

Practices of Community Health Nurses Related to Oral Health Advice given to Caregivers of

Infants and Children

by

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Abstract

Objective: The objective is to determine the oral health knowledge of community and public health nurses in Manitoba, and what oral health advice is given to the caregivers of infants and children, as well as how this knowledge could help to improve the overall oral health of Manitoba children. In addition, the differences in oral health knowledge of rural, northern and urban community health nurses was compared.

Methods: Surveys were emailed using SurveyMonkey to all nurses that identified themselves as community health or public health nurses in Manitoba. The surveys were analyzed using the Fisher's Exact test to determine the differences between the groups of nurses. Significance levels were considered at $\alpha < 0.05$.

Results: A total of 261 responses were collected which can be broken down into nurses that work in the city (133 responses), rural nurses (59 responses) and nurses working in a northern or remote community (50 responses). Nurses had high oral health literacy in regards to diet and feeding practices but need improvement in some areas of knowledge such as timing of the first dental visit and use of fluoride toothpaste. Statistically significant differences between the groups of nurses were found in regards knowledge of timing of the first dental visit, use of fluoride toothpaste in children younger than 3, and transmission of cariogenic bacteria. Nurses also differed with regards to knowledge and referral of caregivers to the Manitoba Dental Association's Free First Visit Program. Finally, nurses differed in whether they were likely to perform an oral exam during a well-child visit.

Conclusions: Nurses had high oral health literacy in regards to diet and tooth brushing. They had less knowledge of the timing of the first dental visit and the proper use of fluoride toothpaste. Even when the nurses had the knowledge, they were not as likely to discuss it with

the caregivers of infants and small children. Nurses largely had a positive view of their role in oral health education but were not as likely to do oral examinations. More education is needed in oral health related topics, in particular, use of fluoride toothpaste, timing of the first dental visit and caries risk assessment (including oral exams). Dentists need to improve communication with other primary health care providers in order to promote interdisciplinary collaboration and the early dental visit, which may lead to the improved oral health.

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Introduction

Early Childhood Caries (ECC), a rapid type of tooth decay and is the most common chronic disease of young children. The most current definition of ECC from the American Academy of Pediatric Dentistry (AAPD) is the presence of 1 or more decayed (non-cavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child 71 months of age or younger¹. ECC is a disease of poverty, with most of the burden harbored by children of lower socioeconomic status (SES)². In Manitoba, the prevalence of ECC is particularly high among Aboriginal children, rural children and the urban poor³.

Prevention is particularly important for the prevention of early childhood caries and as part of this prevention the collective recommendation among pediatric dentists is the age 1 dental visit. Health care professionals such as community health nurses are far more likely to see a child within the first year of life than the dentist. As such, they should be aware of basic preventative oral health measures and the need for the early dental visit. Because of their important role in the first year of life, including the advice given to caregivers, it is important to know what oral health knowledge community health nurses have. Furthermore, it will be interesting to see if this knowledge and advice is consistent among northern, rural and urban health nurses.

Literature Review

Early Childhood Caries and Severe Early Childhood Caries:

The highest prevalence of ECC may include immigrants and Aboriginal children⁴, as well as children from rural areas of Canada². Preventive dental care, when administered in the first year of life has been shown to prevent dental disease and also the likelihood of needing emergency or restorative treatment later on⁵.

Severe Early Childhood Caries (SECC) is a more aggressive counterpart of ECC and typically involves multiple decayed teeth or caries on smooth surfaces of front teeth. Older terms for ECC include “baby bottle tooth decay” or “nursing bottle caries” and are no longer in use because of the implication that feeding practices are the sole modality causing the caries. In reality, feeding practices and the relationship to ECC is not always consistent³ and the term ECC better reflects the multifactorial etiology of dental caries.

Traditionally, the Keyes triad is used to explain the etiology of dental caries. The triad includes consumption of fermentable carbohydrates, exposure to cariogenic bacteria and susceptibility of the host (the tooth enamel)³. Although helpful in explaining caries in a causative manner, the triad is an oversimplification of the disease process. This traditional model fails to take into account many other factors that are associated with developing ECC which include socio-economic status (SES), psychological issues, child-rearing practices and even ethnicity³. A systematic review recently revealed that the relationship between caries development and sugar consumption is weaker than previously recognized because of fluoride exposure in modern times⁶. Plaque accumulation, however, is strongly associated with caries development in young children⁶.

Early Childhood Caries and the scope of the problem:

Although theoretically ECC can affect any young child, oral health disparities are evident among populations with low SES and immigrant populations. In fact, ECC is 32 times more likely to occur in infants with low SES background, with high sugar diets, and whose mothers have less education⁷.

While ECC is known to be the most common chronic childhood disease, and despite preventative efforts, the scope of the problem is worsening. Recent estimates indicate the prevalence is increasing in Canada, with prevalence of ECC at 28 to 58 %⁸. Research conducted in one northern Manitoba First nations community found an ECC rate of greater than 90% among 3 to 5 year old children⁹. Similarly, the Canadian Paediatric Society “Position statement on Oral healthcare for children” cites ECC prevalence in the 50-97% range for northern Manitoba First Nations communities¹⁰. The working poor and children of low socioeconomic status are also vulnerable to ECC and one Canadian study found that children from the lowest income families have 2.5 times the decay rates of children from higher income families¹⁰. More recent Canadian data found that children from the least affluent areas had dental surgery rates 3.7 times higher than children from more affluent communities².

Oral Health Disparities among Indigenous Children:

Although the problem is not limited to children in Indigenous populations, a disparity in oral health is evident and can be attributed to many factors. These factors include, but are not limited to, low SES, geographical barriers, poor access to care, low rates of water fluoridation, dietary factors, and poor oral hygiene.

Socioeconomic status: Low SES is consistently implicated in a higher rate of ECC. Over half of indigenous children in children in Canada live in poverty, which is more than double the general

population¹¹. Other factors include household crowding, family size, health behaviors, child-rearing practices¹¹.

Geographical barriers and access to care: Many First Nations communities are in remote and/or northern locations, making it difficult to access care for these populations. In addition, many of these communities do not have continuous access to a dentist, with many communities having a “fly-in” dentist that periodically visits the community. The access to specialists is even more limited in these communities. Only a third of children less than 4 years old with NIHB coverage have an annual dental exam, which is likely due to a lack of dental providers in northern communities but also due to geographical barriers in accessing care¹⁰.

Water fluoridation: Very few indigenous communities have access to fluoridated drinking water, which only compounds the other caries risk factors faced by these children¹¹. The disparity is evident when comparisons are made: despite 45% of Canadians having access to fluoridated water, less than 10 % of Indigenous people living on reservations had access to fluoridated water¹¹.

Dietary factors and oral hygiene: Prolonged use of the bottle or sippy cups with sugar-containing drinks, a high frequency of sugary snacks are parenting practices associated with ECC in American Indigenous populations¹¹. One study of preschool aged children in a northern Manitoba First Nation community found that the mean number of decayed, extracted and filled teeth (deft) was 13.7, with a caries rate greater among children for whom sugar was added to the bottle³. Other factors that were associated with ECC in this study were poor oral hygiene and late weaning from the bottle³.

Despite an increased rate of ECC among Aboriginal populations in Canada it is important to recognize that they face some unique challenges that make them more susceptible to ECC.

Moreover, the ECC continues to be a persistent problem among other populations with low SES, including immigrant populations.

Consequences of Early Childhood Caries and the Burden of the Disease

The consequences of ECC extend to both primary and permanent dentitions, with higher risk of new carious lesions in both dentitions, hospitalizations, and Emergency Room visits¹⁰. In addition there is higher cost of treatments, increased school absences, decreased ability to learn and decreased oral health related quality of life⁷.

Often children with ECC and SECC have dental surgery performed under general anesthetic due to extensive treatment needs and the young age of the patient. Although there are benefits to performing dental surgery using a general anesthetic, the reality is that the disease causing factors are not addressed. Repeat surgery under general anesthetic is common because new cavities can develop within months of the initial surgery and post surgical relapse is unfortunately more common among the First Nation Populations¹⁰. Other reasons for repeat surgeries include treatment failures (which may include failure to treatment plan aggressively), provider competence, virulence of cariogenic microbes, and poor oral hygiene¹².

