

IMPLEMENTATION OF FLUORIDE VARNISH AS A QUALITY IMPROVEMENT
INTERVENTION FOR PRIMARY CARE PROVIDERS IN A RURAL PEDIATRIC
POPULATION

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ABSTRACT

The purpose of this study was to study implementation of preventive oral health interventions by primary care providers in a rural pediatric population. Acknowledgement of dental caries as a preventable communicable disease indicates that activities and interventions to prevent oral complications are being expanded to multiple disciplines. Primary care providers are acknowledged as partners in health and prevention of chronic illness. Practices including oral risk assessment and fluoride varnish are proposed interventions recommended by dental care providers to be included in primary care in rural or high risk populations not receiving dental services. Collaboration between dental services and pediatric primary care in the communities of central and northwestern North Dakota is proposed as a method to bridge the gap of health disparities between urban and rural counterparts.

The study included five rural clinics and involved 25 providers in education regarding fluoride varnish application and oral risk assessment. Rating of oral health knowledge before the intervention and after the intervention on a 1 to 10 scale by primary care providers was 6.05 (n=23) and 6.33 (n=18) respectively. Following education and introduction of fluoride varnish into practice, 16.7% (n=18) primary care providers indicated using fluoride varnish. Nurses were the majority of respondents in the study and the most likely to perform fluoride varnish. Implications from the study indicate further incentives will be necessary to increase the number of primary care patients treated with fluoride varnish. The North Dakota Oral Health program reports 4,609 Medicaid claims were filed for oral prevention services by primary care providers in 2012-2014, the period during which concerted efforts to educate providers and implement fluoride varnish were initiated.

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TABLE OF CONTENTS

ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
CHAPTER ONE.....	1
Introduction.....	1
Background/Significance of Proposed Project.....	3
Intervention.....	5
CHAPTER TWO.....	8
Literature Review and Synthesis.....	8
Definitions.....	16
Theoretical Framework.....	17
Congruence of the Project to the Organization’s Strategic Plan/Goals.....	20
Project Objectives.....	21
CHAPTER THREE.....	23
Project Design.....	23
Evaluation Plan.....	27
Protection of Human Subjects.....	29
Inclusion of Women and Children.....	30
Potential Benefits.....	30
CHAPTER FOUR.....	32
Results.....	32
Project Outcomes.....	33

Increase in Basic Knowledge of Oral Health Prevention, Screening and Application of Fluoride Varnish by 25 Health Care Providers	35
CHAPTER FIVE	45
Results	45
Discussion	48
Limitations and Assumptions.....	52
Implications for Practice	53
Conclusion	55
REFERENCES	57
APPENDIX A. CURRICULUM	63
APPENDIX B. DIFFUSION OF INNOVATIONS (ROGERS, 2003; ROBINSON, 2009) PROJECT APPLICATION	65
APPENDIX C. DIFFUSION OF INNOVATION POPULATIONS	66
APPENDIX D. ORAL HEALTH LOGIC MODEL.....	67
APPENDIX E. RATING SCALE.....	68
APPENDIX F. IRB APPROVAL LETTER.....	70
APPENDIX G. TIMELINE	71
APPENDIX H. SURVEY RESULTS	72
APPENDIX I. NUMBER OF DENTISTS BY COUNTY (2014) UND CENTER FOR FAMILY MEDICINE.....	74

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Projected cost of education intervention to healthcare employers.....	24
2. Intervention versus treatment of one dental carie cost.....	25
3. Respondent certification	37
4. Respondent experience	37
5. Respondents' use of fluoride varnish.....	38
6. Means and significance of survey items	42
7. Oral health knowledge rating significance	43

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Diffusion of Innovation theory predictive curve	19
2. Survey items.....	26
3. Rating of oral health knowledge	39
4. Oral health knowledge components.....	40

CHAPTER ONE

Introduction

Oral health continues to top the United States (US) health priority list as Health People 2020 was released in December of 2010 (US Department of Health and Human Services DHHS, 2010). Especially alarming is the fact that 50% of the pediatric population in the US experience early childhood caries (ECC) (US DHHS, 2010). Despite making the list as a health priority in 2010 as well, improvements in dental health have not reached target values for many indicators and in underserved populations. Indicators from Healthy People 2010 show progress in the United States in meeting several of the oral health objectives such as increased dental sealants and 75% increase in water fluoridation (US DHHS, 2010). But, as health disparities between ethnic groups and socioeconomic groups have persisted, the focus to decrease the amount of ECC persists. The purpose of this project is to implement an evidence based practice dental intervention and oral risk assessment to decrease ECC in pediatric clients in medical care facilities in northwestern North Dakota.

The persistent disparities in oral health outcomes and limited access to dental care remain a major challenge in the United States (Jones et al., 2013). Statistics from the Agency for Health Care Research and Quality (2011) show that only 30% of individuals deemed as low-income had a dental visit in 2004, while 60% of individuals with a high income had a dental visit in the same year. A report from the Center for Medicare and Medicaid services (2011) indicated that only 40% of children that are enrolled in state programs, Medicaid and Children's Health Service Insurance Programs, had received dental services in 2009. This nationwide trend of low usage of dental delivery is also present in North Dakota. The Centers for Disease Control and Prevention (CDC, 2011) indicated that North Dakota is recognized as a state with higher

incidence of pediatric dental caries than the national average and higher inaccessibility to dental care for underserved residents. Data gathered from the National Survey of Children's Health (NSCH) and summarized by Yineman and Reed (2012) indicated that 64.7% of children with public insurance had teeth in good or excellent condition, while 78% of children with private insurance experienced teeth in good or excellent condition.

Classified as a preventable disease condition, early childhood caries (ECC) afflicts 50% of the pediatric population nationwide, and 55% of children under the age of 8 in North Dakota according to Healthy People 2020 data. Special populations of concern in the state of ND are Head Start preschool children experiencing a prevalence of 17.4% of untreated dental caries in comparison to the national target of 9% (North Dakota Department of Health, 2010). According to the recently released report of state oral health statistics, Oral Health in North Dakota: Burden of Disease and Plan for the Future 2012-2017 (Yineman & Reed, 2012), the rate of North Dakota third graders that experience dental decay is 54.6%, far above the target of 42% proposed by the Healthy People 2020 initiative for oral health. In addition, 18.3 % of rural North Dakota third graders experienced rampant decay as opposed to 8.4% of their urban North Dakota counterparts (Yineman & Reed, 2012).

The focus of this project will include an intervention for collaboration between oral health partners and primary care providers to implement prevention activities. Measures currently in place having a positive impact on oral health include 97% of North Dakota communities with adequate water fluoridation and 60.4% of North Dakota third graders reporting dental sealants (Yineman & Reed, 2012). However, to reduce dental caries and decay, further strategies have been studied that have shown promising results. Particularly, several evidence based practices can be implemented at the primary care provider visit, including oral

risk assessment and fluoride varnish treatments (IOM, 2011). A primary goal for our state in the next 10 years is to develop and promote partnerships and policies intended to improve oral health for all North Dakotans (NDDoH, 2012).

Background/Significance of Proposed Project

Health promotion is described as interventions designed to help people make lifestyle changes including education and activities that create living environments conducive to health (Pender, Murdaugh, & Parsons, 2011). Activities known to promote health have shown to be a more cost effective use of health care dollars. Results of calculations of burdens of illness show health promotion and preventive behaviors are a better use of scarce financial resources than disease treatment (Pizzi & Lofland, 2006). A common example of health promotion is weight loss, physical exercise, and decreased salt intake to decrease blood pressure values as opposed to medication usage (Gee et al., 2012). Related to oral health, a health promotion model focused on increased access to care and oral health education implemented by auxiliary dental providers demonstrated a decrease in the incidence in dental caries experiences by 50% over a 10 year period in Australia (Mathu-Muju et al., 2013).

Oral health has been deemed by Healthy People 2020 authors to be activities in which people can participate and prevent complications of disease and reduce the burden of illness (US DHHS, 2013). Specific measures individuals can perform as key components to healthy oral behavior include brushing, flossing, and regular dental exams, as well as avoiding tobacco products and cariogenic foods. Community health practices contributing to improved oral health include water fluoridation and dental sealant programs (Griffin, 2009). Reduction in costs estimated by a Canadian study in 2011 for preventive care as opposed to restorative care was \$47.82 per child in one year (Mathu-Muju et al., 2013).

The North Dakota Department of Health partnered with the North Dakota Oral Health Coalition to provide a needs assessment of North Dakota dental disease and provide guidance for future planning. The resultant burden of oral disease document (Yineman & Reed, 2012) indicated North Dakotans experience prevalent oral disease and identified groups at high risk. A majority of North Dakota third graders (55%) were identified as having cavities and/or dental fillings, far more than the 42% target goal set by Healthy People 2010. The burden of oral disease was deemed significant, and the Oral Health Coalition set goals, objectives and strategies to provide additional services to individuals who experience disparities in oral health (Yineman & Reed, 2012).

One of the specific goals of the current initiative to improve oral health includes partnering between dental care providers and medical providers to meet target objectives. Specific preventive interventions prevalent in literature shown to be cost effective and within the scope of medical practice include oral risk assessment and dental varnish treatments (Hadley, Long, & Sledge, 2011). One study showed dentists treat an average of two Medicaid clients a month, while transitioning dental care to medical care providers potentially can treat 42% more of a state's Medicaid population (Hadley et al., 2011). Training medical providers including physicians, advanced practice providers and nurses to perform oral risk assessments and apply dental varnish has been initiated in nine states (Sams et al., 2013).

States that have already demonstrated success educating medical providers in oral assessment and implementation of a fluoride varnish treatment program include Washington, Colorado, and Arkansas (CDC, 2013). Studies in other states from high risk population also reported improvements in prevention of dental caries. A Florida Head Start program showed a

reversal of dental caries in 80 percent of the children and a California group reported children not receiving fluoride varnish were twice as likely to get dental caries (Hadley et al., 2011).

Reports from Sams et al., 2013, indicated in 2008 approximately 75% of state Medicaid programs were reimbursing medical providers for dental preventive services including fluoride varnish treatment. Legislation passed by the North Dakota Legislature in 2007 expanded scope of practice for medical providers to apply dental varnish and made reimbursement available to Medicaid and Healthy Steps eligible providers (ND Century Code 43-17-43 and 43-28-02.6). The state of North Dakota will reimburse \$43 for application of fluoride varnish to a Healthy Steps Children's Health Insurance enrollee and \$23.18 for a Medicaid enrollee. Increased use of dental fluoride varnish was recognized by the state of North Dakota to be a preventive practice supported by clinical evidence and encouraged at medical care providers' offices to increase the number of children receiving the intervention (Yineman & Reed, 2012).

The purpose of the project is to implement and evaluate the assessment of oral health and provision of fluoride varnish treatments by primary care providers to a pediatric population in rural health care facilities in northwest North Dakota. It is hypothesized following education and initiation of the fluoride varnish treatment and assessment of oral health, primary care providers will report more use of this intervention and increased knowledge about oral health six months after implementation of the intervention. The strategic goal of the intervention is to improve oral health by decreasing the incidence of dental caries in North Dakota's pediatric population.

