A cross-sectional survey to assess the knowledge, attitude, willingness, and readiness of primary health care providers of Niagara region, Ontario, to provide oral health services to children

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Abstract:	Background: Most children are exposed to medical care but not dental care at an early age, making primary healthcare (PHC) providers an important player in the reduction of tooth decay. The goal of this research was to understand the feasibility of utilizing PHC providers in promoting oral health, by assessing their knowledge, attitude, willingness and readiness in this regard. Methods: Using the Dillman method, a mail-in cross-sectional survey was conducted among all family physicians and pediatricians of the Niagara region, Ontario, who have primary contact with children. A descriptive analysis was performed. Results: Close to 70% (181/265) of providers responded. More than 90% know that untreated tooth decay could affect the general health of a child. More than 80% examine the oral cavity for more than 50% of their child patients. However, more than 50% are not aware that white spots or lines on the tooth surface are the first signs of tooth decay. Lack of clinical time was the top reason for not performing oral disease prevention measures. Interpretation: Overall, survey responses reflect a positive attitude and willingness to engage the oral health of children. To capitalize on this, there is a need to identify mechanisms of providing preventive oral healthcare services by PHC providers; including improving their oral health knowledge and addressing other potential barriers.

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Introduction

Dental caries (tooth decay) among children continues to be a major health problem in most industrialized countries.[1] According to the Canadian Health Measures Survey (CHMS), 56.8% of children aged 6-11 years, have or have had tooth decay.[2] Although the prevalence of tooth decay was higher among children from low-income families (61.4%), children from high-income families also experienced substantial levels of decay (51.1%).[2] While the socioeconomic gap is not as large as in other childhood diseases, children from low-income families continue to have limited access to dental care due to financial, language and cultural barriers, and a lack of perceived need for care.[3-5] Importantly, regardless of income, the poor oral health of children has serious implications for general health, for the health of families, and for the health care system.[6, 7] In the Niagara region, dental surveillance conducted by registered dental hygienists in schools for the most recent school years, 2011/12, 2012/13, 2013/14, indicated that the DMFT/deft prevalence for children 4-13 years old was 40.8%, 44.0%, and 47.1%respectively. The prevalence among all school-age children over the three years has been steadily increasing; with unacceptably high rates among children who just enter school (JK/SK) and those in Grade 2; 35.1% and 65.2% (2013/14 rates).

Importantly, while tooth decay is one of the most common chronic diseases of childhood, it is largely preventable. Experts recommend that initiatives with very young children can promote positive oral and overall health during childhood and into adulthood.[8] Early contact with dental professionals can help reduce the burden of early childhood caries (ECC); however, the first contact with dental professionals is not as early as compared to other primary healthcare (PHC) providers. On average, by the age of three years, it is reported that children have approximately eleven well-child visits.[9] A study in the United States, based on the Medical Expenditure Panel Survey, demonstrated that 89% of infants and 1-year-olds had physician visits annually, compared with only 1.5% who had dental visits.[10] Thus, because most children are exposed to medical care but not dental care at an early age, PHC providers play an important role in reducing the burden of ECC.[11] To address child oral health issues, PHC providers must have adequate knowledge of the disease process, associated risk factors, signs and symptoms, prevention strategies, and fluoride usage,[12] but past studies have shown their lack of oral health knowledge in this regard.[13-15] A Canadian study showed that PHC providers, such as pediatricians and physicians, have knowledge about some aspects of ECC but are uncertain about identifying caries, and very few recommend the first dental visit by the child's first birthday.[16]

In the Niagara region, where community water fluoridation is not in place, other measures to reduce ECC need to be implemented. One preventive strategy proven to be effective is fluoride varnish; it is a topical fluoride product that is safe and effective, inexpensive and can reverse early decay and slow enamel destruction in active ECC. Evidence has shown that when used at least twice a year, fluoride varnish has led to a 38% reduction in dental decay.[17] Also, applying fluoride varnish in a primary care setting can be a cost-effective approach to reduce tooth decay.[18] For example, in the United States, Medicaid pays approximately $15 to $30 (USD) to

physicians and nurse practitioners for fluoride varnish application.[19] According to a study done by Hawkins and colleagues in two regions of Ontario, York and Hamilton, it costs approximately $3.43 (CAD) for each varnish application, among children of age 3-6 years.[20] In non-fluoridated regions, such as Niagara region, appropriate usage of fluoride supplements also needs due consideration. In 1997, The Canadian Consensus Conference on the appropriate use of fluoride supplements for the prevention of dental caries in children established a protocol with guidelines for the use of fluoride supplements.[21] The recommendations suggested that fluoride supplements before the eruption of the first permanent tooth are generally not advisable and should be restricted to only high-risk individuals. To avoid the risk of dental fluorosis, appropriate dosages are recommended (Table 1). The total daily fluoride intake from all sources should not exceed 0.05-0.07 mg F/kg body weight in order to minimize the risk of dental fluorosis. The current literature also suggests that PHC providers generally have a positive attitude towards the importance of oral health in children and are willing to perform oral health care activities.[11, 16] However, there is a consistent lack of knowledge on this issue, which affects their readiness to play an active role.[16] To begin an exploration of utilizing PHC providers in improving the oral health status of children in the Niagara region, Ontario, in 2013 a survey was distributed to assess their knowledge, attitude, willingness, and readiness to perform oral health care activities in their clinical settings.