One study in Alberta (Canada) found that, for children with Non-Insured Health Benefits (NIHB), the mean ages of the time of first and second repeat anesthetic was 64.7 months and 75.8 months¹². More disturbingly, while all the children in the study underwent a repeat general anesthetic, 24% of these children had more than two anesthetics¹². Obviously, these repeat surgeries come with additional costs to the health care system.

Dental surgery for ECC is the most common surgical outpatient procedure at most pediatric and community hospitals in Canada for pre-school children^{10,13}. A recent Canadian study looked at treatment of ECC under general anesthesia found that dental surgery for children aged 12-59

months of age accounted for 31% of all day surgeries in this age group across Canada².

Although serious consequences are rare, general anesthetics do have complications which include nausea and vomiting, fever, swelling of intraoral tissues, bronchospasms, cardiac arrest and respiratory failure, among others¹².

The implications of dental surgery for a public health care system are staggering as the costs also extend beyond the procedures billed by the dentist. For instance, wages to dental assistants, nurses, anesthesiologists, and other hospital personnel are factors. In addition, many of the families have to travel to larger urban centres for their surgery, thus there are also costs associated with flights, accommodation, meals and ground transportation.

Finally, we must take into account the long waiting list for dental surgery and the fact that children may develop infections, and require hospitalization or emergency room visits while on the wait list for surgery. Delays in access to oral care for children with special health care needs can result in delays or postponements in other surgeries or medical procedures. The wait list for dental surgery in Manitoba can be well over 1 year. Between April 2017 and February 2018, the number of children on the wait list for dental surgery ranged between 774 to 1026 children¹⁴.

Unfortunately, much of the focus on dental treatment for high risk populations has focused on dental surgery and treatment, after the disease process has already begun. It is notable, for instance, that only 10% of the total NIHB budget is dedicated towards oral health promotion¹⁵.

Prevention and the Early dental visit

The recommendation for a first dental visit by 1-year-old is almost universally accepted in dentistry, and is supported by the Canadian Academy of Pediatric Dentistry (CAPD), the Canadian Dental Association (CDA) and the American Academy of Pediatric Dentistry (AAPD).

Specifically, the AAPD recommends that the first visit should take place at the time of eruption of the first tooth but not later than 12 months of age¹⁶.

The importance of the timing of the first dental visit cannot be understated. It is an opportunity for the dental team to discuss and demonstrate home dental care, feeding practices, and the avoidance of frequent ingestion of fermentable carbohydrates^{17, 7}. In addition, the dental team can provide anticipatory guidance regarding dental and facial development, teething, prevention of trauma and injury and non-nutritive sucking habits¹⁷. A caries-risk assessment can be completed, and an appropriate recall schedule established based on the caries-risk.

The early dental visit provides for opportunity to influence a child's general health and well being. According to the AAPD, early assessment, diagnosis, and management of oral conditions can lead to improvement of the child's oral health. This in turn affects the general health and well-being of the child and also the child's school readiness¹⁶.

The 1-year-old dental visit can also help to establish an early relationship between the dentist and parent, and also with the dentist and child, allowing the child to become accustomed to the dental chair and procedures. The opportunity to establish a dental home begins at the first dental visit.

The dental home can be defined as “the ongoing relationship between the dentist and the patient, inclusive of all aspects of oral health care delivered in a comprehensive, continuously accessible, coordinated, and family-centered way”¹⁸.

Early preventative visits are cost effective in that children who have early dental visits are more likely to use preventive services afterwards and have lower dental costs later on¹⁰. A recent study of early starters (less than 4 years of age), versus late starters (greater than 4 years of age) found that late starters had more subsequent dental procedures performed and an overall increased cost

of treatment in an 8 year follow up period¹⁹ providing further support for the benefits of early dental visits.

The rationale for the early establishment of a dental home can also be established with the knowledge that oral health related behaviors are formed early, by age 1, and are continued through early childhood¹. When intervention occurs after this time period in which diet and oral hygiene habits are established, intervention by professionals is not as effective.

Despite the recommendation for an early dental visit prior to age 1, many children are not being seen by a dentist until much later—often when oral health problems have already occurred.

Barriers to an early dental visit may include, among other things, lack of understanding or motivation by the caregiver, caregiver perception that an early dental visit is not necessary, or cost to the caregiver²⁰.

Manitoba's Free First Visit program

In Manitoba and in many other Canadian provinces, dental care is not included in the universal health care system. Dental care is generally covered by private dental insurance or the financial burden falls to the family or caregivers. Children of low income families may be able to access dental benefits if their families receive social assistance and many of the First Nation and Inuit children receive dental benefits through Health Canada's NIHB program. At times, dental care for children who fall between the NIHB coverage and the social services programs is paid for, at least partially, by the First Nations band.

Manitoba is unique in that there exists a dental program for children to receive their first dental visit for free. The Manitoba Dental Association "Free First Visit" (FFV) program is in effect for any child under three years of age by dentists who have subscribed as providers²¹. The program,

provides intraoral clinical examinations performed by general dentist practitioners and pediatric dentists.

Despite the existence of the FFV program, recent data from the program shows that the average age of a child's first visit was 24 months, and only 8.5% of participants had their first visit by 12 months²¹. This data suggests that although the caregivers are willing to bring the child to the dentist they are still unaware of the recommended timing of the first visit. Participation of children from high risk groups was not greater because of this program, meaning the program didn't effectively reach the target population. A clinically relevant question arises as to whether involvement of other health care providers may prove more successful. For instance, if nurses were able to tell their patients about this program, they may have more of an impact because they have access to caregivers of infants and very young children. Furthermore, community health nurses have greater opportunity to build an ongoing relationship as they may see a family multiple times in the first year of life. This relationship may allow nurses to gain trust and pass along information regarding the free first visit in a more effective way.

Collaboration among nurses, dentists and physicians

For many years now, there have been calls to increase prevention of dental caries through greater inter-professional collaboration between nurses, dentists and pediatricians^{10, 22, 23}, of which the well-child visit is a prime opportunity²⁴. Some researchers have advocated for oral health care education to begin in the prenatal period, or in the newborn period in the newborn nursery²⁵. Medical health care professionals, including nurses, are far more likely to see new mothers and infants than are dentists²⁶. Because of this primary health care providers should be aware of infectious etiology, risk factors for ECC, and prevention of ECC⁷. In addition, they should be able to intervene when needed, and facilitate the establishment of a dental home²⁷. While this

may include any health care practitioner in the perinatal and infancy period, community health nurses are in an especially advantageous position to communicate basic oral health advice, and timing of the first dental visit. All new mothers in Manitoba are provided with a post-natal home visit, and other support visits are available if needed. In fact, a Manitoban child following the recommended immunization schedule will see a primary health care provider at least four times in the first year of life. Often, and especially in remote or northern areas, this primary health care provider will be a public or community health nurse.

For interdisciplinary collaboration however, there must be an increased recognition of the importance of oral health to the overall health of the patient. In turn, oral health must be a subject that is taught to primary health care providers such as nurses and physicians. In particular, those health care providers that have a focus on pediatrics can influence oral health in terms of caregiver education or even just referral to a dentist at an early age. There has been very little research regarding the oral health knowledge of community/public health nurses, and the advice they provide caregivers of young children. Given that the province of Manitoba has many remote, northern, and high-risk caries populations, it is important to know what oral health information is being given to the caregivers of young children in the time before they see a dentist.

Objective

Despite recommendations for an early dental visit, children are often being seen much later once oral health problems have occurred. Prior to the first dental visit, dentists have limited opportunity to educate caregivers about oral health care. Primary health care providers are, however, in a position to see caregivers and children multiple times throughout the first year of life. The question at hand, is whether the primary health care providers such as community health nurses are telling parents about the need for an early dental visit? If they are telling parents about the timing of the early dental visit, are they aware of a free program that is available to facilitate it? And what advice regarding oral health, if any, is being provided to parents prior to the early dental visit? A questionnaire has been created to answer these questions.

In short, the issue to be addressed is a lack of understanding regarding what oral health information, if any, is being provided by primary health care providers, such as community health nurses, to caregivers of children and young infants. The first objective is to study the oral health knowledge of community /public health nurses in Manitoba. The second objective of the study is to find out what, if any, dental advice or oral health advice is being given to caregivers by community nurses.

Of particular interest, is determining whether community health nurses are aware of, and are communicating the need for an early dental visit to the caregivers. Since Manitoba has the Free First Visit program, it will also be important to determine if community health nurses are aware of this program and are telling patients about it.

