You will receive a phone call from me about one month after your appointment today to talk about your child's mouth and teeth health. Your participation in the phone call is completely voluntary and will not affect the care you receive from this clinic. If you have any questions or concerns, please talk to your child's provider during the visit today.

Katie Hansen, RN, BSN, CPN
Student Investigator, UMKC, DNP-S
Baseline Data
- Baseline data collected by clinic RNs from all children age 2-5 presenting to Clinic A and Clinic B for a well-child check from 8/14-9/10
- Questions: How often does your child brush his or her teeth each day? How many cups of sugary drinks does your child consume each day?

Clinic A
- Intervention group
- Follow up phone call at one month to discuss status of oral care habits (completed by student investigator)
- Follow up phone calls to begin 9/18

Clinic B
- Standard group
- Follow up phone call at one month to discuss status of oral care habits (completed by student investigator)
- Follow up phone calls to begin 9/18

Intervention by clinic staff
- Intervention begins 9/11
- Clinic A RN or CA gives iPad to child and caregiver before provider enters room and plays Healthy Teeth, Healthy Me video
- Clinic B (non-intervention clinic) receives standard anticipatory guidance

Data
- Gathered from 8/14-12/4
- Gathered by student investigator by follow up phone calls
- Provider perception survey to be sent from 12/1-12/15

Data analysis
- Conducted from 12/15-2/5
- SPSS statistical analysis run by statistician

Dissemination
- Poster presentation in August 2017
- Possible publication
- Dissemination of results to clinic
Appendix H
Intervention Material
A creation of

sesameworkshop.

The nonprofit educational organization behind Sesame Street and so much more

Sesame Workshop is the nonprofit educational organization that revolutionized children’s television programming with the landmark Sesame Street. The Workshop produces local Sesame Street programs, seen in over 140 countries, and other acclaimed shows to help bridge the literacy gap, including The Electric Company. Beyond television, the Workshop produces content for multiple media platforms on a wide range of issues including literacy, health, and military deployment. Initiatives meet specific needs to help young children and families develop critical skills, acquire healthy habits, and build emotional strength to prepare them for lifelong learning. Learn more at www.sesameworkshop.org.

Major funding provided by

The Sam’s Club Giving Program supports community-based programs that empower young people, families and small businesses to make smart choices that lead to healthier and brighter futures. Through cash and in-kind donations, as well as the dedication of associates, Sam’s Club is committed to making an impact in areas that align with the company, and with the passions and interests of members.

Generous support from

MetLife Foundation

MetLife Foundation was established in 1971 to carry on MetLife’s longstanding tradition of corporate contributions and community involvement. The Foundation is committed to building a secure future for individuals and communities worldwide. Through programs focusing on empowering older adults, preparing young people and building livable communities, MetLife Foundation increases access and opportunities for people of all ages. Since it was established, MetLife Foundation has made more than $500 million in grants and $75 million in program related investments. For more information visit www.metlife.org.
Caring for your child's teeth early on is an important part of keeping her whole body healthy. Healthy baby teeth help your child talk, eat healthy foods, and develop strong permanent teeth. Children with healthy teeth are better able to learn in school, maintain strong bodies, feel good about themselves, and build lifelong healthy habits.

This family guide includes fun ideas and information to help you care for your child's teeth and to help her know—her teeth count!

🔥 Happy, Healthy Smiles: tips on brushing and caring for teeth

🍎 Strong Teeth, Strong Bodies: foods that are good for your child's teeth and growing body

💡 Team Teeth: ways you and your child can connect with the people who care for his teeth

👩‍🏫 PLUS: Children's Section: "Let's Pretend" story, "A-Maze-ing Apples" activity, and the "Super Teeth" chart

Together, you and your child can discover how fun and easy it can be to take care of his teeth.
Healthy teeth start at home. There are lots of simple things you can do to help your young child learn to take good care of his mouth—especially his first (baby) teeth. Use these ideas to get started.

**Tooth Together Time!**

Brushing at least twice a day—after breakfast and before bed—is one of the best ways to take care of teeth. Help your child become a Super Brusher with these tips:

- **My Turn, Your Turn:** Preschoolers are still developing the muscles and skills they need to brush on their own. Help your child brush his teeth, and then ask him to take the lead and imitate your actions. Have fun as you remind him to rinse and spit out the toothpaste.