Intervention

Smiles for Life Course Module Six curriculum includes training for caries risk assessment, fluoride varnish application and oral health counseling. Appropriate oral health care education can contribute to a provider's performance of these tasks during a well-child exam and

are included in the Smiles for Life curriculum published by the Society of Teachers of Family Medicine. The curriculum is certified by the American Dental Association and the North Dakota State Board of Dental Examiners. The North Dakota legislature authorized legislation to allow physicians, nurse practitioners, physician assistants, registered nurses and licensed practical nurses to assess oral health and apply fluoride varnish after training with the Smiles for Life curriculum (ND Century Code, 2007). In order to apply varnish and be reimbursed, the provider must work for a clinic enrolled in Medicaid and/or Healthy Steps Children's Health Insurance Provider Program (CHIP). Coding for topical application of fluoride varnish can be billed for a Medicaid or CHIP client with the CPT code D1206 and will be reimbursed by state funds for the services.

Fluoride is effective by working to protect the tooth from decay by incorporating into the structure during tooth formation, by enhancing the remineralization process of the dental surface, and by interfering with decay-causing bacteria on the teeth (ASTDD, 2007). Fluoride varnish treatment was recommended by the American Dental Association (2013) as a Grade 1a intervention for children age 0-6 at moderate to high risk for development of dental caries. The ADA panel study included 17 randomized clinical trials evaluating the effectiveness of 2.26% fluoride varnish. Expert dental panels indicate this fluoride intervention has shown a decrease in future dental caries experiences (ADA, 2013). Safety of fluoride in varnish treatment was described by the American Public Health Association as comparable or lower to other fluoride applications, such as tooth brushing with fluoridated toothpaste (APHA, 2010).

The intervention in this project was the presentation of Module Six (Appendix A) in the Smiles for Life curriculum including how to assess oral health and apply fluoride varnish. Completion of this module and further interventions by educators in oral health can assist clinics

and providers of healthcare to incorporate oral health strategies as part of health promotion. The goal of the Oral Health Initiative coalition and this practice improvement project was to educate as many health professionals as possible to provide assessment and treatment to underserved populations in North Dakota.

The education was preceded by and followed by assessment of oral health knowledge and descriptive data of participants in the education intervention by use of a survey tool. Improvement in short term and long term objectives were hoped to be achieved by education of health care professionals in multiple settings. Due to geographical circumstances, the goal was to provide the intervention to rural clinics in the rural and northwestern North Dakota region.

As a doctor of nursing practice student and history as an educator, I was able to partner with the DentaQuest grant administrators and North Dakota Department of Oral Health Program employees, Bobbie Will, BS, and Jaclyn Seefelt, RDH, BS. After the approval of this project, contact was made with northwestern North Dakota sites to implement the assessment and fluoride varnish intervention in primary care clinic practices.

CHAPTER TWO

Literature Review and Synthesis

The Centers for Disease Control and Prevention (2011) indicates tooth decay affects 25% of U.S. children age 2-5 years and 50% of 12-15 year olds. However, numbers are higher for low income children, reports indicating up to 50% of young children and 66% of adolescents experience tooth decay in this population. Despite effective practices for preventing oral disease including community and personal interventions, dental caries and tooth decay persists. Dental caries remain the leading chronic disease of children age five to seventeen years (CDC, 2011). The cost associated with dental services in the United States was \$108 billion for 2010 (CDC, 2011).

The CDC in its 2011 Oral Health report cited North Dakota as having unmet dental needs as one of the top ranking issues for low-income residents. The CDC “Oral Health- At A Glance” website promotes North Dakotas efforts to address this dental need. The CDC reports the state is addressing these dental needs by prioritizing strategies and advocating for legislation to improve dental care. The CDC cites development of the Oral Health Program created by the North Dakota Department of Health and formation of the Oral Health Coalition as positive measures to address ongoing problems with dental concerns in the state.

Activities in the state intended to advocate for the underserved population include legislative efforts to improve access including the previously mentioned Medicaid reimbursements for dental prevention services, funds for mobile dental care for underserved children and a loan repayment program for dentists practicing in public health or nonprofit dental clinics (CDC, 2011). The work plan created by the North Dakota Oral Health Coalition and published in the Burden of Oral Disease and Plan for the Future outlines future goals for

planning services and activities for the state. In the ensuing discussion, the impact of dental decay on health will be discussed. Examination of successes in other states and programs with meaningful results are also cited in the literature review.

Dental decay persists as a chronic illness in developed nations and continues to plague experts in public health. Dental health also impacts overall health, including documented cases of mortality. Cited as a situation that shows the relationship between medical care and dental care includes the case of a young boy that died after a bacterial infection spread from a dental abscess to his brain. (Kagihara, Niederhauser, & Stark, 2008). Hypothetically the death could have been prevented with appropriate dental care. Other consequences children suffer from development of dental caries were identified by Kagihara et al. (2008) as, “Pain, bacteremia, high treatment costs, reduced growth and development, speech disorders, and premature tooth loss with its’ sequelae of compromised chewing, loss of self-esteem, and harm to the permanent dentition (p. 1).”

The article proposed the partnering of dental practices and medical practices to assist in decreasing the amount of dental caries experienced by vulnerable children age 2 -5 years. Health practices addressed by health care providers in well child exams such as nutrition, bottle feeding and infectious organism transfer from caregiver to infant were recognized as contributing factors to early childhood caries encountered in medical practices. Numbers from national health centers show the very young child is the most at risk for development of dental caries and can possibly be identified by the primary care physician or pediatrician.

Specific interventions that can be included in prevention at the primary care visit are proposed to be “risk assessment, intervention, education and referral” (Kagihara et al., 2008, p. 1). This study suggests young children at high risk for development of dental caries can be better

served by early identification and referral by health care clinicians. Appropriate assessment and risk appraisal can prompt the healthcare provider to make early referrals to dental care providers of patients deemed high risk for dental caries or already experiencing dental decay. Studies indicated that early referral before two years of age can result in fewer dental treatments necessary in age 0 to 5 (Bell et al., 2014).

Recognition of mutual pediatric clients at high risk for dental caries between dentistry and primary care can assist with earlier intervention and prevention. Early recognition and intervention are key components of well child health. Kaghara, Niederhauser, and Stark (2008) propose anticipatory guidance for oral health care of infants and children will play a “significant role” in preventing early childhood dental caries and establish better oral health practices in the pediatric clientele. Partnerships between medical providers create collaborative practices projected to meet better health outcomes for clients.

Further detrimental impacts related to poor oral health was studied by Seirwan, Faust, and Mulligan (2012). Measuring the impact on academic performance of disadvantaged children’s dental disease management was performed by the authors in Los Angeles County. In a group of 1495 students age 5 to 18, students were screened for test scores, attendance, and parent’s absence from work for dental problems. The study hypothesized students who were disadvantaged, including socio-economic disadvantages and minority children, would experience lower academic performance and more lost school hours. The hypothesis was based on estimates in the literature indicate 51 million hours are lost annually due to dental disease (Seirawan et al., 2012).

Students experiencing urgent dental needs missed statistically more school than students without urgent dental needs, 9% compared with 5%. The impact was also reflected by parental

report including economic disadvantages and loss of promotional opportunities due to missed days of work with their child with dental needs. The average amount of work loss reported by parents of students with dental problems was 2.53 days annually as opposed to 1 day annually in children without urgent dental needs (Seirawan et al., 2012).

Several detrimental findings were reported related to poor dental care in the study. Results indicated children with toothaches in elementary and high school in a disadvantaged county were four times more likely to have a lower grade average (Seirawan et al., 2012). In addition, 16% of children with toothaches experiencing inaccessible dental care missed school in comparison to 3% of students without toothaches. Students with severe caries also reported feelings of embarrassment, withdrawal, anxiety, and other social interaction affections.

The indirect costs related to the nation for dental problems are cited as “enormous” though actual figures are not included in this study (Seirawan et al., 2012). Not only did the costs incurred relate to direct dental costs, the cost of lost work days and impact on family economics affected quality of life. The recommendations of the study was implementation of oral health education and programs occurring in integrated settings of health care clinics and social programs to help eliminate dental disparities.

Another study performed in North Carolina (Jackson et al., 2011) specifically tracked the number of absent school days related to dental pain or infection. Dental pain or infection accounted for 4% of missed days and had an impact on learning. While the findings were not alarming overall, the students missing school due to dental pain or infection were students experiencing poorer academic performance. Parent reports from the study indicated grades were significantly lower for students with poor dental health and showed dental pain and infection may interfere with student learning.

Using multivariate statistics and logic regression, the Jackson et al. (2011) study showed a direct correlation between poorer oral health and poor school performance. Jackson et al. (2011) concluded that poor oral health has a greater impact on school performance than projected. Originally the study was targeting school attendance, but the correlation with school performance and poor oral health was stronger. The study reiterated the public health burden of oral disease on education and recommended more dental services for children with public or no insurance.

Griffin (2009) reported 50% of 0-15 year old children experience dental caries. The most disturbing statistics are from the low-income populations that indicate children living below the federal poverty level are twice as likely to experience untreated dental decay (Griffin, 2009). The findings of more untreated decay amongst low income children are consistent with reports from Healthy People 2020 (DHHS, 2013), the Agency for Healthcare Research and Quality (2011), the Center for Disease Control (2011), and the Center for Medicare and Medicaid Services (2011). Public dental insurance is accessible to children from lower income homes, but utilization of these services is lower than their higher income counterparts. Factors contributing to this lack of utilization include lack of dentists accepting public insurance coverage, undereducated parents regarding dental prevention and available services, and differing health beliefs about the benefits of preventive oral care (Griffin, 2009).

One strategy recommended by Griffin (2009) to increase the supply of dental personnel to meet the shortage of providers to underserved populations is by use of an auxiliary dental provider. Success has been demonstrated in several state models by increasing the scope of practice for dental hygienists to provide preventive dental services. Twelve states allow Medicaid reimbursement for delivery of preventive services by dental hygienists. Coverage of

underserved areas by dental hygienists with expanded practice should be considered as a possible alternative to improved coverage of pediatric oral services.

Another recommendation by Griffin is to create a class of dental provider known as the dental health aide therapist (DHAT). Successful implementation of the dental health therapist has occurred in 50 countries worldwide with impressive reduction of dental caries experiences (Mathu-Muju et al., 2013). Currently however, programs training dental health aide therapists in the United States are available only in two states, Alaska and Minnesota. Expanding dental services by creating another level of care is not well developed and successful implementation in the United States remains anecdotal.

A third strategy suggested by Griffin (2009) is the use of health care professionals other than dentists to provide preventive dental care. Primarily the recommendation to use primary care providers is to reach those individuals the least serviced by the current dental delivery system. Training of medical professionals to provide preventive dental services to patients at high risk of dental caries is the proposed method to decrease the number of dental caries experiences. Several states were cited in the report as successfully increasing the number of high risk children receiving preventive dental services.

One success was reported from North Carolina's program of reimbursement of medical care providers for preventive dental services to Medicaid eligible children. Reports from North Carolina by Slade, et al., 2007, show coverage of preventive dental care at the medical providers' office resulted in 10% more Medicaid eligible children receiving services. Interestingly, the number of children was higher despite only three percent of pediatricians performing regular preventive dental services.

Other states have implemented programs of preventive oral care for Medicaid populations using fluoride varnish treatments (Hadley et al., 2011). Washington states' success stems from recognition of the burden of disease. Children's Hospital and Regional Medical Center operating room was most frequently used for surgical dental care. Calculating the cost benefit analysis of fluoride varnish treatments as opposed to surgical dental care for Medicaid enrolled children potentially could save \$1.5 million. An intensive state program was launched and currently data is being collected to monitor outcomes related to preventive dental services (Washington Department of Health, 2013).