Another objective is to determine the difference in practice between nurses practicing in urban, rural and northern/remote communities. Since patients in rural or northern communities have

more barriers with accessing dental care, it will be interesting to see if community health nurses in this area are more knowledgeable with oral health advice, and whether they are providing this advice to patients more often than nurses practicing in urban centers. Overall improved knowledge of nurses in regards to oral health promotion may lead to improved oral health in children.

Null Hypothesis

The null hypothesis is that there will be no difference in the level of knowledge and information given to parents among the three groups of registered nurses (urban, rural and northern/remote).

Alternative Hypothesis

It is expected that nurses will be aware of the First Free Visit program in Manitoba, and will be making patients aware of the need for a dental check-up prior to one year of age.

It is also anticipated that nurses will be receptive to providing information about oral health during the well child visits and that an oral exam will be a standard part of the well baby visit.

At the very least, nurses providing health care to infants in the first year of life should be aware of the timing of the first dental visit, so they can enquire with caregivers as to whether or not an appointment to see a dentist has been made.

It is expected that nurses working within rural and northern communities will be more knowledgeable of both oral health care principles and the timing of the first dental visit than nurses working within urban centers. This is because rural and northern communities have limited access to dentists and doctors and so nurses take on a more extensive role in the scope of care that they provide. Furthermore, ECC is a significant health issue in northern communities and is more prevalent than in non-northern communities.

If it is determined that nurses are not aware of basic oral health practices and the existence of the FFV program, or that they do not routinely provide advice on oral hygiene or referral to dentists, then it could be argued that dentists need to do more to educate primary health care professionals about oral health and hygiene.

Methods

Ethics approval for this study was obtained from the Manitoba Health Research and Ethics Committee (HREB) (Appendix 2). In addition, collaboration with the College of Registered Nurses of Manitoba (CRNM) was established in order to access their membership of community and public health nurses.

The survey was developed by the principal investigator, a pediatric dentistry resident using general knowledge and published studies involving oral health surveys given to nurses. In addition, additional questions were proposed through feedback given by health professionals who reviewed the survey. These professionals included a pediatric dentist, pediatric dentistry residents, a registered dental hygienist, and two registered nurses working in public or community health.

In collaboration with the College of Registered Nurses of Manitoba, an electronic survey was emailed to CRNM members through the on-line company “Survey Monkey”. The survey was emailed to all nurses who identified themselves as either a Public Health Nurse or Community Health Nurse during the most recent registration year (Appendix 1).

The community health nurses were divided into three groups based on the region where they work: 1. Urban nurses (defined as working in a community with a population greater than 10,000). 2. Rural nurses (a population of less than 10,000). 3. Northern/Remote nurses.

The survey was open for a period of 60 days. A second email was sent to non-responders on the 25th day to elicit more responses. Participation was on a voluntary basis with no incentive provided to the individual respondents. To ensure only one survey was filled out per person and to avoid multiple submissions, a unique URL was provided in the email. Bias was prevented by

preventing the researcher from linking the demographic information of the nurses with the corresponding results.

A statistician analyzed the results. The Fisher Exact Test was used to compare responses between the nurses' work communities (urban, rural and northern/remote). The Fisher Exact Test is a test of association between the two variables in question. It is similar to comparing proportions or percentages. If the p value is less than 0.05, we can conclude that the two variables are associated.

Results

Of 1035 surveys that were emailed, 261 responses were received or 25.2%. The respondents can further be broken down into nurses that work in the city, northern/remote community, or rural. City nurses comprised the majority of the respondents at 54.96 % (or 133 total). Nurses working in northern or remote community gave 20.66% of responses, while nurses working in a rural environment made up 24.38% of responses (Table 1).

Table 1- Work Community				
Frequency and Percent of Respondents by Community of Practice (City, Northern/Remote or Rural)				
Question: Which Option BEST describes the community in which you work?				
Work Community	Frequency	Percent	Cumulative Frequency	Cumulative Percent
City	133	54.96	133	54.96
Northern/Remote	50	20.66	183	75.62
Rural	59	24.83	242	100.00

Questions 1-8 can be summarized in frequency and percent of correct and incorrect responses for all the groups of nurses combined (Table 2).

Table 2- Question set 1-8. Oral Health Knowledge Questions				
Frequency and Percent of Correct and Incorrect Responses for all nurses combined.				
Question	Frequency Correct	Frequency Incorrect	Percent Correct	Percent Incorrect
Manitoba has a program for a free first dental exam for young children of all socio-economic groups	233	25	90.31	9.69
The first dental visit should occur by age 1	177	83	68.08	31.92
The first dental visit should occur between 2-3 years old	169	87	66.02	33.98
Infants should have their teeth brushed as soon as the first tooth erupts	222	38	85.38	14.62
Children less than 3 years old should have their teeth brushed with fluoride toothpaste	161	96	62.65	37.35
Bacteria that cause cavities can be transmitted from person to person	183	76	70.66	29.34
Giving a bottle of milk or formula in the crib is sometimes acceptable	244	16	93.85	6.15
Giving juice in a bottle will not cause cavities so long as it's unsweetened	258	2	99.23	0.77

Question 1: Manitoba has a program for a free first dental exam for young children of all socio-economic groups.

Respondents answered correctly with “TRUE” at a percentage of 90.31%. Respondents answered incorrectly at a percentage of 9.69% with “FALSE”. There was no significant difference between the three groups of nurses ($p= 0.0688$) (Table 3).

Table 3- Manitoba has a program for a first free dental exam for young children of all socio-economic groups. Frequency and Percent of True and False Answers by Work Community (City, Northern/Remote or Rural)			
Question 1 by Work Community			
Work Community	FALSE	TRUE	Total
City	6 4.51	127 95.49	133
Northern/Remote	7 14.00	43 86.00	50
Rural	6 10.17	53 89.83	59
Total	19	223	242
Frequency Missing = 18			

Question 2: The first dental visit should occur by age 1

The correct answer is “true” and was answered correctly by 68.08% of respondents while 31.92% answered incorrectly. There was a significant difference between the 3 groups of nurses ($p= 0.0458$) with 44% of Northern/Remote group of nurses incorrectly answering this question (Table 4).

Table 4-Question: The first dental visit should occur by age 1 Number and Percent of True and False answers by Community of Work (City, Northern/Remote or Rural)			
Question 2 by Work Community			
Work Community	FALSE	TRUE	Total
City	39 29.32	94 70.68	133
Northern/Remote	22 44.00	28 56.00	50
Rural	13 22.03	46 77.97	59
Total	74	168	242
Frequency Missing = 18			

Question 3: The first dental visit should occur between 2-3 years old

The correct answer for question 3 is “FALSE”, and was chosen by 66.02% of respondents, while 33.98% chose the incorrect response “TRUE”. There was not a significant difference between the groups of nurses ($p= 0.0565$) (Table 5).

Table 5 –The first dental visit should occur between 2-3 years old			
Question 3 by Work Community			
Work Community	FALSE	TRUE	Total
City	88 67.18	43 32.82	131
Northern/Remote	28 56.00	22 44.00	50
Rural	45 77.59	13 22.41	58
Total	161	78	239
Frequency Missing = 21			

Question 4: Infants should have their teeth brushed as soon as the first tooth erupts

85.38% of responses were correctly answered “TRUE”. 14.62 % answered incorrectly. There was no difference between groups of nurses ($p=1.0000$) (Table 6).

Table 6- Infants should have their teeth brushed as soon as the first tooth erupts			
Question 4 by Work Community			
Work Community			Total
	FALSE	TRUE	
City	20 15.04	113 84.96	133
Northern/Remote	7 14.00	43 86.00	50
Rural	19 15.25	50 84.75	59
Total	36	206	242
Frequency Missing = 18			

Question 5: Children less than 3 years old should have their teeth brushed with fluoride toothpaste

The question was correctly answered “TRUE” at a rate of 37.35%. Nurses answered incorrectly “FALSE” at 62.65%. There was a significant difference between groups of nurses ($p=0.0300$) with the northern nurses answering this question correctly at 48%, while city and rural community nurses answered correctly at 38.93% and 24.14 % respectively (Table 7).