Methods

A cross-sectional survey was conducted among Niagara region PHC providers (family physicians and pediatricians) who have primary contact with children. The survey was sent to all family physicians and paediatricians, a list of which was obtained from the Niagara Region Public Health secure database. A 22-item questionnaire was designed based on previous surveys from the published literature. A modified Dillman approach was used.[22] The first mailing was sent through a registered post to 265 PHC providers. The package included an introduction letter, questionnaire, returning envelope with paid postage, and a gift certificate of $25. Two weeks after the first mailing, a second mailing was sent to non-respondents. It included an introduction letter, questionnaire, and return envelope with paid postage, and was sent by regular mail. The same process was repeated after two weeks of the second mailing. After one week from the third mailing, a "Thank you" post card was sent to all 265 participants. Ethics approval was obtained from the Research Ethics Board of the University of Toronto (protocol reference # 29866).

Data analysis

A descriptive analysis was performed and responses were tabulated accordingly. Responses of family physicians and paediatricians were observed separately; however, no statistical differences were explored between the two groups. Chi-square analysis was conducted to specifically observe if the attitude of PHC providers (physicians and paediatricians together, as number of paediatricians was small to conduct a separate analysis) in promoting oral health among children is associated with willingness to conduct preventive measures for tooth decay.

Results

Overall, 68.3% (181/265) of PHC providers responded; 66.9% (164/245) of family physicians and 85% (17/20) of paediatricians. Table 2 details the response rate for each of the three mailings. Table 3 describes the practice characteristics of family physicians and paediatricians in the Niagara region. The majority of paediatricians are in solo practice whereas family physicians are more involved in group practice. The majority of family physicians practice within a Family Health Organization or Family Health Group. Most family physicians and paediatricians have administrative staff in their practice; however, the proportion of nurses or nurse practitioners is much higher in family physicians offices (90.7%) as compared to paeditricians (31.3%).

Knowledge of ECC, community water fluoridation, and topical fluorides

Descriptive analysis reveals that the majority of family physicians and paediatricians know the importance of baby teeth, brushing children's teeth, and the implications of untreated dental decay; however, a large proportion (66.5% family physicians and 50% paediatricians) is not aware of the white spots or lines on the surface of teeth as the first signs of tooth decay (Table 4). In comparison to family physicians, paediatricians are more confident in identifying tooth decay among children and discussing with parents their child's oral health (81.3% vs. 57.9%). A large proportion of family physicians and paediatricians understand the importance of community water fluoridation; however, many (52.8% family physicians and 35.3% paediatricians) are not aware that the water supply in the Niagara region is not fluoridated. The majority of family physicians and paediatricians appreciated the importance of topical fluoride therapies for preventing tooth decay among children.

Readiness and willingness of dental screening, risk assessment and dental referral

The majority of family physicians and paediatricians in the Niagara region visually examine the oral cavity and teeth of pediatric patients (Table 5). However, results reveal that a lower proportion advise parents regarding tooth cleaning methods or use of fluoridated toothpaste for their children. The majority of them never prescribe fluoride supplements. A greater proportion of paediatricians determine a child's risk for developing tooth decay as compared to family physicians.

Assessment of the willingness of family physicians and paediatricians to perform preventative oral health measures reveals that the majority is willing to lift the child's lip to check for tooth decay and advise parents regarding prevention measures for tooth decay (Tables 6 and 7). The majority is willing to formally refer suspected cases of tooth decay to dental professionals. Regarding prevention measures such as fluoride varnish, both paediatricians and family physicians showed a willingness to obtain more education on these topics; interestingly, paediatricians in comparison to family physicians were less willing to actually implement fluoride varnish for tooth decay.

To understand what family physicians and paediatricians do to identify a child with tooth decay, specific questions were asked (Table 8). A large proportion advises parents to take their child to a dentist. A higher proportion of paediatricians than family physicians make a note in the medical chart. Surprisingly, no paediatrician reported making formal referrals to a dentist.

Perceived barriers in carrying out prevention measures aimed at dental problems

Lack of clinical time was the top reason for family physicians and paediatricians for not performing oral disease prevention measures in clinical settings (Table 9). Also, a large number assumes that the oral health care of children is the responsibility of dentists (42.2% family physicians and 50% paediatricians). A higher proportion of family physicians (52.2%) compared to paediatricians (25%) identified lack of knowledge regarding dental problems as a barrier to care.

Attitude towards oral health care in children

Family physicians and paediatricians though assume that providing oral healthcare is the responsibility of dentists, they have a positive attitude (87.3%) when asked if their practice plays an important role in promoting oral health of children. Interestingly, those who felt that it is unimportant or of less importance were significantly less willing to perform preventive oral health care activities, including advising parents or formally referring children to dental professionals (Table 10).