A report from the state of Wisconsin (Okunseri, et al., 2009) demonstrated successful training and implementation of a fluoride varnish intervention positively benefitted the pediatric population studied. The state identified children enrolled in Medicaid were underserved by current dental services and passed legislation to reimburse medical providers for fluoride varnish treatment. Since it was noted a larger number of pediatric clients regularly attend medical visits but were not attending dental visits, preventive dental services were expanded. Wisconsin experiences a relatively high participation rate of pediatricians and medical care providers in state Medicaid programs and recognized the potential point of contact for dental services.

Funding for the implementation of fluoride varnish treatments for Medicaid enrolled children showed the increase of this health promotion practice to 48.6% by medical providers. Providers reported that the varnish was relatively easy to apply and pediatricians were willing to accept reimbursement for the practice (Okunseri et al., 2009). Children between the ages of 1 to 2 were the age group most impacted by the program, but other positive results were reported. A total of 28, 303 claims were reported in this study for one year following the implementation of the fluoride varnish reimbursement.

Several unanticipated benefits of implementation of the fluoride varnish treatment were cited by Okunser et al., (2009) including an increase in interventions (fluoride varnish treatments) by dentists and an increase in the number of Native American children receiving the intervention. The study did not include research to determine why dentists increased their provision of fluoride varnish treatments during the study time, but it is proposed preventive services were assigned more value than previously. The large increase in the Native American children population was viewed as beneficial as this minority group reportedly receives inadequate dental services (MMWR, 2011).

Fluoride application by medical care providers was successful as reported in a small study in a Native American population over a period of three years in a Head Start program (Holve, 2008). Overall, 368 children were included in this study and received fluoride varnish treatments at the age of 9, 12, 15, 18, 24 and 30 months. Children who received four or more fluoride varnish treatments demonstrated a significant decrease in the amount of decayed, missing or filled surfaces ($p = 0.005$). The rates of decayed, missing or filled surfaces were 15.5 in the children with the four or more fluoride varnish applications and 23.6 in children who did not receive treatments. The overall report of a decrease in dental caries experience was 35%.

The strength of this study was the homogenous group studied over a period of three years and included little to no migration of subjects during the study period. Limitations included the lack of randomization and lack of control over confounding variables e.g. cariogenic food exposure, home dental practices. Included in the analysis of the study was the actual cost of the treatment, six dollars for all the fluoride varnish treatments, as opposed to a full mouth restoration of \$2500. Results from the study suggested that application of fluoride varnish in a high risk population can demonstrate a decrease in the development of early childhood caries.

Definitions

Dental sealant. Dental (pit and fissure) sealants are clear or opaque plastic resinous materials applied to the chewing surfaces of the back teeth to prevent dental caries (Community Preventive Task Services, 2013).

Dental decay. Destruction of the tooth enamel-hard, outer layer of the tooth (ADA, 2013).

Early childhood caries. The presence of one or more decayed (cavitated or non-cavitated lesions), missing, or filled tooth surfaces in any primary teeth (ADA, 2013).

Fluoride varnish treatment. Application of 2.26% sodium fluoride in a colophony/resin base to the surface of the teeth (ADA, 2013).

Oral health. Oral health is the absence of disease of the teeth or gums including no experience of dental caries or tooth decay. Oral health is also engaging in activities that prevent dental caries or tooth decay including tooth brushing, flossing, eating nutritious foods, avoiding cariogenic food and beverages, avoidance of tobacco products, ingestion of fluoridated water and application of dental sealants. (North Dakota Department of Health fact sheet, 2013)

Oral risk assessment. Determination of the likelihood of the incidence of caries by identification of one or more areas of enamel demineralization, enamel hypoplasia, visible plaque, inadequate fluoride exposure, exposure to simple sugars more than three times between meals, lack of routine dental care and Medicaid eligibility (Kagihara et al., 2008).

Pediatric. Individuals aged birth to 17 years (Yineman & Reed, 2012).

Rural. According to the United States Census Bureau in 2010, any “cluster” area that is less 2,500 people is designated as rural (US Department of Commerce, 2013).

Stakeholders. The principal investigator, the dissertation committee, Department of Health Oral Health Program employees administrating the DentaQuest oral health grant.

Underserved population. Populations within geographic areas that are not adequately served by available health care resources calculated by four components including: ratio of primary care providers, percentage of individuals below the federal poverty level, infant mortality rate and individuals over the age of 65. The population calculations are performed by the secretary of the Department of Health, Education and Welfare (National Health Policy Forum, 2010).

Urban. Territory, persons and housing units in places of 2,500 or more persons, incorporated as cities, villages and towns (US Department of Commerce, 2013).

Theoretical Framework

The framework used to guide this project was the theory of Diffusion of Innovations (Rogers, E., 2003). Rogers original work on the theory began in the 1930's and spanned seven decades. His work has gained international acclaim, and its success in multiple social systems is recognized by his peers as applicable to many settings including health care (Isong, et al., 2011). The theory describes how a population or system adopts an innovation, whether it is “an idea, behavior or object that is perceived as new by its audience” (Robinson, 2009, p. 1).

The Diffusion of Innovations theory has been used in 6,000 research studies and recognizes five qualities predictively responsible for determining the success of a “new” intervention (Robinson, 2009). The qualities are 1) relative advantage, 2) compatibility with existing values and practices, 3) simplicity and ease of use, 4) trialability, and 5) observable results. Innovations considered successful are the ideas or products able to evolve as the users identify needs or request modification of the innovation. The strength of the qualities of the

innovation and evolution of the idea to meet the five qualities suggest whether an innovation will succeed or fail. The theory is founded on the ability of the innovation to meet needs and change rather than the requirement for people to change.

Oral health care in the medical providers' setting is potentially perceived as a new concept by this researcher, and previous studies by Isong, et al., 2011, and Lewis, Lynch & Richardson, 2005, indicated providers adoption of preventive oral care creates mixed reactions. The most frequent barriers to the adoption of fluoride varnish and implementation of oral risk assessment were cited by medical providers as lack of time and logistical challenges (Isong, et al, 2011). Understanding the fit of the barriers and ability to change the innovation marketability to fit the five qualities of the Diffusion of Innovation theory guided planning for the intervention. Recognizing barriers and anticipating response of primary care providers to the perceived challenges of the practice were addressed in the education session.

The five qualities were addressed to guide data collection, but also to plan approaches to education in the settings chosen for the intervention. Inherent in the education module was the simplicity and ease of use of fluoride varnish. The co-researcher or dental hygienist applied varnish either to a child or a participant at the education session to demonstrate ease of use. Recognition of the advantage of fluoride varnish was also addressed in the education module presentation. Additionally the co-researcher or North Dakota Department of Health representative discussed compatibility with current visits by outlining reimbursement methods with billing staff. The concept of trialability was addressed through the DentaQuest grant which supplied fluoride varnish kits to the clinics free of charge for implementation of use. Projected application to the project and survey tool was included in Appendix B, but flexibility was required during visits to the clinic depending on the participation by primary care providers.

Interestingly, diffusion scholars have noted a bell curve prediction model for the propensity of individuals in a population to adopt change (Figure 1). Innovators are those that become passionate advocates for the innovation (change), early adopters are quick to understand the benefits of an innovation and help to take the change forward but may lose energy in the process later on, early majority adopters will change once evidence of benefits from change are noted, late majority dislike change and will adopt change only when influenced by others, and laggards are the challengers of innovative ideas (Robertson, 2009).

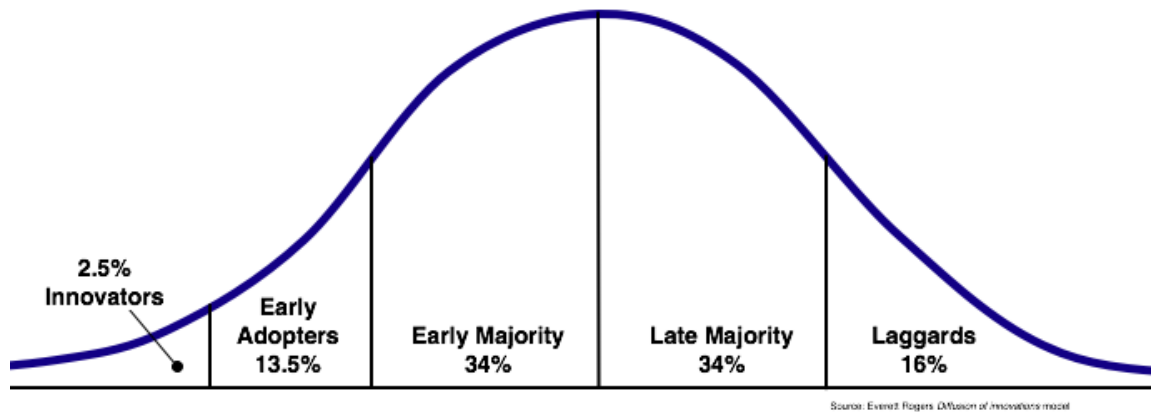


Figure 1. Diffusion of innovation theory predictive curve

The influence of the bell curve of the diffusion of change model was considered in planning the intervention and the bell curve model provided the idea for the one month follow-up to the intervention. Understanding real and perceived barriers to the adoption of the innovative oral health intervention were important to the stakeholders of this project to decrease resistance to the intervention. Follow up with innovators and early adopters within the clinic can and did assist the implementation of an innovation. Barriers were addressed at several points during the study as the co-researcher made contact with clinic managers.

Congruence of the Project to the Organization's Strategic Plan/Goals

The North Dakota Department of Health and North Dakota Oral Health Coalition have received funding from a DentaQuest grant to pursue the goals and objectives outlined in the Burden of Disease and Plan for the Future document (Yineman & Reed, 2012). The Plan for the Future overall goal most applicable to this project is Goal 1: Develop and promote partnerships and policies that improve oral health for all North Dakotans. This is further identified as Objective 1.2: by 2017, the number of effective and sustainable partnerships between key oral and medical health organizations aimed at improving the integration between oral and medical health will have increased by 10 percent. Specifically the project will occur within the strategy: “Integrate oral and medical health where possible” (Yineman & Reed, 2012, p. 82).

The North Dakota Department of Health, acting on the plan for the future for oral health received a DentaQuest foundation grant. The grant work plan includes the priority to collaborate services including medical and dental professionals to achieve better oral health. Within the DentaQuest work plan (2012) created by the Oral Health Coalition, this project would meet goal 2: Increase basic knowledge of oral health prevention, screening and application of fluoride varnish to 50 healthcare professionals and staff. DentaQuest grantees are already working in eastern and urban medical facilities; this project attempted to incorporate rural communities in the northwest region of North Dakota.

Referring to the NDSU Department of Nursing Graduate Program handbook, the focus of this clinical dissertation project fits the category: “Health Promotion and Community Health: Continuity of care project” (NDSU, 2012, p. 16). The clinical dissertation project meets the objective: Launch collaborative health promotion program in a vulnerable community population and evaluate outcomes. Since this project included collecting data from healthcare providers and

not the population served, it could also be congruent with the type of project translating research into practice application. The impetus for this project was “collaboration on a legislative healthcare-related change using research evidence for support” (NDSU, 2012, p. 16).