Table 7-Question 5: Children less than 3 years old should have their teeth brushed with fluoride toothpaste. Number and Percent of True and False answers by Community of Work (City, Northern/Remote or Rural)			
Question 5 by Work Community			
Work Community	FALSE	TRUE	Total
City	80 61.07	51 38.93	131
Northern/Remote	26 52.00	24 48.00	50
Rural	44 75.86	14 24.14	58
Total	150	89	239
Frequency Missing = 21			

Question 6: Bacteria that cause cavities can be transmitted from person to person

Nurses answered correctly “TRUE” 70.66% of the time, and incorrectly at 29.34 %.

There was a significant difference between the groups of nurses ($p=0.0393$). Northern nurses had 58.00% correct response, while city nurses responded correctly at 77.27% and rural nurses at 72.88% (Table 8).

Table 8- Question 6: Bacteria that cause cavities can be transmitted from person to person Number and Percent of True and False answers by Community of Work (City, Northern/Remote, or Rural).			
Question 6 by Work Community			
Work Community			
	FALSE	TRUE	Total
City	30 22.73	102 77.27	132
Northern/Remote	21 42.00	29 58.00	50
Rural	16 27.12	43 72.88	59
Total	67	174	241
Frequency Missing = 19			

Question 7: Giving a bottle of milk or formula in the crib is sometimes acceptable

The correct answer “FALSE” was given by 93.85% of nurses, while 6.15% answered incorrectly. There was not a significant difference between the 3 groups of nurses ($p= 0.6365$) (Table 9).

Table 9- Question 7: Giving a bottle of milk or formula in the crib is sometimes acceptable. Number and Percent of True and False answers by Community of Work (City, Northern/Remote or Rural).			
Question 7 by Work Community			
Work Community	FALSE	TRUE	Total
	City	127 95.49	6 4.51
Northern/Remote	46 92.00	4 8.00	50
Rural	56 94.92	3 5.08	59
Total	229	13	242
Frequency Missing = 18			

Question 8: Giving juice in a bottle will not cause cavities so long as it's unsweetened.

The question was answered "FALSE" by 99.23 % of nurses. 0.77 % answered incorrectly. No significant difference between groups of nurses was observed ($p=0.6990$) (Table 10).

Table 10- Question 8: Giving juice in a bottle will not cause cavities so long as it's unsweetened. Number and Percent of True and False answers by Community of Work (City, Northern/Remote or Rural).			
Question 8 by Work Community			
Work Community	FALSE	TRUE	Total
City	132 99.25	1 0.75	133
Northern/Remote	50 100.00	0 0.00	50
Rural	58 98.31	1 1.69	59
Total	240	2	242
Frequency Missing = 18			

Table 11- Summary of p Values for Question Set 1-8			
Question 1-8		p value	
Manitoba has a program for a free first dental exam for young children of all socio-economic groups		0.0688	
The first dental visit should occur by age 1		0.0458	
The first dental visit should occur between 2-3 years old		0.0565	
Infants should have their teeth brushed as soon as the first tooth erupts		1.0000	
Children less than 3 years old should have their teeth brushed with fluoride toothpaste		0.0300	
Bacteria that cause cavities can be transmitted from person to person		0.0393	
Giving a bottle of milk or formula in the crib is sometimes acceptable		0.6365	
Giving juice in a bottle will not cause cavities so long as it's unsweetened		0.6990	

Question set 9-15 evaluated knowledge and practices of the community health nurses. The overall summary of responses prior to breaking down responses by community of work can be seen (Table 12).

Table 12- Question set 9-15. Frequency and Percent of Yes and No answers for all nurses combined.				
Question 9-15	Frequency YES	Frequency NO	Percent YES	Percent NO
Are you aware of the Manitoba Dental Association's Free First Visit Program?	194	48	80.17	19.83
Have you told caregivers about the MDA's Free First Visit Program?	154	88	63.64	36.36
Do you refer infants (1 year old or younger) to see the dentist?	110	131	45.64	54.36
Do you refer young children (>1 year-3 years old) to see the dentist?	201	41	83.06	16.94
Do you feel that giving oral health advice to caregivers is within your scope of practice?	219	22	90.87	9.13
Should oral health advice be a topic covered in the well-baby or well-child visit?	238	3	98.76	1.24
Is an oral examination part of your standard well-baby/well-child visit?	119	115	50.85	49.15

Question 9: Are you aware of the Manitoba Dental Association’s Free First Visit Program?

80.17% of nurses were aware of the program, while 19.83% of nurses were unaware of the Free First Visit Program. There was a significant difference between the groups of nurses, with 46.00% of northern/remote nurses being unaware of the program (Table 13).

Table 13- Question 9: Are you aware of the Manitoba Dental Association’s Free First Visit Program? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 9 by Work Community			
Work Community	NO	YES	Total
City	16 12.03	117 87.97	133
Northern/Remote	23 46.00	27 54.00	50
Rural	9 15.25	50 84.75	59
Total	48	194	242
Frequency Missing = 18			

Question 10: Have you told caregivers about the Manitoba Dental Association’s Free First Visit Program?

63.64% of nurses responded that they had told caregivers about the MDA FFV Program. 36.36 percent of nurses had not told caregivers about the program. There was a significant difference between the groups of nurses ($p = 0.0016$) with northern/remote nurses being less likely to have told caregivers about the FFV program (Table 14).

Table 14- Question 10: Have you told caregivers about the Manitoba Dental Association’s Free First Visit Program? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 10 by Work Community			
Work Community	NO	YES	Total
City	43 32.93	90 67.67	133
Northern/Remote	29 58.00	21 42.00	50
Rural	16 27.12	43 72.88	59
Total	88	154	242
Frequency Missing =18			

Question 11: Do you refer infants (1-year-old or younger) to see the dentist?

Only 45.64 % of nurses referred infants to see the dentist, while 54.36% said they did not refer children of this age to see the dentist. There was not a significant difference between groups of nurses $p= 0.6408$ (Table 15).

Table 15- Question 11: Do you refer infants to see the dentist? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 11 by Work Community			
Work Community	NO	YES	Total
City	75 56.39	58 43.61	133
Northern/Remote	27 55.10	22 44.90	49
Rural	29 49.15	30 50.85	59
Total	131	110	241
Frequency Missing =18			

Question 12: Do you refer young children (> 1 year- 3 years) to see the dentist?

83.06% of nurses said that they refer young children to see the dentist while 16.94% did not.

No significant difference between groups of nurses was observed ($p= 0.1957$) (Table 16).

Table 16- Question 12: Do you refer young children (> 1 year – 3 years) to see the dentist? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 12 by Work Community			
Work Community	NO	YES	Total
City	28 21.05	105 78.95	133
Northern/Remote	6 12.00	44 88.00	50
Rural	7 11.86	52 88.14	59
Total	41	201	242
Frequency Missing =18			

Question 13: Do you feel that giving oral health advice to caregivers is within your scope of practice?

A strong majority of nurses 90.87% felt that giving oral health advice was within their scope of practice, while 9.13% did not. The 3 groups of nurses did not have a significant difference in their responses ($p=0.0980$) (Table 17).

Table 17- Question 13: Do you feel that giving oral health advice to caregivers is within your scope of practice? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 13 by Work Community			
Work Community	NO	YES	Total
City	17 12.88	115 87.12	132
Northern/Remote	2 4.00	48 96.00	50
Rural	3 5.08	56 94.92	59
Total	22	219	241
Frequency Missing =19			

Question 14: Should oral health advice be a topic covered in the well-baby or well-child visit?

98.76% of nurses agreed that oral health advice should be covered in early well-child visits.

Only 3 respondents (or 1.24%) felt that it should not be a topic covered. No significant difference between the groups of nurses was observed ($p= 0.4211$) (Table 18).

Table 18- Question 14: Should oral health advice be a topic covered in the well-baby or well-child visit? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 14 by Work Community			
Work Community			
	NO	YES	Total
City	3 2.26	130 97.74	133
Northern/Remote	0 0.00	50 100.00	50
Rural	0 0.00	58 100.00	58
Total	3	238	241
Frequency Missing =19			

Question 15: Is an oral examination part of your standard well-baby/well-child visit?

Nurses were almost evenly split here, with 49.15 % answering “NO”, and 50.85% answering “YES”. There was a significant difference between the 3 groups of nurses ($p= 1.975 E-07$) (Table 19).