- **'Round and 'Round:** Show your child how to brush in gentle circles, remembering to include the front, back, inside, and outside of his teeth (even the ones that are hard to reach!), and how to open up to brush the tops of teeth.

- **Brush and Groove:** Your child should brush for about two minutes. Play music or sing "The A-B-C Song" to your child to help him keep track of the time.
Tools of the Trade

These two trusty tools help keep your child’s teeth (and body!) healthy for a lifetime:

**Toothbrush**

- Look for children’s toothbrushes that have small heads and soft bristles. Add to your child’s interest by letting her choose the color.
- Keep germs away by rinsing your child’s toothbrush after brushing. Stand it up to help it air dry.
- Change your child’s toothbrush about once every three months. If the bristles are no longer straight and firm, or if your child has been sick, change the toothbrush right away.

**Toothpaste**

- Help your child learn to use the right amount by putting toothpaste on her brush (just a smear for children under age 2; a pea-size amount for children ages 2 to 5).

**AGES AND STAGES**

Here’s how to keep your child’s smile healthy, age by age:

**Infant and toddler:**
- Use a soft washcloth to clean your baby’s gums and teeth every day, as soon as they come in.
- Schedule your child’s first dental visit within six months after his first tooth, or by his first birthday.
- Soothe your teething child by gently rubbing her gums with a clean finger, cold washcloth, or chilled teething ring.

**Preschooler:**
- Remember to help your child brush his teeth.
- Set up regular dental visits. There you can also find out more about common concerns, such as thumb-sucking and mouth injuries.

**School-age child:**
- Keep track of your child’s brushing and flossing routines. Help out when needed.
- During your child’s regular dental visits, get advice about caring for baby teeth or new, permanent teeth. Feel free to ask for advice on issues from using mouth guards for sports to chewing gum with xylitol (a sugar substitute).
SNACK TIPS

#1
Be sure your child brushes, or at least rinses, his teeth after snacks and after drinks such as milk or juice.

#2
Space your child's meals and snacks to give his mouth time to wash away food.

Strong teeth, strong bodies

Foods that are good for teeth can also give your growing child the energy she needs to learn and play.

Healthy Choices

Talk to your child about "anytime" and "sometime" foods.

- "Anytime" foods have lots of nutrients and can be eaten any time. They include fresh fruit (apples, pears); fresh vegetables (carrots, celery); low-fat cheese; water. Encourage your child to "eat a rainbow" of colorful fruits and vegetables.

- "Sometime" foods are usually sugary, salty, or fatty. They should be eaten only once in a while. "Sometime" foods include sticky sweets (caramels, chewy fruit "snacks"); sugary or acidic snacks and drinks (sour candy, sports drinks); starchy snacks (chips, cookies).
team teeth

Help keep a strong team for your child’s teeth in place:
Visit your dental office twice a year and stay in touch with your child’s primary-care physician and nurse.

Meet the Team

- Let your child know that the dentist and dental hygienist are her teeth’s best friends. You might say, “The dentist or dental hygienist count and check teeth to make sure they’re healthy.”

- Ask your child’s primary-care physician or nurse to look at your child’s teeth at his next visit. Each can help spot any problems early and make sure your child gets care if he needs it.

Getting Ready

By talking to your child about visiting the dental office, you can help your child’s visit go smoothly. Stay positive, and explain that a dental checkup is an important part of keeping healthy.

- Describe to your child what will happen, including sitting in a big chair, having pictures taken of teeth, and having gooey fluoride (like vitamins for teeth) applied. Read with your child the photo story, “Let’s Pretend” on pages 6–7, to help her learn more about the new experiences she will have and things she will see during the dental visit.

- At the end of the visit, you will have an opportunity to ask your dentist or hygienist questions about how to keep your child’s teeth healthy.
let’s pretend

Use the words in blue and pictures to act out a visit to the dental office. The next time your child has a dental visit, encourage him to look for some of the dental tools that Abby mentions.

Brushy brush! Pretend to brush your teeth. My mommy always helps me brush mine. All done? Let’s pretend to walk to the dental office.

Here we are! Look, there’s the dental hygienist! Let’s wave hello. Check out that cool chair.