Project Objectives

The logic model was used as a guide to plot strategic objectives including short term and long term outcomes (Appendix D). Included in the model were activities to occur during the project including scheduling education/implementation sessions at the clinics in Williston, Tioga, Stanley, Garrison, and New Town originally. Partway into the study further sessions were requested for Washburn and Watford City by the North Dakota Department of Health Oral Health Program. The education/implementation sessions were coordinated with the DentaQuest grant administrators, clinic managers, and the co-investigator. Outcomes were developed based on indicators appearing in the study by Yineman and Reed (2012), DentaQuest grant application objectives (2012) and projection of activities possible within one year’s time.

Strategic objectives

1. Improve prevention and educational activities that promote oral health in a rural pediatric population.
2. Expand interdisciplinary partnerships between healthcare providers to improve oral health.

Long term outcomes

Potential decrease in the number of reported dental caries in the Basic Screening Survey of North Dakota Third-Graders by rural respondents beyond the scope of this project.

Short term outcomes

1. Increase basic knowledge of oral health prevention, screening and application of fluoride varnish to 25 healthcare professionals that work with rural pediatric clients.
2. The number of fluoride varnish treatments applied to pediatric clients in rural healthcare facilities will increase potentially as further studied by the North Dakota Oral Health Program. Currently outside the scope and timeframe of this project.
3. Increase the number of early referrals to dentists of high risk pediatric patients potentially reported by the Rural Center for Medicine. Currently outside the scope and timeframe of this project.

CHAPTER THREE

Project Design

The population of interest in this study was healthcare providers able by law to apply the preventive dental care intervention including oral risk assessment and fluoride varnish treatment. The study group was providers in northwestern North Dakota employed by clinics in the rural towns of Stanley, Garrison, Tioga, Watford City and New Town. The city of Williston is also on the list of providers targeted by the ND Department of Health, so the intervention was also provided there. Medical care professionals included in the intervention were medical doctors, nurse practitioners, physician assistants and nurses.

Education sessions were coordinated with clinic managers at a time convenient for the clinics' providers. Lunch was provided through DentaQuest grant funds as allowable. The clinics were provided the intervention including the Smiles for Life curriculum, fluoride varnish application kits, preventive dental care handouts for parents, and contact information for questions and referrals as needed. Billing information including a procedure code for the fluoride application was provided to the clinic's manager and billing department. Continuing education credit was granted for attendance at the education session or completion of the Smiles for Life course six outside of the workplace.

Funding by the state DentaQuest grant provided resources for education and follow-up for progress towards the oral health goals including fluoride varnish kits and education materials. The time spent by North Dakota Department of Health employees was also provided by the DentaQuest grant. The researcher's time for implementation of the intervention, education sessions and follow-up was considered scholarly exercise and occurred at the expense of the co-researcher. A projection of cost to the health care providers was performed in Table 1. The

education was provided free of charge to the clinic and the supplies were covered by grant funds. The clinics paid their employees to attend for one hour. The approximated cost for an employee hour was \$20 based on rural wages and paid by the clinics.

Table 1.

Projected cost of education intervention to healthcare employers

Item	Projected cost	Cost
Education by RN		Free
Dental varnish kits (\$1/kit paid by DentaQuest grant)		Free
One hour employee time X 20 employees	\$200	\$200
Free CEU for providers X 20 employees	-\$200	\$-200
Total		\$0

Cost analysis of the fluoride intervention was also calculated in Table 2. Potential costs of long term integration of the interventions included the cost of fluoride varnish application kits and 5-10 minutes of billable time for the primary care provider or designated personnel to perform the oral assessment, apply fluoride varnish, and provide counseling for dental care and follow up. One kit can be purchased for one to two dollars depending on the supplier, and the provider cost calculated using the most expensive provider to apply the fluoride varnish. Current rural rates for a provider well visit was \$155 for a 45 minute visit (Garrison Family Clinic).

Table 2.

Intervention versus treatment of one dental carie cost (Johnson, n.d. & Splichal, 2013)

Dentist	Cost (Dollars)	Dental varnish	Cost (Dollars)
Amalgam filling (1 tooth)	100	Kit x4 for best effect	4
Dental charge	110-200	Application x 4 for best effect	72-144
Total	\$210-300		\$76-148

Additional data collected during the study were providers’ oral health knowledge and attitudes regarding oral health assessment and fluoride varnish application. The design of this project was collection of data before and after the implementation of the oral health education intervention. The before-after comparison included provider rating of basic knowledge of oral health, attitudes about oral health and fluoride varnish value, comfort with oral risk assessment and fluoride varnish application, the number of fluoride varnish treatments applied, and the number of referrals of dentists made. A survey tool was used to collect data from the providers participating in the Smiles for Life training (Appendix E).

The survey tool was designed from input by the DentaQuest grant administrators and addresses goals designed to evaluate oral health prevention knowledge and screening comfort amongst health care providers. In addition, inclusion of items similar to previous surveys of medical care providers includes criteria regarding oral health knowledge and fluoride varnish attitudes (Isong et al., 2011). Questions related to provider’s knowledge of oral health include:

One Likert scale item: I feel comfortable performing an oral risk assessment, one rating question on a 0 to 10 scale: current oral health knowledge, and one question regarding history of formal oral training: yes or no. The items related to attitudes regarding oral health and fluoride varnish application include Likert scale items: I feel oral health is a priority of care, I feel that fluoride dental varnish is an effective preventive practice against dental decay, I feel confident performing fluoride dental varnish in my practice, and I feel that it is cost effective to provide dental varnish to a client.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel oral health is a priority of care	5	4	3	2	1
I feel comfortable performing an oral risk assessment	5	4	3	2	1
I know how to refer my client to a dental provider	5	4	3	2	1
I feel that dental varnish is an effective preventive practice against dental decay	5	4	3	2	1
I feel confident performing dental varnish in my practice	5	4	3	2	1
I feel that it is cost effective to provide dental varnish to a client	5	4	3	2	1

Figure 2. Survey items

Attitudes regarding fluoride varnish items were also designed using the Diffusion of Innovation theory as guidance and survey data collected by Isong et al, 2011. The diffusion of

innovation theory was the basis for items in the survey of medical providers in Massachusetts measuring oral health knowledge, fluoride varnish attitudes and characteristics of the medical providers (Isong et al., 2011). The survey results were reported in literature, but the survey did not include reliability or validity analysis.

Additional demographic collection from the survey included: practice level of the provider: LPN, RN, FNP, PA or MD, years of experience, previous dental training and geographic site. This data was collected before and after the education session intervention. Data collection six months following the intervention had planned to include counting the number of D1206 claims made for each clinic in children age 0-18 years with reporting of the statistics. The initial number should be 0, and following the intervention, the total number was collected and reported. Descriptive demographic items are reported in a table format. Item analysis of the attitude includes pre post calculations of t scores between Likert scores of items one through six.

Surveys were administered before the education session intervention by the researcher. Six months following the intervention, the survey was again administered by the researcher at all the sites receiving the education intervention. Calculation of pre and post assessment comfort level with fluoride varnish application was performed. Further recommendations for implications for practice are included based on survey data, state reports, and comments on the survey regarding the oral health prevention practices.

Evaluation Plan

The plan included survey of the participants prior to the oral health education with the indicated survey tool. After the education was provided, a follow-up phone call one month was conducted to determine needs or questions having arisen regarding the education activities. The

assessment performed one month after the initiation of the intervention included asking the following questions to the clinic provider:

1. Have you been able to perform an oral risk assessment on your pediatric patients?
2. Do you feel comfortable performing the oral risk assessment, or would you like further information or training?
3. Have you applied fluoride varnish to pediatric patients?
4. Have you encountered barriers to providing fluoride varnish?
5. Is there further information or training you feel would assist with fluoride varnish application?

An attempt to visit with staff members participating in the training was made following the education session. Identification of an early adopter was performed for continued communication with the clinic. The researcher and stakeholders from the Department of Health Oral Health Program anticipated the intervention of oral risk assessment and fluoride varnish application to follow the diffusion of innovation bell curve response by medical providers in the clinics. Answers to the five questions above were expected to prompt further activities for adoption of the intervention. The activities may include providing more supplies to the clinic, providing more education materials or further instruction regarding preventive dental techniques if necessary.

Six months following the education, the survey was re-administered to the participants of the education program at each clinic site. Data collection and analysis was performed at the six month interval. The researcher attempted to include the same number of subjects from each site in the six month reassessment. Contact was made with the clinic manager prior to reassessment

and plans included a clinic visit when the most providers of preventive dental services were available.

Protection of Human Subjects

The policy outlined by the NDSU Institution Review Board was followed by the principle investigator submitting an application for IRB approval of the project. The IRB process was implemented following the approval of the preliminary proposal and recommended changes by the proposal committee were considered. The NDSU IRB process pursued was an expedited review based on the analysis of a low risk to subjects. According to NDSU policy, an expedited review was requested based on the criteria that the potential harm to subjects is minimal. IRB approval was received (Appendix F).

Advice from the North Dakota Department of Health regarding risk to subjects was solicited. The current analysis of risk to subjects by the North Dakota Department of Health institutional review process indicates:

“Our IRB contact and he said we have no need to go through exemption process. He said you better make sure you are ok with your institution but all we are doing is sharing oral health education with providers, asking questions on oral health knowledge and asking them to implement fluoride varnish services. We are not collecting data or providing any services (then HIPPA concern) directly to the patients.” (Will, 2013).

The harm to subjects is minimal.

The project was planned for individual permission to be obtained from each rural healthcare facility prior to the educational training. Informed consent was solicited from individuals receiving the survey tool prior to the education intervention as outlined by the NDSU

Institutional Review Procedures 7.2. No confidential information was solicited and the only identifiers used in the study were used for the location of the intervention to determine evaluation numbers for follow-up at the previously specified locations. The data was reported in aggregate fashion without identifying information.

Inclusion of Women and Children

No inclusion of women as a study group occurred in this project. Gender was not reported in any manner or included in the survey tool. Children will be included only as recipients of evidence based standards of care including oral risk assessment and fluoride varnish treatment. Safety and efficacy of the intervention have been cited and no sources used in this study indicated that fluoride varnish treatment is harmful. No attempt was made to solicit data from children.

Potential Benefits

Potential benefits of this project include achieving strategic objectives as outlined by the logic model. Improvements in rates of using an evidence based intervention for pediatric dental health should increase long term outcomes. Overall numbers reported of dental caries experienced by North Dakota school age children should potentially decrease. International reports of incorporation of preventive dental practices have shown decreased experiences of early childhood caries (Mathu-Muju, et al., 2013).

Importance of knowledge to be gained includes demonstrating partnerships between medical and dental providers to achieve target outcomes as recognized by national programs (US DHHS, n.d.). Creating models of interprofessional education is postulated to improve competencies and create institutional change for the good of primary health practice (Curran, et al., 2007). Inclusion of practices promoting health instead of treating disease are important for

primary care providers to implement for well child examination to achieve the best outcomes for our pediatric patients.

CHAPTER FOUR

Results

Using a logic model can define the priority actions to achieve a purpose or guide activities, inputs and outputs. Outcomes planned using the logic guidance process should fit with an overall plan or objective (Appendix D). Every decade the United States Department of Health and Human Services analyzes data and sets strategic objectives for the expenditure of national monies and resources to improve the health of the nation. Oral health has maintained a spot in the Healthy People 2020 plan to achieve the goal: prevent and control oral and craniofacial diseases, conditions and injuries, and improve access to preventive services and dental care.