Table 19- Question 15: Is an oral examination part of your standard well-baby/well-child visit? Number and Percent of Yes and No answers by Community of Work (City, Northern/Remote or Rural).			
Question 15 by Work Community			
Work Community	NO	YES	Total
City	77 60.63	50 39.37	127
Northern/Remote	8 16.00	42 84.00	50
Rural	30 52.63	27 47.37	57
Total	115	119	234
Frequency Missing = 26			

Table 20- Summary Table of Questions 9-15 with Significant differences highlighted p value <0.05 .		
Question 9-15	Percent YES	p value
Are you aware of the Manitoba Dental Association's Free First Visit Program?	80.17	5.131 E - 06
Have you told caregivers about the MDA's Free First Visit Program?	63.64	0.0016
Do you refer infants (1 year old or younger) to see the dentist?	45.64	0.6408
Do you refer young children (>1 year-3 years old to see the dentist?	83.06	0.1957
Do you feel that giving oral health advice to caregivers is within your scope of practice?	90.87	0.0980
Should oral health advice be a topic covered in the well-baby or well-child visit?	98.76	0.4211
Is an oral examination part of your standard well-baby/well-child visit?	50.85	1.975 E - 07

Questions 16-21

Questions 16-21 were used to evaluate topics the nurses discussed with caregivers of small children and infants. There were no significant differences between the groups of nurses (Table 21).

Table 21- Questions 16-21. Percent Yes/No/Occasionally for all nurses.			
Question 16-21 In your role as a nurse do you recommend:	Percent YES	Percent NO	Percent Occasionally
Toothbrushing after eruption of the first tooth	78.42	12.03	9.54
Use of fluoride toothpaste before the age of 3	30.42	62.08	7.50
Methods to prevent transmission of bacteria that cause cavities from mother to infant	44.54	42.86	12.61
Avoiding giving bottles of milk or formula at night	79.25	13.28	7.47
Wiping an infants gums and teeth with a clean moist cloth after feedings	84.34	10.37	5.39
Limiting frequency of sugar or carbohydrate ingestion to prevent cavities	85.89	8.71	5.39

Question 16: Toothbrushing after eruption of the first tooth

78.48 % of nurses answered “Yes”, 12.03 % of nurses answered “No”, and 9.54% of nurses answered “Occasionally”. No significant difference was observed between groups of nurses ($p=0.1741$).

Question 17: Use of fluoride toothpaste before the age of 3

The majority of nurses did not discuss the use of fluoride toothpaste before the age of 3, with 62.08% answering “No”, 30.42% answering “Yes” and 7.50% answering “Occasionally”. There was not a significant difference between the nurses ($p=0.1713$).

Question 18: Methods to prevent transmission of bacteria that cause cavities from mother to infant

44.54 % of nurses answered “yes”, 42.86 % of nurses answered “no” and 12.61% of nurses answered “Occasionally”. Differences between groups of nurses were not significant ($p= 0.7285$)

Question 19: Avoiding giving bottles of milk or formula at night

The majority of nurses discussed this topic, with 79.25 % answering “Yes”, 13.28% answering “No”, and 7.47 % answering “Occasionally”. Differences between groups of nurses were not significant ($p=0.4262$).

Question 20: Wiping an infant’s gums and teeth with a clean moist cloth after feedings

Most nurses discussing wiping an infant’s gums and teeth with a moist cloth after feedings with 84.23% answering “Yes”, 10.37 % answering “No”, and 5.35 % answering “Occasionally”.

There were no significant differences between groups of nurses ($p= 0.2627$).

Question 21: Limiting frequency of sugar or carbohydrate ingestion to prevent cavities

Dietary recommendations of limiting frequency of sugar or carbohydrate ingestion was discussed by most nurses with 85.89% answering “Yes”, 8.71 % answering “No”, and 5.39 % answering “Occasionally”. No significant differences were observed between groups of nurses ($p=0.1956$).

The results indicate that while nurses had good knowledge relating to diet and oral hygiene, improvements need to be made in knowledge related to timing of the first dental visit and referral to a dentist. Use of fluoride in young children was also an area where many nurses differed in their knowledge and these topics will be examined in depth in the discussion section.

Discussion

For the purpose of our discussion, the questions in the survey can be broken down into several themes. First, is the knowledge and awareness of the MDA's Free First Visit Program. Second, is the overall knowledge of the nurses regarding oral health in infants and toddlers. The third theme, is the differences in knowledge and scope of practice of nurses from different worksites. Lastly, how can we improve the knowledge and communication between nurses and caregivers?

Manitoba Dental Association's Free First Visit program

Awareness of the FFV program was assessed with 2 questions. The first was a true/false question where nurses were asked "Manitoba has a program for a free first dental exam for all young children of all socioeconomic groups". The follow up question "Are you aware of the Manitoba Dental Association's Free First Visit Program?" was asked with options to respond "Yes" or "No".

A large majority of respondents answered the first question correctly with "TRUE" while 9.69% answered incorrectly with "FALSE". There was not a significant difference between the three groups of nurses. This question did not specifically ask about the FFV program and it is likely many of the nurses who answered the question correctly could have been referring to the programs such as NIHB dental coverage or social services insurance coverage.

On the follow up question, less nurses were aware of the FFV program than in the previous question "Manitoba has a program for a free first dental exam for young children of all socioeconomic groups". This lends support to the idea that some of the nurses who responded to the more generalized first question were considering government coverage programs, rather than the Manitoba Dental Association's FFV program when they answered.

There was a significant difference between the groups of nurses, less northern/remote nurses being unaware of the program. This difference can likely be explained by several factors. Firstly, many of these communities do not have a dentist working or visiting the community meaning nurses would be understandably less familiar with the MDA's FFV program. Another explanation is that many of the children from remote communities would be covered under the NIHB program and therefore the nurses may not be aware of other forms of insurance coverage. Lastly, there is likely to be less dentists participating in the FFV program who visit northern/remote communities when compared to both of the rural and community settings due to smaller numbers of dentists in remote/northern communities.

Later, when the nurses were asked "Have you told caregivers of children about the Manitoba Dental Association's Free First Visit Program?" less nurses answered "yes" than in the original question which asked about awareness of the program. Northern and remote nurses were significantly less likely to have told caregivers about the program than other nurses which is consistent with the fact that they were less likely to be aware of the program and less likely to have access to dentists participating in the program.

In another study, dentists who participate in the FFV program were interviewed and felt that although the FFV program encouraged some parents to bring their child to the dentist earlier than they would have, and most parents were largely unaware of the program and didn't know about the age 1 dental visit²⁸.

More primary health care providers including both nurses and physicians should be encouraged to tell caregivers about the FFV program. Parents of young children who participated in the

program echoed this statement, saying they believe their family doctors and pediatricians should tell them about the program²⁹.

Overall knowledge of nurses related to oral health in infants and small children

Overall knowledge of oral health in young children was assessed with questions relating to timing of the first dental visit, referral practices, tooth brushing, diet, and transmission of cariogenic bacteria.

Timing of the first dental visit: In this study, approximately two thirds of nurses were aware that the first dental visit should occur by age 1 but still almost 1/3 of nurses were not aware of this recommendation.

Overall, a third of nurses falsely believed that the first dental visit should occur between the ages 2-3 and there wasn't a significant difference between groups of nurses. Among primary health care providers, nurses in this study were not alone in this fact that they were not always aware of the need for an age 1 dental visit. In fact, the nurses in this study did much better than health professionals in other surveys. Studies have shown that most pediatricians and general dentists did not advise patients to see a dentist by age 1⁷. In a 2009 survey of American pediatricians, only seventeen percent said that the first dental visit should occur by age 1 and about half believed it should occur for healthy children at age 3²⁰. In a survey of Manitoba general dentists, only 58% were aware of the recommendation for an age 1 dental visit³⁰. In addition, the dentists thought that children should be visiting a dentist at the average age of 2 years old³⁰.