The dental hygienist is putting on a mask and some gloves. She’s ready to count your teeth now. Open wide! Wow, she’s using a light and a cute, little mirror to look inside your mouth. She’s touching every tooth with a silver tool. Can you feel that?
Hi! It's me, Abby.

Have you ever visited the dental office? Let's pretend we're going there together!

Cleaning time! The dental hygienist has neat silver tools to clean your teeth. She rests a curved straw in your mouth that helps get the water out. Gulp, gulp, gulp. Oh, she's done! Now she'll brush your teeth with a buzzy toothbrush and a little bit of toothpaste. Let's make a buzz sound, like the toothbrush!

Pretend to rinse your mouth one more time. Here comes the dentist, ready to look inside your mouth. Open again! She says your teeth look healthy. Must be all that brushing.

You're all done! Let's skip home. You know, that imaginary visit really made me want to show off my smile. Thanks for pretending with me!
a-maze-ing apples

Grover loves crunchy fruits and vegetables!
They are good for your teeth and body.

Follow the apples with your finger to help
Grover find his way to the picnic. What other
crunchy foods do you see along the way?
Use this chart to encourage good habits that can make teeth healthy and strong. Hang it somewhere that is easy for your child to see. When your child finishes brushing, make a check together for a job well done. When she sees the filled-in chart, your Super Brusher will have something to smile about!

What other things have you done to keep your teeth healthy?

To make copies of the Super Teeth Chart, visit www.sesamestreet.org/teeth.
Appendix I
Project Timeline

June-July 2017
- Project approval by professor and advisor
- Site confirmation
- Facilitator secured
- IRB submission and approval - non-human subjects research

August-November 2017
- Recruitment of participants by clinic staff
- Implementation of intervention in clinic
- Follow up phone calls conducted by student investigator to both intervention and non-intervention arm

February-April 2017
- Statistical data analysis
- Dissemination of results to clinic and general public
Appendix J
Measurement Tools

1. How often does your child brush his or her teeth each day?
   A) 0
   B) 1
   C) 2
   D) More than 2

2. How many cups of sugary drinks does your child consume each day?
   A) 0
   B) 1-2
   C) 3-4
   D) 5 or more

3. How helpful was the oral health material given to you at the Well Child Check in teaching you more about your child’s oral health?
   A) Very helpful
   B) Somewhat helpful
   C) Not helpful
   D) I didn’t receive any materials
# Appendix L

## Statistical Analysis Tables

<table>
<thead>
<tr>
<th>Statistical Analysis Table</th>
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<tbody>
<tr>
<td><strong>PICOTS</strong></td>
</tr>
<tr>
<td><strong>Purpose Statement</strong></td>
</tr>
<tr>
<td><strong>Null Hypothesis</strong></td>
</tr>
<tr>
<td><strong>Independent Variable</strong></td>
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<tr>
<td><strong>Dependent Variable</strong></td>
</tr>
<tr>
<td><strong>Statistical Comparison Test for Primary Outcome</strong></td>
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</tbody>
</table>

## Comparing Clinic A pre-intervention to Clinic A post-intervention

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Asymptotic p-value</th>
<th>Median pre-intervention</th>
<th>Median post-intervention</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth brushing</td>
<td>0.62</td>
<td>2</td>
<td>2</td>
<td>Retain the null hypothesis</td>
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<tr>
<td>Sugary drink</td>
<td>&lt;.000</td>
<td>2</td>
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### Clinic B teeth brushing

<table>
<thead>
<tr>
<th></th>
<th>Zero</th>
<th>One</th>
<th>Two</th>
<th>More than 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>1 (3.3%)</td>
<td>8 (26.7%)</td>
<td>17 (56.7%)</td>
<td>4 (13.3%)</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>0 (0%)</td>
<td>17 (56.7%)</td>
<td>12 (40%)</td>
<td>1 (3.3%)</td>
</tr>
</tbody>
</table>

### Clinic B sugary drink consumption

<table>
<thead>
<tr>
<th></th>
<th>Zero</th>
<th>1-2</th>
<th>3-4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>6 (20%)</td>
<td>21 (70%)</td>
<td>3 (10%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>5 (16.7%)</td>
<td>9 (30%)</td>
<td>8 (26.7%)</td>
<td>8 (26.7%)</td>
</tr>
</tbody>
</table>