The purpose of the study, based on the strategic plan for improving oral health, was to enhance practice of oral risk assessment and fluoride varnish applications by primary care providers through an education intervention. The potential outcome was to meet the objective of improved access to preventive services and decrease the number of dental caries reports by rural pediatric responders. Within the scope and time frame of the study, evaluation of primary care response including the rating of oral health knowledge was performed. Education encounters were arranged at five of seven rural clinics and fluoride varnish kits and other printed oral care resources were supplied to medical providers at the clinics for preventive dental care interventions.

Activities in the rural clinics included planning an education session, providing training for oral risk assessment and fluoride varnish application, and provision of resources for implementation of preventive services. The education training session was preceded by administration of the project survey (Appendix E). Follow-up at each clinic was done within six to nine months by a phone call to the clinic contact and the survey was re-administered.

Collaboration with the North Dakota Oral Health grant personnel was developed to choose training sites, supply fluoride varnish kits, and augment printed resources to the clinics regarding oral health activities and follow-up instructions for preventive dental care. An attempt was made to contact all clinics proposed in the study and survey all providers that received the education intervention.

Project Outcomes

Long term outcomes. The North Dakota Department of Health administers questionnaires to third grade children in the state regarding their health habits and risky behaviors. The most recent report from 2009-2010 indicated 64.3% of rural respondents experienced dental caries (Yineman & Reed, 2012). Urban counterparts reported a 49.7% rate of dental caries, indicating a significant gap in oral health by location. Activities recommended to bridge the gap for rural areas include access to fluoridated water, implementation of preventive dental services and increased access to dental care (Schroeder, et al., 2014). State services dedicated to the activities include further education of primary care providers as a potential breach for the gap between urban and rural dental caries experiences. This project speculated the fluoride varnish education intervention and referral to web and print resources to health care providers could increase preventive dental activities and decrease dental caries experiences amongst rural children.

A long term outcome as defined by the use of a logic model indicates an outcome may be an impact or trend occurring three to seven years or more after the implementation of the activities. State surveys from third grade children reporting dental caries are collected from the North Dakota Basic Screening Survey. The Basic Screening Survey and ensuing report is administered every three to five years under the auspices of the North Dakota Department of

Health. Third grade children enrolled in Healthy Tracks program are the respondents for the survey. Due to the nature of the scope and time frame of this study, proposed outcomes refer to broader outcomes to be achieved and reported by the North Dakota Oral Health Program.

In this proposal, the original data used to determine dental caries experience was from the 2009-2010 collection period and statistically published in the *North Dakota Oral Health Report* (Yineman & Reed, 2012). The number of children in rural communities reporting dental caries was 64.3%. Ideally in a long term model, speculated outcomes can be affected by change. The proposed outcome of introduction of education and implementation of fluoride varnish application and oral risk assessment could potentially decreased the report of dental caries by rural children. The most current survey of third graders was performed in the fall of 2014, but unfortunately the data was not available for report by the date of this practice improvement project.

Short term outcomes. Three proposed short-term outcomes were introduced in the study intending to be accomplished by the education intervention and follow-up. The first outcome was demonstrated by the data collected during the study, but the source and scope of the second and third outcomes are outside the influence of this study and are proposed goals. The first short term outcome was an increase in the report of basic knowledge of oral health prevention, oral risk screening assessments and application of fluoride varnish by 25 healthcare professionals that work with rural pediatric clients. The second was to increase the actual number of fluoride varnish treatments applied to pediatric clients in rural healthcare facilities. The third short term outcome was to increase the number of early referrals to dentists of high risk rural pediatric patients.

Increase in basic knowledge of oral health prevention, screening and application of fluoride varnish by 25 health care providers

Population. The rural clinics visited during this project lie in the central and northwestern regions of North Dakota. Four of the five clinics, Garrison, Washburn, Tioga and New Town are in rural population areas lying in a county with towns less than 2,500 residents (Center for Rural Health, 2010). The Williston clinic lies in a growing area previously designated as a rural population community, but has changed status due to an influx of workers and families from the oil industry. Two clinics, Stanley and Watford City, were contacted more than four times by phone without a return phone call or ability to contact the clinic manager. Attempts to contact the clinic administrators were also made by the North Dakota Department of Health Oral Program staff. Five of the seven proposed clinics for the study were therefore included in the study.

A total of 25 providers were presented with education in the five clinics. To increase participation in the education session, a free lunch was coordinated with the North Dakota Oral Health Program grant recipients from DentaQuest grant funds. The providers at the clinic were informed of the education offering at least seven to fourteen days in advance of the training, and the clinic manager was able to clear schedules and assist with timing. Publication of the receipt of continuing education was also made before the date of the session. Two of the five clinics had excellent turnout, including 75% or more of the primary care providers attending the education session. Garrison and New Town were the best attended by all clinic providers able to be certified to apply fluoride varnish.

All providers qualified to provide fluoride varnish by the ADA that attended the education session were to be contacted to complete the follow up survey. Interestingly, eight of

the LPN's, RN's, NP's, PA's and MD's had left their job by the timing of the follow up survey. An attempt was made to contact all individuals, even the relocated providers, but not all forwarding addresses were available. Five of the eight providers were sent the survey with a forwarding address. A total of 18 individuals anonymously completed the follow up survey.

Descriptive statistics. Descriptive data collected from the survey tool included the provider's certification, years of experience, previous dental training, incorporation of fluoride varnish and oral risk assessment, and comments regarding fluoride varnish and oral assessment. Before the intervention, it was determined that a total of 23 providers indicated their certification information. Five MD's completed the survey, three physician assistants, two nurse practitioners, four registered nurses and seven licensed practical nurses' participated in the survey. Three surveys were completed by clinic personnel not authorized by the American Dental Association to apply fluoride varnish and were not included in the results. Two surveys were returned without certification indicated and were not included in the results. The total number of surveys that were able to be used for statistical computation was 23.

The number of primary care providers in rural areas who were able to provide fluoride varnish and completed the survey six to nine months following the education intervention was 18. Efforts were made to contact all providers, but some did not complete the follow up survey. The number of respondents following the intervention that completed the survey tool included: nine licensed practitioner nurses (LPN), four registered nurses (RN), no nurse practitioners (NP), one physician assistant (PA), and four medical doctors (MD). A better response was obtained by nurses than MD's, PA's and NP's on the follow up survey. Certification and years of experience indicated by the respondents on the survey before the education and on the follow up survey are displayed in Table 3 and 4.

Table 3.

Respondent Certification

	LPN	RN	FNP	PA	MD
Respondents before	8	4	2	3	6
Respondents after	9	4	0	1	4

Table 4.

Respondent Experience

Years of experience	0 to 5	5 to 10	10 to 20	20-30	Over 30
Respondents before	7	3	4	3	5
Respondents after	2	2	3	5	6

Incorporated fluoride varnish. None of the individuals that completed the survey had formal dental training in the past and none had been using fluoride varnish in their practice. A question on the survey form requested comments for not using fluoride varnish. Reasons for not using fluoride varnish before the education session were: access to varnish kits, lack of knowledge regarding the intervention and its application, and unawareness of reimbursement for the application. Six to nine months following the education session, three of the 18 respondents indicated incorporating dental varnish into practice.

Table 5.

Respondents' use fluoride varnish

Incorporate dental varnish	Yes	No
Respondents before	0	23
Respondents after	3	15

Reasons in the comment section written by respondents for not incorporating fluoride varnish into practice include: staff turnover and short staffed, lack of time, lack of supplies, no high risk children clients, not remembering to apply the varnish, and belief that oral/dental assessment or intervention is not part of a primary care providers practice (2 respondents).

Oral health knowledge rating. The parameter used to determine the basic knowledge of oral health by medical providers was the overall rating of current oral health knowledge on a 1 to 10 rating scale, with one being no knowledge, and ten being the most knowledge. Prior to the education intervention the providers rated their knowledge as 6.05, and following the intervention the providers rated their knowledge at 6.33 on the survey. None of the providers indicated they had received formal oral health training prior to or after the education intervention.

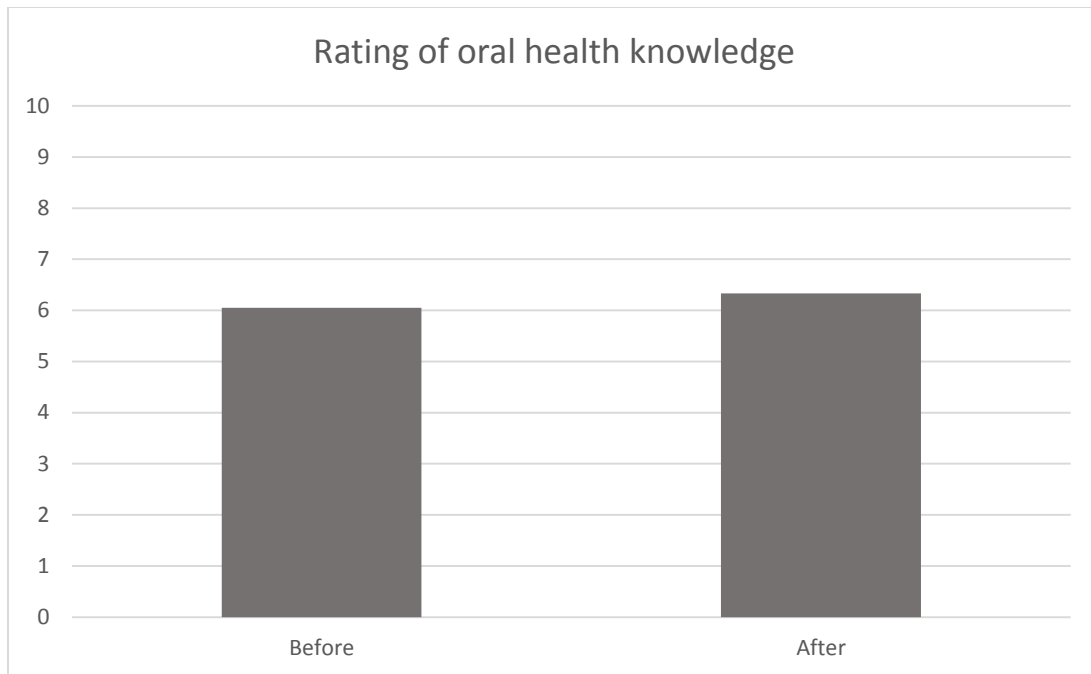


Figure 3. Rating of oral health knowledge

Based on the study by Isong et al., (2011), other rating items on the survey also indicating the provider’s knowledge of oral health prevention, screening and application of fluoride varnish include the questions on the survey: “I feel comfortable performing an oral risk assessment,”” I feel that dental varnish is an effective preventive practice against tooth decay” and “I feel confident performing dental varnish to a client.” These items scored before and after the survey are included in Figure 2.