Despite the recommendations for an age 1 dental visit, studies are showing that this recommendation is rarely followed and that there are consequences to delaying the first dental treatment. For instance, a Canadian study found that less than one percent of the 2505 healthy

urban Toronto area children had seen a dentist by age 1⁵. They concluded that among the urban children seen by a primary care provider, those who were the most vulnerable to caries were the least likely to receive early dental care. The same study identified several factors that are associated with never having been to the dentist: low family income, prolonged bottle use, and higher intake of sweetened drinks⁵. Another study found that the severity of caries in the primary teeth was correlated to the reason for the first dental exam and also the the subsequent frequency of dental visits, and only 9.5% of one year olds had seen a dentist¹⁷. In one Canadian study, over one quarter of the caregiver's who participated said that their general dentist advised them not to bring their child to the dentist before 3²⁹. Anecdotally, many caregivers from northern or remote population presenting to the Children's Dental Clinic in Winnipeg state that they must wait until child is 3 years old for dental treatment. One possible explanation for this is the lack of access to dental services in these geographically remote regions. The issue with delaying the age 1 dental visit is that oral hygiene advice and caries prevention practices are delayed and the child may have already have caries. In fact, most children are seen for a first dental visit after decay has been noticed¹⁷.

Referral Practices: When asked about referring children to a dentist, less than half of all nurses answered that they refer children under the age of 1 to see the dentist. Nurses were much more likely to refer a child to a dentist between the ages of 1-3. Interestingly, there was not a significant difference between groups of nurses' tendency to refer in either of the age categories. In other studies, geographical location and transportation has been cited as a barrier to accessing dental care⁵. In this study however, geographical location was not a factor in nurses' willingness to refer or pattern of referral based on age. This supports the idea that, in this instance at least, access to care was not an issue in whether the nurses were likely to refer a child to a dentist.

Toothbrushing: Infants must have their teeth brushed as soon as the first tooth erupts, but this was not considered universal knowledge among the survey participants. Most nurses, however, were able to correctly identify that infants should have their teeth brushed as soon as the first tooth erupts and there was no difference between groups of nurses. In addition, most nurses said that they discuss toothbrushing after eruption of the first tooth with the caregivers.

A limitation of this survey is that there were not areas for respondents to clarify points or to give alternative answers. Due to this limitation, it is unclear why there is a knowledge gap in regards to toothbrushing. In addition, it is not known at what point the remaining participants think that toothbrushing should begin.

Diet: Nurses showed a high level of oral health literacy in regards to the diet of infants and young children. When asked if giving a bottle of milk in the crib is sometimes acceptable, only 6.15% of nurses answered incorrectly and there wasn't a difference between the groups.

Despite this, only 79.25% of nurses later answered that they discuss avoidance of giving bottles of milk in the crib at night with the caregiver. The reason that more nurses didn't discuss appropriate bottle feeding practices is unclear. Given the simplicity of advice regarding proper bottle feeding practices, and the potential to intervene *before* the caregivers develop this habit, this advice should be a universal recommendation. Often by the time the caregiver and child see the dentist for the first time the habit of putting the child to bed with a bottle of sweetened liquid has already been established. At this point, the dentist can give advice for weaning the child off the bottle or sweetened liquid but once the habit has been established already it is difficult to modify. Additionally, the dentist is often seeing the child for the first time because the caregiver has already noticed cavities¹⁷.

It is well established fact that the frequency of carbohydrate ingestion is more important than the actual amount of carbohydrate ingested. A large percentage of nurses answered that they regularly discuss limiting frequency of carbohydrate with caregivers. When asked if juice in a bottle could cause cavities, even when it is unsweetened, nurses almost unanimously identified the correct answer and there wasn't a difference between the groups of nurses.

The reason that nurses in this study were largely able to correctly answer the diet related questions may be a result of general nursing training or just general knowledge. A survey of public health nurses in Norway found that nurses prioritized nutrition as the health subject most often discussed in the counselling of parents of young children, however, oral health was not among the first priority for counselling subjects³¹. Similarly, nurses in this study did very well on questions related to diet compared to other oral health related questions.

Transmission of Cariogenic Bacteria: It has been well established that *Streptococcus mutans*, the bacteria primarily responsible for dental caries, is transmitted to infants and children at an early age⁷. The transmission is typically vertical, that is, from mother to child or caregiver to child. Transmission can also be horizontal, that is, from siblings or other children. Even pre-dentate infants are at increased risk for ECC in the future if they have been colonized early by *S. mutans*. Most nurses were able to correctly identify that bacteria causing dental caries could be transmitted from person to person.

Primary care providers should all have a basic understanding of the caries process and the transmissibility of dental caries so that they are able to properly advise their patients. In addition, they may be able to contribute to prevention by recommending a dental exam to women in the prenatal period.

According to Hallas et al, there has been no known documentation in the nursing literature on whether information of bacterial transmission and colonization of infants has been presented to caregivers of infants in the nursery setting or by pediatric nurses in outpatient settings²⁵. It is possible that this study is the first to document nursing knowledge and advice on transmissible cariogenic bacteria.

Differences in knowledge and scope of practice of nurses from different worksites.

Nurses working in northern, remote, and rural areas tend to have a greater responsibility and scope of practice due to the lack of medical and dental practitioners in these areas. As a result, it could be expected that nurses working in more remote locations would have greater knowledge about oral health since patients are likely to see them more often than a dentist. Nurses largely had similar knowledge in regards to feeding practices, oral hygiene and attitudes towards giving oral health advice. Areas of significant difference included knowledge related to timing of the first dental visit, use of fluoride toothpaste, transmission of cariogenic bacteria and the likelihood of doing an oral examination during a well-child visit.

Timing of the first dental visit: Nurses differed significantly in their knowledge of the timing of the first dental visit, depending on the community in which they practiced. Most unexpectedly was that almost half of remote/northern nurses were unable to answer this question correctly and almost half of them believed that the first dental visit should occur later, between the ages of 2 and 3. The responses of the northern nurses might be explained by the lack of dental services available in northern or remote locations which would also mean that the nurses could have less contact with dentistry in general. Another consideration is that a lack of available local dental services could be the reason in itself for delaying the first dental visit. For example, it could be

viewed that there is little point in recommending a dental exam before age one if there is no access to a dentist. Even in communities that have fly-in dentists, these dentists are often not pediatric dentists and many are not accustomed to infant dental exams. Still, it is surprising that given the lack of health care services in the north, that more nurses aren't aware of the timing for the first dental visit.

It was interesting that there was no significant difference in the nurses' tendency to refer to a dentist. Given the extremely high rate of ECC in some northern and remote communities, it is startling that nurses in these communities were not more likely to refer to the dentist at an earlier age compared to their urban counterparts. This is even more surprising given that northern nurses often act as "gatekeepers" to accessing medical and dental care outside of the community. This expanded health care role gives them greater responsibility and at times they determine which children will receive priority dental treatment and will need referral for treatment on an urgent basis.

Although most of the nurses in this study referred for a dental visit between the ages of 1 to 3 years old, less than half the nurses referred during the recommended age for a first dental visit. Several barriers to accessing dental care among low-income families have been identified as finances, access to transportation, school-absence policies, and the idea that dental health is not related to over-all wellness⁵. It is possible, in light of the results of this study, that another barrier to the age one dental visit could be a lack of early referral from primary health care providers such as nurses?

There could be several reasons for this tendency to refer to a dentist later. Most logical is that as a child gets older they are more likely to have cavities (which would then be more likely to cause

symptoms of pain and infection that need to be addressed). Another reason for the tendency to refer later could be because of parental concern or questions or if the parent has noticed cavities. The concern with the later referral to a dentist is that, as previously discussed, the child is more likely to have dental caries already.

Use of fluoride toothpaste: Fluoride has long been recognized as a safe and inexpensive method of reducing dental caries. When community water supplies are optimally fluoridated, recent data shows a caries reduction of 25% with little risk of enamel fluorosis³². Topical fluoride in toothpastes, and professionally applied preparations provide an additional protective effect from dental caries³². The cost of children's oral health care with the long-term use of fluorides can be reduced by up to 50 percent³². The potential for fluoride's benefits to translate into health care savings for publicly funded dental programs such as NIHB and social services programs cannot be understated.

The AAPD recommends that *all* children have their teeth brushed twice daily with fluoride toothpaste, with children under 3 years old limited to a smear amount and children over 3 using a pea sized amount³². It is important to note that this recommendation does not take into account caries risk and is recommended for all children regardless of risk.

Health Canada and Canadian Dental Association's recommendations on fluoride use under the age of 3 differ from that of the AAPD in that risk of dental caries is a consideration in whether or not fluoride toothpaste should be used. Health Canada states that parents of children under 36 months should consult a "health care professional" to determine if the child is at risk of developing tooth decay. Health Canada and the CDA go on to say that *if* the child under 36 months is at risk, then they should have their teeth brushed by an adult with a rice size grain of fluoridated toothpaste³³.