### Clinic A teeth brushing

<table>
<thead>
<tr>
<th></th>
<th>Zero</th>
<th>One</th>
<th>Two</th>
<th>More than 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>0 (0%)</td>
<td>20 (48.8%)</td>
<td>20 (48.8%)</td>
<td>1 (2.4%)</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>0 (0%)</td>
<td>12 (27.9%)</td>
<td>30 (69.8%)</td>
<td>1 (2.3%)</td>
</tr>
</tbody>
</table>

### Clinic A sugary drink consumption

<table>
<thead>
<tr>
<th></th>
<th>Zero</th>
<th>1-2</th>
<th>3-4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-intervention</td>
<td>3 (7.3%)</td>
<td>27 (65.9%)</td>
<td>11 (26.8%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>6 (14%)</td>
<td>29 (67.4%)</td>
<td>7 (16.3%)</td>
<td>1 (2.3%)</td>
</tr>
</tbody>
</table>

**Comparing Clinic B pre-intervention to Clinic B post-intervention**

<table>
<thead>
<tr>
<th></th>
<th>p-value</th>
<th>Teeth brushing</th>
<th>Sugary drink consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth brushing</td>
<td>.037</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sugary drink consumption</td>
<td>.317</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

**Comparing Clinic A post-intervention to Clinic B post-intervention**

<table>
<thead>
<tr>
<th></th>
<th>p-value</th>
<th>Teeth brushing</th>
<th>Sugary drink consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth brushing</td>
<td>.022</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sugary drink consumption</td>
<td>.014</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Clinic B teeth brushing**

<table>
<thead>
<tr>
<th></th>
<th>p-value</th>
<th>T-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth brushing</td>
<td>.037</td>
<td>2</td>
<td>Reject the null hypothesis</td>
</tr>
<tr>
<td>Sugary drink consumption</td>
<td>.317</td>
<td>2</td>
<td>Retain the null hypothesis</td>
</tr>
</tbody>
</table>

**Clinic B sugary drink consumption**

<table>
<thead>
<tr>
<th></th>
<th>p-value</th>
<th>T-test</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teeth brushing</td>
<td>.022</td>
<td>2</td>
<td>Reject the null hypothesis</td>
</tr>
<tr>
<td>Sugary drink consumption</td>
<td>.014</td>
<td>1</td>
<td>Reject the null hypothesis</td>
</tr>
</tbody>
</table>
### Clinic A and Clinic B post-intervention teeth brushing

<table>
<thead>
<tr>
<th></th>
<th>Zero</th>
<th>One</th>
<th>Two</th>
<th>More than 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>0 (0%)</td>
<td>12 (27.9%)</td>
<td>30 (69.8%)</td>
<td>1 (2.3%)</td>
</tr>
<tr>
<td>Purple</td>
<td>0 (0%)</td>
<td>17 (56.7%)</td>
<td>12 (40%)</td>
<td>1 (3.3%)</td>
</tr>
</tbody>
</table>

### Clinic A and Clinic B post-intervention sugary drink consumption

<table>
<thead>
<tr>
<th></th>
<th>Zero</th>
<th>1-2</th>
<th>3-4</th>
<th>5 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>6 (14%)</td>
<td>29 (67.4%)</td>
<td>7 (16.3%)</td>
<td>1 (2.3%)</td>
</tr>
<tr>
<td>Purple</td>
<td>5 (16.7%)</td>
<td>9 (30%)</td>
<td>8 (26.7%)</td>
<td>8 (26.7%)</td>
</tr>
</tbody>
</table>
Appendix M
IRB Approval Letter
July 17, 2017

Members of Institutional Review Board
Kansas City, Missouri

IRB Members,
This letter serves to provide documentation regarding Kathryn Hansen’s Doctor of Nursing Practice (DNP) project proposal. Ms. Hansen obtained approval for her project proposal, *Pediatric Oral Health Promotion in Primary Care* from the School of Nursing DNP faculty committee on July 17, 2017.

If I can provide any further information, please feel free to contact me.
Sincerely,

Susan J. Kimble, DNP, RN, ANP-BC, FAANP
Clinical Associate Professor
DNP Programs Director
UMKC School of Nursing and Health Studies
816-235-5962
kimbles@umkc.edu