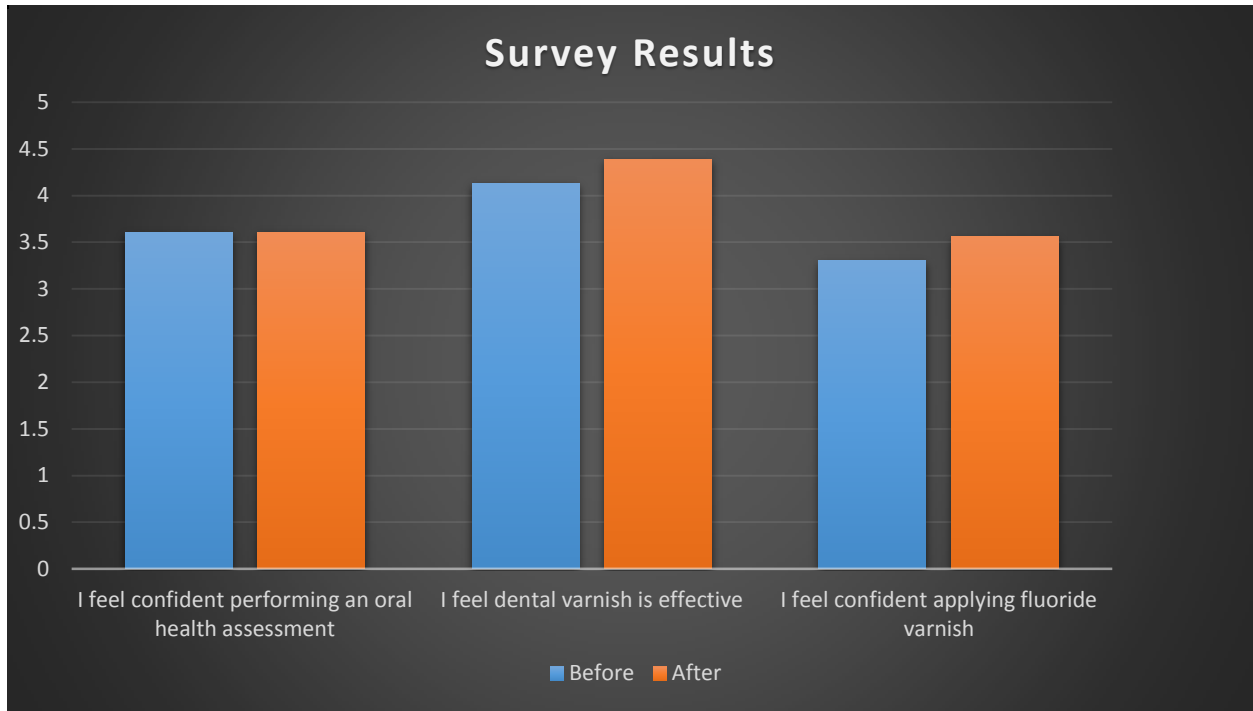


Figure 4. Oral health knowledge components

The providers stating “I feel confident performing an oral health assessment” with 0 designating strongly disagree to 5 strongly agree was rated 3.70 prior to the education session (n=23). In the survey following the education, the providers indicated a mean 3.61 value for confidence performing an oral health assessment (n=18). The providers rating for “I feel dental varnish is effective” with 0 as strongly disagree and 5 strongly agree averaged 4.13 before the education session (n=23) and 4.39 in the after survey (n=18). The rating for I feel confident applying fluoride varnish” with 0 being strongly disagree and 5 strongly agree was 3.30 prior to the education session (n=23) and 3.56 following the education session (n=18).

Each of the six items from the survey was rated before and after on the 0 to 5 Likert scale. The completed and returned surveys from before the education session and after the education session were tabulated. The means tabulated from survey results before and after the education session are displayed in Appendix H. The first item, “I feel oral health is a priority of

care” with a mean rating 4.70 before the intervention (n=23) and 4.56 (n=18) following the education. Most primary care providers gave the item a 4 or 5 score, indicating strongly agree or agree with the statement of the priority of oral care.

Referral to a dentist was rated 4.26 (n=23) before the education session and 4.56 (n=18) following the education session. Primary care providers indicated in the education session they were familiar with referral, and resources for dental referral were provided during the education. The last item was “I feel it is cost effective to provide dental varnish to a client” and the mean rating was 3.87 before the education (n=23) and 3.89 (n=18) following the education.

Data Analysis. The quasi experimental values in a pre and post study survey are examined with t test of means for significance of the variables in the study. The 2 tailed t test of means was performed using the Vassar stats calculation pages and displayed in Table 4. The items were rated similarly before and following the education session, including two items that were scored higher before the education than at the later point in time.

Table 6.

Means and significance of survey items

	Rating before (Mean score)	Rating after (Mean score)	P (significance)
I feel oral health is a priority of care	4.70	4.56	-0.4138
I feel comfortable performing an oral risk assessment	3.70	3.61	-0.7126
I know how to refer my client to a dental provider	4.26	4.56	0.2208
I feel that dental varnish is an effective preventive practice against dental decay	4.13	4.39	0.2424
I feel confident performing dental varnish in my practice	3.30	3.56	0.4479
I feel that it is cost effective to provide dental varnish to a client	3.87	3.89	0.9336

The before and after two tailed *t* test of the means failed to show significance in the provider's ratings before or after the education session. The item showing the largest change in rating before and after the education session was the knowledge of referring a client to a dental provider. The item that changed the least was the rating "I feel it is cost effective to provide dental varnish to a client." A score of 3 indicates neutrality regarding an issue, and the rated

confidence of performance of fluoride varnish tended more to neutrality at 3.30 than the rating of “agree” which is rated 4.

Providers did not indicate on the survey a significant change in ratings before and after the education session. Each site was not isolated out of the study to determine if individual sites changed more than others. There was also no significance shown in the provider’s overall rating of oral health knowledge before the education session or after the session and implementation of oral risk assessment and fluoride varnish into practice. The rating scale consisted of 1 indicating little knowledge and 10 indicating the most knowledge. The significance value for oral health knowledge was $p = 0.6402$.

Table 7.

Oral health knowledge rating significance

	Rating before (mean score)	Rating following education (mean score)	Significance (p)
Oral health knowledge	6.05	6.33	0.6402

Increase in fluoride varnish application amongst rural health care providers. The report from the North Dakota Department of Health Oral Health Program indicated the number of reimbursements from Medicaid for oral health services by primary care providers. The reimbursements from Medicaid during the grant period and this project period, 2012-2014 was 6,056. Included in the report was the total number of patients served, which was 4,609 out of a Medicaid population of 48,914 eligible in the state of North Dakota (Axelson, 2014). The original intent of this project was to ascertain the number of rural clients served, however, the NDSU IRB recommended reporting of aggregate data available from public sources for

vulnerable populations. The number of claims in the entire state of North Dakota cannot be directly influenced by the number of primary care providers in the northwest region, so it will not be possible to determine actual achievement of this outcome.

Increase the number of dentist referrals. For the purpose of aggregate data reporting, numbers of referrals to dentists in the state from was collected from a public source, the North Dakota Oral Health Report: Needs and Proposed Models, 2014 (Schroeder et al., 2014). High risk population data were reported by Medicaid claims from 2010 in the report. Schroeder, et al. (2014) reported a decrease in the number of Medicaid covered children that saw a dentist in 2013 as opposed to the previous three years. The number in 2010 was 36% and it declined to 30% in 2013. In addition, data were collected regarding the number of children needing treatment and receiving dental treatment of a high risk population. The number of Medicaid enrolled children that needed dental treatment and received it was 95% in 2010, and the number fell to 75% in 2013 (Schroeder, et al., 2014).

CHAPTER FIVE

Results

The strategic plan for improving oral health was to enhance practice of oral risk assessment and fluoride varnish applications by primary care providers through an education intervention. The projected number of primary care providers to receive the education was 25, and the total number of recipients was 25. More staff in the rural clinics than the 25 able to apply fluoride varnish also attended the education session and became aware of the availability of state funding for preventive dental services for primary care providers.

The lack of response from one of the five clinics resulted in an addition of two more clinics in the region receiving the education session. An addendum was requested from the NDSU IRB to add Washburn and Watford City to the requested sites. The Washburn Clinic requested the education following the session at Garrison, and the North Dakota DentaQuest grant recipients requested the intervention be presented at Watford City. Multiple attempts were made to contact Stanley and Watford City Clinics for the education, but after four to six calls to the managers and other clinic staff members with no response, the requests were abandoned.

Five clinics located in central and western North Dakota therefore received a visit from the co-researcher during the study and included: Garrison, Washburn, Williston, New Town and Tioga. Of the five clinic locations, Garrison and New Town were the best attended by clinic staff with 75% of clinic providers and staff turnout for the education session. Garrison had the most providers able to apply fluoride varnish attend, and New Town's entire staff of primary care providers attended. Support staff, including billing staff and clinic schedulers, were able to attend at both locations for the education session and lunch.

Unfortunately, three of the clinics did not have 50% provider turnout. Tioga had only one MD, PA or NP attend the education. Williston had excellent MD turnout, but the contact failed to include nursing and support staff in the education invitation. Washburn has an extremely small staff, and one of the two nurse practitioners attended the education, but has since resigned from the facility. Despite hopes to provide education to a large proportion of the clinic staff in the chosen communities, the projected 25 providers was the number reached.

The attendance at the sessions by a majority of nursing staff was welcome. Twelve out of 23 of the results tabulated in the before session survey were from nurses attending the education. Fifty two percent, accounting for the greatest proportion, of the respondents were either RN's or LPN's. Thirteen of the 18 respondents were nurses in the follow up survey and accounted for 72% of respondents. Ideally, higher turnout was expected from the nurse practitioners and physician assistants at the clinics. Each clinic had at least one to six nurse practitioner or physician assistant on staff. The response rate on the survey from NP and PA respondents was 22% before the education and 6% after the session. Doctor responses were 26% and 22% respectively, before and after the education session.

The proposed long term goal of intensive implementation and education of primary care providers to apply fluoride varnish will continue after this project. Accomplishment of a larger outcome for improved oral health for rural third graders was not measurable at the reporting of this project. In the planning stages, Department of Health projections were for the Basic Screening Survey of third graders to be completed and results available by fall 2014, but communication with staff indicated results have not yet completely tabulated. Projected release of the figures has been for fall 2015. The most recent report from 2009-2010 indicated 64.3% of rural respondents experienced dental caries (Yineman & Reed, 2012). Urban counterparts

reported a lower 49.7% rate of dental caries. The difference in rural and urban children's reports indicates a significant gap in reports of oral health by location.

The short term outcome to increase knowledge of oral health prevention, screening and application of fluoride varnish by the primary care providers was partially met. The oral health knowledge rating was higher after the education session, 6.33 after as opposed to 6.05 before, but did not reach significance ($p = 0.6042$). The other six items had different mean scores, but did not reach significance. Two items actually had higher scores before the education than after: I feel oral health is a priority of care and I feel comfortable performing an oral risk assessment. The mean score of providers feeling oral health is a priority of care was 4.70 before and 4.56 after the education. The item regarding an oral risk assessment had a mean rating of 3.70 before and 3.61 after the education and time interval.

The other four items from the survey were scored higher after the education including the items: I know how to refer my client to a dental provider (4.26 then 4.56); I feel that dental varnish is an effective preventive practice against dental decay (4.13 then 4.39); I feel confident performing dental varnish in my practice (3.30 then 3.56); and I feel dental varnish is cost effective (3.87 and 3.89). None of the items were significantly higher following the education session than before the education was performed.