In this study, the practice of recommending fluoride toothpaste for all children regardless of risk, which follows the AAPD fluoride guidelines, was considered to be correct. This recommendation is also currently used by the University of Manitoba's graduate program in pediatric dentistry.

Nurses differed by community in regards to knowledge on the use of fluoride toothpaste in young children. When asked about use of fluoride toothpaste under the age of 3, nearly half of the northern nurses answered this question correctly, while city and rural community nurses answered were not as likely to answer correctly.

Interestingly, almost half of northern nurses were able to answer this question correctly, compared to rural and city nurses, who were less likely to answer this question correctly. It may be speculated that the northern nurses were more knowledgeable about the need to use fluoride toothpaste in young children due to the high caries risk in their communities.

City nurses were less likely than northern nurses to say that fluoride toothpaste should be used under the age of 3. While still incorrect, this result can likely be explained by the fact that the city nurses would know that the city water is fluoridated and therefore the need for topical fluoride is less important given the exposure to system fluoride in the water supply of city children.

Unexpectedly, over 75% of rural nurses answered incorrectly, meaning they would be less likely to recommend fluoride toothpaste use under the age of 3. Given that most rural children would not have access to adequately fluoridated water, we would presume the rural nurses to have more awareness of fluoride toothpaste recommendations.

Although northern nurses had more knowledge about use of fluoride toothpaste under age 3 compared to their peers, it must be noted that more than half of them did not know that fluoride

toothpaste can be used under the age of 3. Given the studies that show ECC rates of greater than 90% in some northern communities¹⁵ we should consider most northern/remote children high risk and so more nurses working in these environments should be more aware of the current recommendations. Similarly, recent Canadian data indicates the rates of ECC in children from rural regions is 3.2 times that of children in urban centres². Given the higher caries rates in rural children, we should also expect more of the rural nurses to have knowledge regarding the use of fluoride toothpaste in young children. Increasing nursing knowledge regarding use of fluoride toothpaste twice daily would be a simple measure that could benefit many children in all communities, but in particular the northern and remote communities.

Transmission of cariogenic bacteria: Most nurses were able to correctly identify that cariogenic bacteria could be transmitted from person to person. There was a significant difference between groups of nurses with northern nurses being least likely to answer correctly. The reason that this question is important is because if the mother or caregiver has dental caries, then those children are specifically at a greater risk for a higher level of *S. mutans*, earlier colonization and higher dental caries. Considering the northern populations are at a high risk for dental caries it is noteworthy that the northern nurses were the least likely to identify the correct answer.

Scope of practice: Nurses demonstrated positive attitudes to giving oral health advice to caregivers. A large majority of nurses agreed that giving oral health care advice to caregivers was within their scope of practice, with no significant differences between the groups. Almost all nurses agreed that oral health advice should be covered during the well-baby or well-child visit. Although the difference was not significant among the nurses based on their community of work, it should be noted that 100% of rural and northern nurses agreed that oral health advice should be

covered during a well-child clinic. This may reflect the heightened responsibilities and expanded roles in communities where access to dental care is limited.

Oral examinations: Despite these positive responses to incorporating oral health advice into their practice, only half of the nurses actually said that an oral examination was a standard part of their well-baby or well-child visit. There was a significant difference between the groups, with nurses being far more likely to do an oral exam if they were in a northern/remote community.

It is positive that a strong majority of northern/remote nurses are doing an oral examination, but given the limited access to dental care in these regions it is interesting that it is not a universal practice. In these communities the expanded role of nurses means they will often be the first to identify medical and dental issues that need to be addressed. Likewise, it was surprising to see that less than half of rural nurses were doing an oral exam as part of the well-baby visit.

Considering that many rural locations may not have a dentist easily accessible, it should be expected that more rural nurses would be doing oral examinations. City nurses were the least likely to do an oral examination. The most likely explanation for this finding is that dental care is accessible in urban environments and therefore this role is being left to the dentist or even to other primary care providers such as physicians.

Overall the nurses in this study were more likely to do an oral exam as a standard part of a well-child visit than nurses in similar surveys. A similar study of public health nurses in Norway found that only 24.8% of nurses responded that they always examine the child's teeth. While an additional 64.6% responded that they sometimes examine the child's teeth. When the teeth were checked, it was more common to check them at age 2 (72.2%) than at age 1 (24.4%)³¹. These results shows that an oral exam is often not a standardized part of the well-child visit performed

by community health nurses in Manitoba, and that even when the teeth are examined it is often done later than ideal.

Improving Oral Health Knowledge and Communication between Nurses and Caregivers of Young Children

The results obtained by this study show several clear areas where nursing knowledge related to oral health needs to be improved. Generally, these areas can be identified as information about timing of the first dental visit, use of fluoride toothpaste and referral to a dentist by age 1.

The lack of knowledge or primary health providers is may be related to a lack of training during their professional studies. Past studies have shown that oral care is a low priority for nurses and that nurses and nursing students do not have a good understanding of oral health issues²⁴. A 2009 study found that the most frequently cited barrier for pediatricians to perform oral health related activities was a lack of training, with less than 25% of them receiving oral health education during the course of their training²⁰. A comparable study of American pediatricians in 2009 found that over 90% of pediatricians agreed that they should examine their patients teeth and provide oral health education. However, only 54% of these pediatricians actually examined the teeth of their 0-3 year old patients²⁰.

Training programs, however, do have potential to improve knowledge and confidence in oral health care related tasks. A study of nursing students who participated in an inter-professional oral health education program had a significant knowledge increase and felt they had the knowledge to perform oral exams, provide fluoride varnish, do caries risk assessment and do oral health counselling²⁴.

Oral health should be an integral part of the well-child visit. The attitude of nurses towards oral health is not a barrier for change: Nurses in this study largely demonstrated positive attitudes

towards their role in oral health. A discussion related to oral health should also be a standard component of a well-child visit, whether it is provided by nurses or other health care professionals.

Having greater expectations of primary health care providers in oral health related skills will require training specific to oral health care and examination. Those nurses who assume a greater role in primary health due to remote or rural practice locations should also have more knowledge in oral examination and oral health counseling. While the systematic re-training and education of primary health care providers is an admirable goal with potential for long term changes, the reality is that changes to caries prevalence on a population level is a long term goal.

Perhaps a more realistic short term goal is that health care workers are aware of the need for an early dental visit and that this need is communicated to the caregivers of young children. If this early contact with a dentist is made, then the dentist may go on to establish a dental home and provide the caregiver with the tools necessary to provide a level of oral health that is functional and free from pain or infection.

The reason for the referral for a dental exam was not recorded in this study. For instance, was the referral for an exam and routine dental care or perhaps when caries was noticed? Alternatively, the reason for referral could be related for dental pain and infection or even trauma to the dentition. A greater focus on early referral, ideally by age one, and prevention of caries is necessary.

Discussion about use of fluoride toothpaste is another important area where communication between nurses and patients could be improved. Considering all children with teeth are technically at risk of developing tooth decay (which can be broken down into high, medium or

low risk categories), the recommendation given by Health Canada and the CDA are somewhat confusing, especially to non-dental professionals.

Finally, we do not know the reason that some of the respondents don't do oral exams during well-child clinics. One possibility is that there are so many topics that must be covered during a nursing visit and that oral health is lower on the priority list and sometimes don't get covered. In one survey of public health nurses, lack of time was mentioned as being a problem³¹. Still, the American Academy of Pediatrics has called for discussion of oral health during well-child visits, recognizing the role of the primary health care provider as being complementary to the dental professional¹¹. From a dental perspective, however, it could be argued that dentists need to be more active in their in teaching other health care professionals about dental caries and prevention.

Limitations

One major limitation of this survey, like any survey, is that the questions can be subject to different interpretations, depending on the individual. To limit this, the questionnaire was given to several nurses to complete, and feedback was given to ensure that the questions were clear.

Another limitation is that the study did not allow for nurses to given feedback or explain their rationale for choosing any given answer. Consequently, the reasons for the results obtained are speculative.

Several oral health related topics were not addressed in this study, which could limit the ability to speculate on the reasons for results given. For instance, whether or not the oral examination was required as a standard part of the well-baby or well-child visit was not addressed.

Knowledge regarding feeding practices such as timing and frequency of breast or bottle feeding were not addressed in this study for several reasons. The first is due to the complexity and individual nature of these practices among caregivers and infants. In one study, efforts to prevent ECC which focus on feeding methods have had “limited success” in reducing ECC³. In addition, feeding practices are influenced by culture and knowledge that can be in families or cultures for many generations and are therefore not easily changed.

Although the number of responses obtained were sufficient for statistical analysis and within expected percentages for on-line surveys, it would be ideal to see a higher response rate.

Future Research

Regrettably, questions related to the nurses' training in oral health were not included in this survey and would be an area for future research. In particular, development of an interdisciplinary oral health training program for students in health care professions in Manitoba and Canada would be an interesting area for future study.

It is possible that some of the nurses looked in the mouth only if solicited to do so by the caregiver, for instance if the child is in pain and it was brought to the nurse's attention. Even if the nurses were looking at the teeth, it is not known if they would be able to identify dental caries, the severity of caries, plaque accumulation or a dental abscess. Whether or not nurses and physicians are able to reliably identify plaque and dental caries would give us insight into the ability of primary health care providers to do oral examinations. Even if primary care providers are able to identify these, it would be interesting to know whether they are able to reliably determine the severity of caries and whether or not a child is in need of immediate dental treatment or whether they should be prioritized for treatment. This is especially true for northern communities where PCP often act as gatekeepers for services in the larger centers.

Given the current Health Canada/CDA recommendation for use of fluoride toothpaste in children under the age of 3 (based on caries risk), it would be interesting to see if health care professionals are actually able to identify children or infants at risk for dental caries. If they are not able to identify high risk patients, then dentists should be deliberating whether the current Canadian guidelines are overly complicated and difficult to understand, for both non-dental health care providers and caregivers alike.

While expanding roles of primary health care providers seems to be an obvious solution to increase oral health awareness, expanding oral health care into schools and daycares has also been recently studied and should be studied in the highest risk populations in Manitoba. Bringing oral health messages into many social settings, instead of just the dental clinic, is a thought-provoking idea in promoting oral health.

Conclusion

The following general conclusions can be reached as a result of this study:

1. Community health nurses need more training in areas of oral health promotion.
Specifically, the areas of greatest concern are timing of the first dental visit and the use of fluoride toothpaste in children under age 3.
2. Dentists need to actively bring oral health messages into public health in order to be more effective at primary prevention. This could include training programs for primary health care providers or even just promoting the idea of the age 1 dental visit as a standard of care so that primary care providers can refer early.

Oral health in young children is a concern to both nurses and dentists. An increase in interdisciplinary collaboration is necessary in order to achieve primary prevention and delivery of oral health messages at a young age.

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**Oral Health in Infants and Children:
Survey for Community Health Nurses**

Please answer the following YES/NO questions related to oral health in infants and children:

Yes No

1. Manitoba has a program for a first free dental exam for young children or infants of all socioeconomic groups
2. The first dental visit should occur by age 1
3. The first dental visit should occur between 2-3 years of age
4. Infants should have their teeth brushed as soon as the first tooth erupts
5. Children less than 3 should have their teeth brushed with fluoride toothpaste
6. Bacteria that cause cavities can be transmitted from person to person
7. Giving a bottle of milk or formula in the crib is sometimes acceptable
8. Giving juice in a bottle will not cause cavities so long as it's unsweetened
9. Are you aware of the Manitoba Dental Association's Free First Visit Program
10. Have you told caregivers of children about the Free First Visit Program
11. Do you refer infants (1 year old or younger) to see the dentist
12. Do you refer young children (> 1 year to 3 years) to see the dentist
13. Do you feel giving oral health advice to caregivers is within your scope of practice
14. Should oral health advice be a topic covered in the well-child or well-baby visit
15. Is an oral examination part of your standard well-baby/well-child visit (i.e., do you look at the child's teeth?)

14. In your role as a nurse do you inform caregivers about:

Yes No Occasionally

Tooth brushing after eruption of the first tooth

Use of fluoride toothpaste before age 3

Methods to prevent transmission of bacteria that cause cavities from mother to infant

Avoiding giving bottles of milk or formula during the night

Wiping an infant's gums with a clean moist cloth after feedings

Limiting frequency of carbohydrate or sugar ingestion to prevent cavities

Yes No

15. Are you a community health nurse?

16. Are you a public health nurse?

17. Do you regularly see infants/children and their caregivers?

18. Which option best describes the community in which you work? Select ONE option

City (population greater than 10,000 people)

Rural (population less than 10, 000 people)

Northern



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Research Ethics - Bannatyne
 Office of the Vice-President (Research and International)

HEALTH RESEARCH ETHICS BOARD (HREB)
CERTIFICATE OF FINAL APPROVAL FOR NEW STUDIES
 Delegated Review

PRINCIPAL INVESTIGATOR: Dr. Jennifer Coutu	INSTITUTION/DEPARTMENT: U of M/ Dentistry/Pediatric Dentistry	ETHICS #: HS19661 (H2016:153)
APPROVAL DATE: April 25, 2016	EXPIRY DATE: April 25, 2017	
STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (If applicable): Dr. C. Lekic		

PROTOCOL NUMBER: N/A	PROJECT OR PROTOCOL TITLE; Practices of Community Health Nurses Related to Oral Health Advice given to Caregivers of Infants and Children
SPONSORING AGENCIES AND/OR COORDINATING GROUPS: N/A	

Submission Date of Investigator Documents: April 3 and April 24, 2016	HREB Receipt Date of Documents: April 4 and April 25, 2016
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THE FOLLOWING ARE APPROVED FOR USE:

Document Name	Version(if applicable)	Date
Protocol: Protocol Revised REB Submission Form dated April 25, 2016	V. 1	April 3, 2016
Consent and Assent Form(s): Online Survey Consent Disclosure	V. 2	April 24, 2016
Other: Survey for Community Health Nurses	V. 2	April 24, 2016

CERTIFICATION

The above named research study/project has been reviewed in a *delegated manner* by the University of Manitoba (UM) Health Research Board (HREB) and was found to be acceptable on ethical grounds for research involving human participants. The study/project and documents listed above was granted final approval by the Chair or Acting Chair, UM HREB.

HREB ATTESTATION

The University of Manitoba (UM) Research Board (HREB) is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement 2, and the applicable laws and regulations of Manitoba. In respect to clinical trials, the HREB complies with the membership requirements for Research Ethics Boards defined in Division 5 of the Food and Drug Regulations of Canada and carries out its functions in a manner consistent with Good Clinical Practices.

Consent Disclosure Statement

My name is Jennifer Coutu and I am a first year resident in pediatric dentistry at the University of Manitoba. I am conducting a survey of community health nurses working with infants and children in the first few years of life. The survey will be part of my master's thesis and will be supervised by Dr. Charles Lekic, Division Head – Pediatric Dentistry, University of Manitoba.

Dental surgery to treat dental decay is the most common procedure for which children undergo general anesthetic in Manitoba each year. Dental decay is preventable with appropriate oral hygiene practices. Nurses are far more likely than a dentist to see a child and his/her caregiver in the first few years of life. Community health nurses in particular are very likely to be in contact with children in the first few years of life and have a large role in educating caregivers of young children and infants.

A study is now being conducted to determine what oral health advice nurses give to caregivers of infant of children. This includes the practices of registered nurses in directing patients to see a dentist. We would also like to determine the opinion of nurses in whether or not giving oral health advice is within their scope of practice and whether they routinely do an examination of the mouth.

The survey takes 2-3 minutes to complete. The survey is not intended to test your knowledge, but instead to see what advice is given to caregivers in caring for children and infants' teeth. No personal information is collected. There are no foreseeable risks to survey participants.

Your participation in this survey is confidential and voluntary. You can refuse to participate or withdraw at any time. The survey system will not record your e-mail or Internet Protocol (IP) address. Once your survey has been submitted you will not be able to withdraw it because we cannot link the survey back to you. By completing and returning the survey you are giving your consent to have you survey anonymously included in the study.

If you do not regularly see infants and children in your nursing practice please do not fill out this survey.

Your participation in this study would be greatly appreciated. If you have any questions related to the survey, please contact me at coutuj3@myumanitoba.ca

The study is funded by the Graduate Pediatric Dentistry Program at the University of Manitoba.

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Table 11-

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