The item, "I feel confident performing dental varnish in my practice" was rated the lowest before and after the education session at 3.30 and 3.56 respectively. The item rated the highest before and after was "I feel oral health is a priority of care," rated 4.70 and 4.56 respectively. Interestingly, the individuals opposing implementation of oral preventive care into primary care by writing comments about dental practices not belonging in medical care on the

survey after the education session gave scores of 4 out of 5 and 5 out of 5 to the rating of oral health priority item on the survey.

The number of fluoride varnish treatments provided during the study cannot be measured as an individual number due to recommendations from the NDSU IRB. However, the DentaQuest Foundation grant report indicated that 6,056 claims were made to Medicaid since 2012 for oral preventive services by primary care providers (Axelson, 2014). The representation of 4,609 clients indicates approximately 10% of North Dakota Medicaid eligible children (48,914) in North Dakota received oral care by their primary care providers. Comparison to previous numbers is impossible at this time due to analytical difficulties in the Medicaid offices. A North Dakota Department of Health contact indicated discrepancies were found in previous numbers, so recalculation of claim numbers is currently occurring.

The percent of Medicaid enrolled children receiving a dental visit in 2013 actually decreased from the previous year from 31% to 30% (Schroeder, et al., 2014). The number of clients receiving a visit in 2011 was 32%, down from 36% in 2010. The decrease in visits correlates with the lack of dental providers in rural areas. Two of the five communities included in the study have 0 dentists in the county, Garrison and Washburn. By searching local directories, one dentist is located in Tioga, and one was located in New Town. The distribution of dentists in the state is lower in the western rural counties than urban population areas (Appendix I).

Discussion

The overall goal of the study to provide education to health care providers regarding oral health care and implement fluoride varnish into practice was met. The report from the DentaQuest oral health grant indicated that 61 providers received education regarding oral health

in the past two years, 2012 to 2014 (Axelson, 2014). The collaborative nature of this project with the North Dakota Department of Health facilitated the ability to reach five clinics located in central and northwest North Dakota. A total of 25 health care providers received the educational module from Smiles for Life including oral risk assessment and application of fluoride varnish as a result of the study intervention.

The fluctuating population in the oil patch definitely negatively affected the follow through of the fluoride varnish intervention. Eight of the 25 original recipients of the education session had relocated during the ensuing six to nine months. This equals approximately 33% change in staffing for the facilities surveyed. In addition, several of the clinics indicated their patient numbers have doubled or even quadrupled in one clinic. Lack of staffing and time contributed to reasons for not implementing fluoride varnish. Resources from the Department of Health cited the fluctuating population in the north central and northwestern regions of the state as an inhibitor to full implementation of oral health care practices (Will, 2014). Clinic managers informally reported the current facilities lack full support for the size of the clientele being served, two of the five clinics are expanding their facilities in the upcoming year, and new primary care providers are added regularly to staffing.

Nursing staff were the most represented clinic primary care providers at the education sessions and the respondents to the survey after the education session. Providers at the clinics informally indicated that nursing staff would be the most likely staff to apply varnish to the children's teeth, so attendance at the session was beneficial for the implementation of fluoride varnish. Whether the impetus for change will come for nursing or medical providers will remain to be seen. Projections by the DentaQuest Foundation grant program and the Center for Rural

Medicine recommend training all medical professionals able to apply fluoride varnish (Axelson, 2014; Schroeder, et al., 2014).

Numbers from the survey did not indicate the education session provided caused a significant change in oral health knowledge or significantly increase comfort with fluoride varnish application and oral risk assessment. Implementation of oral health services in primary care is recommended by current practice (Clinical Advisor, 2014), but adoption of recommended treatments are taking time. Primary care providers wrote comments on the survey and verbally stated oral health is a dentistry service. Continued education and support of implementation by state funded health department activities may help to change attitudes and beliefs regarding oral health. The number of individuals receiving education and becoming aware of the oral health of children and interventions to decrease dental caries is rising.

Similar to the implementation of fluoride varnish application programs in other states, claims in North Dakota for reimbursement of dental services from Medicaid reflect the goal of including oral preventive care attention by primary care providers (Okunseri et al., 2009). The number of Medicaid claims from 2012 to 2014 for oral preventive services of 4,609 indicates that the states' fund for oral health is being used by primary care providers. The additional focus on preventive oral care is hypothesized to increase the value of interventions intended to decrease dental carie experiences (Okunseri et al., 2009).

While findings from this study and other oral health reports (Schroeder, et al., 2014) suggest there will need to be more implementation activities, numbers of clients served are positive. Furthering the oral health of children and adults in the nation continues to be a priority as implementation of the Healthy People 2020 goals and activities continue. Projection from the Rural Center for Health (2014) cites continued expansion of oral health services by primary care

providers as one action to achieve better oral outcomes for rural dwellers. Activities recommended to bridge the gap for rural areas include access to fluoridated water, implementation of preventive dental services and increased access to dental care (Schroeder, 2014). State services dedicated to the activities include further education of primary care providers as a potential breach for the gap between urban and rural dental caries experiences.

Implementation of fluoride varnish into practice was reported by three of the 18 providers. This indicates 16.7% of medical providers included the new intervention in their practice. Comparing the number to the Diffusion of Innovation theory parallels the curve for the implementation of a new practice. During the early phase of a new practice, the theory describes the innovators and early adopters to comprise 16% of those with the propensity to adopt a new innovation. According to the theory, in the next couple years if legislation continue to support reimbursement of oral preventive services and training continues in the state, 34% or more of providers will continue to implement oral preventive services.

Unfortunately rural areas continue to suffer from the barriers of decreased access to services and larger populations of underinsured residents (Schroeder et al., 2014). The number of dentists in central and northwest North Dakota, similar to the trend of urban localization of medical providers, reveals 67% of dentists serve four counties in the state: Burleigh, Cass, Grand Forks and Ward. North Dakota averages 61 dentists per 100,000 people as opposed to the national average of 76 per 100,000. Strategies to improve oral health in rural areas include implementation of activities such as the oral risk assessment and fluoride varnish application by primary care providers.

Limitations and Assumptions

Studies performed in rural populations often result in small samples, thereby producing non-significant results. Difficulty in contacting clinic managers and capturing the clinic provider population proved to be the case during this project. Achievement of significance may have occurred if a larger sample size was used. At the outset the goal was to reach all providers in the rural facilities able to supply preventive oral care. Including five to seven rural clinics in the education sessions was planned, but inability to contact individuals prohibited the goal. The inclusion of all clinics in the entire northwest region would be ideal, but time and travel became more than the researcher would be able to achieve.

Lack of a pilot study group for the calculation of validity and reliability of the survey tool could have provided feedback for further development of the survey tool. The survey tool was created by using references with similar items and requesting input by stakeholders in the DentaQuest Foundation grant program. A possible reason the lack of significance of the results from before and after the education session could have been related to the survey tool. Further testing of the tool with additional sample sizes and calculation of Cronbach's alpha could strengthen the findings from the survey. However, it is impossible to determine if other factors may have been responsible for the non-significant findings as well. Implementation of the novel practice of fluoride varnish and oral assessment by primary care providers appeared to be a barrier from respondents and the methods used for education and follow-up could have affected the survey results.

An assumption made prior to this study was that oral health is part of primary care. Due to the nature of individuals that present regularly to a primary care provider for treatment of dental emergencies, oral health is conclusively integral to the physical health of an individual.

Studies show however, medical providers are cautious to incorporate oral care due to professional courtesy for the field of dentistry (Isong, et al., 2011). Clarity of the support of the North Dakota Dental Association for the expansion of dental prevention to primary care providers was provided. Despite reassurances during the education session, two of the 18, or 11%, respondents in the survey administered indicated they felt the oral risk assessment and fluoride varnish should not be performed in primary care.

An assumption prior to the education and incorporation of oral preventive care was children are not receiving fluoride varnish at dental providers regularly. Statistically this was shown in reports by the Center for Rural Medicine and the Oral Health: Burden of Disease and Plan for the Future document, but the education session provided assumed all high risk children identified by the oral risk assessment should receive fluoride varnish. Claims to the state for dental services do not define care received, so there is difficulty determining the exact nature of the visit by 36% of Medicaid eligible children to a dentist in 2013 (Schroeder, 2014). Preventive care may have occurred in these 36% cases, although dental practices vary during dental visits and determination of varnish application by dentists was not studied. Programs in the state such as mobile dental units and Head Start dental assessments may be responsible for application of fluoride varnish to this client population and was not studied separately.

Implications for Practice

Understanding the role of oral health as part of the holistic care of an individual can enhance studies and programs to decrease the burden of oral disease in the state. The novel practice of fluoride varnish application and oral risk assessment in primary care may take time for adoption of practice. Advocates in rural facilities can educate and sustain current efforts to provide preventive services to at risk clients. Continuance of efforts to expand inclusion of

preventive oral health services by primary care providers is recognized as an intervention possibly improving oral health in the rural communities of the state (Schroeder et al., 2014). As a result of learning more about fluoride varnish benefits, ease of application, and reimbursement legislation, this researcher will continue to seek opportunities to provide the preventive services during client care.

- Implications for clinical practice improvement:
- Participate in further education efforts to rural clinics regarding implementation of oral risk assessment and fluoride varnish
- Partner with North Dakota Department of Health DentaQuest grant opportunities
- Incorporate oral preventive practices in nursing education at the baccalaureate level
- Participate as a member of the North Dakota Oral Health Coalition

While mixed opinions were elicited during the survey and education session of this project, holistic health indicates a lack of oral health can affect other systems. Efforts to include fluoride varnish kits to participating clinics, provide needed supplies, and maintain contact with rural sites will be the goal of the co-researcher and future North Dakota Department of Health (NDDoH) grant applications. Identification of contact persons in the rural areas was done by North Dakota Department of Health personnel and a log of innovators has been kept. As further grant monies are solicited, the NDDoH personnel should continue to partner with the innovators in future endeavors for oral health.

Further activities recommended in communities are school fluoride varnish applications, oral assessment and fluoride varnish application to nursing home residents, and incorporation of oral health activities in primary care education programs (Axelman, 2014). High risk populations including residents in rural areas would be included in expansion of dental activities to setting

that capture a larger population. Recommendations from the Center for Rural Health Proposed Models Executive Summary list these activities as means to meet current oral health needs (Schroeder, 2014).

The North Dakota Oral Health Coalition is an interdisciplinary effort to continue assessment and planning for interventions at many levels of care for oral health. The group meets quarterly and is comprised of dental, medical and support professionals to continue to achieve goals as outlined in the *Burden of Oral Disease* report by the North Dakota Department of Health. Review of numbers provided by data in the Youth Behavior Survey, Basic Screening Survey and other state reports will be regularly reviewed for outcome achievement and planning for future activities. Monitoring for success and continued needs assessment will work towards the achievement of oral health goals as projected by Healthy People 2020.

Conclusion

Given the burden of disease related to oral health in our state, innovative practices can be initiated in high risk populations. Resolving health disparities requires health care providers to develop solutions that use resources available and embrace new ideas. Solutions to decrease oral health disparities in rural populations include further fluoridation of water for communities, oral health risk assessment, fluoride varnish application and appropriate referrals to dentists of high risk individuals with rampant dental decay (Schroeder et al., 2014).

Resources provided in this study included the intervention of formalized education, fluoride varnish kits and printed handouts for primary care providers in rural areas to address the issue of dental decay in clients, specifically children. Results from a survey indicated providers agreed oral health is a priority for care, but incorporation of oral risk assessments and fluoride varnish application was implemented in numbers similar to Rogers' theory of diffusion. The

theory predicts novel ideas will be incorporated by innovators and early adopters which approximate 16% of individuals exposed to the new idea.

Results indicated further work is needed to address the burden of oral health disease and expand oral health preventive services to bridge the additional gap between urban and rural dwellers. The study followed the theoretical model of slow implementation of incorporation of oral preventive services by primary care providers. This does not mean efforts to expand services should be abandoned. Instead, incorporation of oral health preventive care should be acknowledged at an earlier time in primary care providers' training and be included for providers currently not implementing oral health prevention.

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APPENDIX A. CURRICULUM

See page 64.



Module 6: Caries Risk Assessment, Fluoride Varnish and Counseling

Description

This module focuses on caries prevention. It offers a brief review of Early Childhood Caries (ECC) and address how the use of fluoride is part of a comprehensive approach to a child's oral health. Specifically, clinicians will learn the benefits, appropriate safety precautions, and dosing for fluoride, as well as how to apply fluoride varnish and provide adequate follow-up care.

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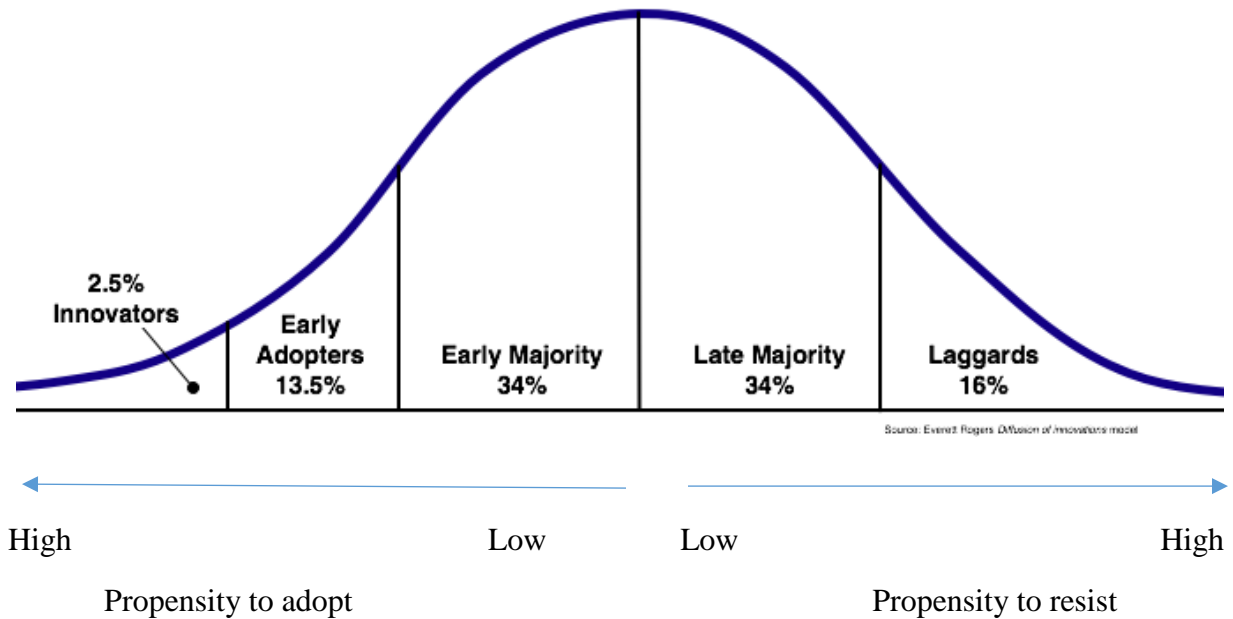
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**APPENDIX B. DIFFUSION OF INNOVATIONS (ROGERS,
2003; ROBINSON, 2009) PROJECT APPLICATION**

Quality	Definition	Projected activities	Barriers	Survey tool item
Relative advantage	The perceived advantages or benefits of the innovation	Statistics provided to medical providers regarding effectiveness of fluoride varnish treatments	Lack of interest in oral health by medical providers	1, 2, 6
Compatibility with existing values	The degree that the individual (child, parent or doctor?) values the innovation	Discuss health promotion and disease prevention as medical practice	Belief that oral care is not medical care	1, 4, 6
Simplicity and ease of use	The degree to which the innovation is perceived as difficult to understand and use	Demonstration of fluoride varnish application at intervention education session	Absence of provider, difficult subjects	2, 3, 5
Trialability	Experimentation potential of innovation	Educate billing department on reimbursement coding Provide kits to medical clinics free of charge	Lack of Medicaid or Healthy steps pediatric clients	
Observable results	Visible results	Referrals of patients in the area to the clinic for intervention	Lack of long term oral assessment for results	

APPENDIX C. DIFFUSION OF INNOVATION POPULATIONS



APPENDIX D. ORAL HEALTH LOGIC MODEL

Assumptions:

1. Oral health care needs improving
2. Primary Care Providers are partners in providing oral health care

INPUTS	ACTIVITIES	OUTPUTS	SHORT/MEDIUM TERM MESSAGES*	LONG TERM OUTCOMES	STRATEGIC OBJECTIVES
<p><i>In order to accomplish our goals will need the following resources</i></p> <p>Partnerships Laurie time: Teach Evaluate/data collect Bobbi time Supplies Varnish kits Billing models Mentors Institutional Support</p>	<p><i>Accomplishing the following activities will result in the following measurable deliverables</i></p> <p>1.Contact NW ND clinics and schedule trainings 2.Provide training, billing info, and supplies (varnish and teaching re: dental care) to clinics 3.Evaluate providers 4. Evaluate patient/parents</p>	<p><i>Accomplishing these activities will result in the following evidence of progress</i></p> <p>Decrease in the number of reported dental caries in the Basic Screening Survey of North Dakota Third-Graders by rural respondents.</p>	<p><i>We expect the following measurable changes within the life of the grant</i></p> <p>1.Increase basic knowledge of oral health prevention, screening and application of fluoride varnish to 25 healthcare professionals that work with rural pediatric clients. 2.The number of fluoride varnish treatments on pediatric clients in rural healthcare facilities. 3.Increase the number of referrals to dentists of rural pediatric clients</p>	<p><i>We expect the following impacts/trends within the next three to seven years or more</i></p> <p>1.Improve prevention and educational activities that promote oral health in a rural pediatric population. 2.Expand interdisciplinary partnerships between healthcare providers to improve oral health.</p>	<p><i>Alignment with Healthy People 2020 strategic objectives and educational needs</i></p> <p>Healthy People 2020 Oral health goal Prevent and control oral and craniofacial diseases, conditions, and injuries, and improve access to preventive services and dental care.</p>

APPENDIX E. RATING SCALE

Please rate the following:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel oral health is a priority of care	5	4	3	2	1
I feel comfortable performing an oral risk assessment	5	4	3	2	1
I know how to refer my client to a dental provider	5	4	3	2	1
I feel that dental varnish is an effective preventive practice against dental decay	5	4	3	2	1
I feel confident performing dental varnish in my practice	5	4	3	2	1
I feel that it is cost effective to provide dental varnish to a client	5	4	3	2	1

Name of clinic:

Certification: LPN RN FNP PA MD

Other:

Years of experience: 0 to 5 6 to 10 11 to 20 21 to 30 More than 30

Previous formal dental training Yes No

Current oral health knowledge: Circle please (10 High and 1 Low)

10 9 8 7 6 5 4 3 2 1

I have incorporated fluoride varnish now, or previously? Yes No

If no, what has prevented fluoride varnish treatments?

I have incorporated oral risk assessment Yes No

If no, what has prevented oral risk assessment?

Comments:

APPENDIX F. IRB APPROVAL LETTER



December 18, 2013

FederalWide Assurance FWA00002439

Dr. Dean Gross
Nursing
Sudro Hall

Re: IRB Certification of Exempt Human Subjects Research:
Protocol #PH14119, "Implementation of Fluoride Varnish as a Quality Improvement
Intervention for Primary Care Providers in a Pediatric Rural Population"

Co-investigator(s) and research team: **Laurel Dimler**

Certification Date: 12/18/13 Expiration Date: 12/17/2016
Study site(s): **varied**
Funding: **n/a**

The above referenced human subjects research project has been certified as exempt (category # 2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*). This determination is based on protocol materials (received 12/10/2013).

Please also note the following:

- If you wish to continue the research after the expiration, submit a request for recertification several weeks prior to the expiration.
- Conduct the study as described in the approved protocol. If you wish to make changes, obtain approval from the IRB prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Notify the IRB promptly of any adverse events, complaints, or unanticipated problems involving risks to subjects or others related to this project.
- Report any significant new findings that may affect the risks and benefits to the participants and the IRB.
- Research records may be subject to a random or directed audit at any time to verify compliance with IRB standard operating procedures.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

Sincerely,

A handwritten signature in cursive script that reads "Kristy Shirley".

Kristy Shirley, CIP, Research Compliance Administrator

INSTITUTIONAL REVIEW BOARD

NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | 701.231.8995 | Fax 701.231.8098 | nds.u.edu/irb

Shipping address: Research 1, 1735 NDSU Research Park Drive, Fargo, ND 58102

NDSU is an EO/AA university.

APPENDIX G. TIMELINE

Proposed timeline for clinical dissertation project

Activity	Completion date	Members involved
Proposal meeting	December 9	Laurie Dimler Dr. Dean Gross Dr. Mykell Barnacle Dr. Mark Strand Bobbie Wills
IRB Expedited Review	December 16	NDSU IRB
Garrison Training/Initiation FVT	December 16 or 20	Laurie Dimler Jaci Seefelt
Williston Training	December	Laurie Dimler Bobbie Wills
Tioga Training	January	Laurie Dimler
Watford City Training	January	Laurie Dimler
New Town Training	January	Laurie Dimler Jaci Seefelt
Stanley Training	February	Laurie Dimler
Data collection	May-July	Laurie Dimler
Data analysis	August	Laurie Dimler
Final report compilation	August/ September	Laurie Dimler Dr. Dean Gross
Final dissertation committee meeting	September	Laurie Dimler Dr. Dean Gross Dr. Mykell Barnacle Dr. Mark Strand Bobbie Wills
Results reporting and submission for publication	Fall 2014 semester	Laurie Dimler

APPENDIX H. SURVEY RESULTS

Before	5	4	3	2	1
I feel oral health is a priority of care	17	5	1	0	0
I feel comfortable performing an oral risk assessment	3	11	6	3	0
I know how to refer my client to a dental provider	9	12	1	1	0
I feel that dental varnish is an effective preventive practice against dental decay	8	10	5	0	0
I feel confident performing dental varnish in my practice	3	7	8	4	1
I feel that it is cost effective to provide dental varnish to a client	6	8	9	0	0

After	5	4	3	2	1
I feel oral health is a priority of care	10	8	0	0	0
I feel comfortable performing an oral risk assessment	2	8	7	1	0

I know how to refer my client to a dental provider	12	5	0	1	0
I feel that dental varnish is an effective preventive practice against dental decay	8	9	1	0	0
I feel confident performing dental varnish in my practice	2	10	4	0	2
I feel that it is cost effective to provide dental varnish to a client	3	10	5	0	0

APPENDIX I. NUMBER OF DENTISTS BY COUNTY (2014)

UND CENTER FOR FAMILY MEDICINE