Discussion

This cross-sectional survey conducted among family physicians and paediatricians of the Niagara region provides an understanding of their knowledge, willingness, attitude and readiness regarding oral health care for their pediatric patients. With a very high response rate, contributed to the utilization of the Dillman method and improved communication with public health, this survey provides an understanding of what challenges and opportunities may be present in a primary care setting in improving the oral health status of children.

The results show that family physicians and paediatricians are knowledgeable about the importance of oral health in general such as health implications of untreated decay and importance of baby teeth. Also, they understand the importance of healthy oral health practices such as tooth brushing and healthy eating. However, they are less informed about visible decay, identifying it, and counseling parents, which are all normal practices for a dentist. This is evident from responses to questions that tested this knowledge and also from self-acknowledgement. This can also be a potential reason for a lack of formal referrals to dentists, as PHC providers might not be confident enough in filling out the referral form. Importantly though, the majority were willing to formally refer suspected cases of tooth decay to dentists. They were also willing to obtain more education about preventive measures such as fluoride varnish. Regarding fluoride usage, responses suggest that PHC providers are not advising parents to use fluoridated toothpaste for their children. As well, the majority never prescribes fluoride supplements. Such responses could be expected, considering that a large proportion were not aware that the community water supply in the Niagara region is not fluoridated.

Including oral health modules in medical schools' curriculum can enhance the knowledge and capacity of future PHC providers to address the oral health of their paediatric patients more confidently. A general movement towards cross-discipline training would positively impact this issue. Having dental academics teach medical students and having them practice basic acts such

as examining the teeth, providing oral health anticipatory guidance, and applying fluoride varnish would likely be a more effective approach to learning, and understanding the PHC provider's role around oral health.

With this educational gap identified, it provides an opportunity to engage with PHC providers to improve their oral health knowledge. As part of Continuing Professional Development (CPD), accredited courses or workshops could focus on the oral health of children where PHC providers can receive credits as part of their continuing medical education. Literature suggests that such courses can reduce prominent knowledge deficits.[23] Also, CPD can facilitate acquisition and retention of positive attitudes for better clinical outcomes.[24]

Overall, survey responses reflect a positive attitude and willingness of family physicians and paediatricians regarding the oral health of children. In order to capitalize on this, there is a need to identify mechanisms of providing preventive oral health care services in offices of PHC providers; this would include improving their knowledge about oral health and addressing other potential barriers for facilitating provision of such services. Recommendations include:

1. As been exemplified in the United States, there needs to be advocacy to the Ministry level for primary health care providers to be reimbursed for providing fluoride varnish applications to children
2. Local public health units engage with PHC providers to determine readiness and feasibility in implementing a fluoride varnish strategy
3. Continue to provide the option of continue medical education credits to participate in oral health education

Conclusions

The oral health of children is important and a demonstrated public health issue in Niagara region. Since PHC providers have frequent contact with children, they are in an optimal position to provide preventive oral health care services and education to children and families. Across Ontario, public health units are in an optimal position to engage with local PHC providers to equip them with education around the importance of oral health and support them in implementing a preventive strategy. For a paediatric oral health strategy to be successful, it needs to be cross-disciplinary to address both the preventive and clinical aspects to benefit the paediatric patient. PHC providers are willing to learn more about oral health and recognize its value and importance – this should be capitalized on.

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Table 1. Dosage of daily fluoride supplements based on fluoride in water supply

Age of child	< 0.3 ppm	≥ 0.3 ppm
0 – 6 months	None	None
> 6 months – 3 years	0.25 mg/day	None
> 3 years – 6 years	0.5 mg/day	None
> 6 years	1.0 mg/day	None

Source: Canadian Dental Association[25]

Table 2. Responses from three mailings

Mailing (N)	Returned N (%)
First (265)	161 (60.7%)
Second (104)	16 (6.1%)
Third (88)	4 (1.5%)
Total (265)	181 (68.3%)

Table 3. Characteristics of family physicians and pediatricians

Practice characteristics	Family physicians Percent (%)	Pediatricians Percent (%)
Years of practice		
<10 years	20.8	17.6
10-19 years	22.5	23.5
20 years or more	56.7	58.8
Type of practice		
Solo	27.6	94.1
Group	72.4	5.9
Model of primary practice (can be more than one)*		
Comprehensive Care Model	3.0	41.2
Community Health Centre	2.4	0.0
Family Health Group	28.0	5.9
Family Health Organization	34.8	0.0
Family Health Network	5.5	0.0
Family Health Team	26.2	0.0
Other	9.1	47.1
Type of staff in office*		
Nurse	58.0	25.0
Nurse Practitioner	32.7	6.3
Physician Assistant	6.8	0.0
Office Manager	61.1	31.3
Administrative Staff	94.4	81.3
Other	33.3	18.8

*Note: percentages may add up to >100% because participants were allowed to select more than one response

Table 4. Knowledge about ECC, community water fluoridation, and topical fluorides

	Family physicians Agree or strongly agree (%)	**Pediatricians Agree or strongly agree (%)**
Knowledge about ECC		
Untreated tooth decay could affect the general health of a child	100.0	93.8
Parents should brush their young children's teeth twice a day	98.2	100.0
The first signs of tooth decay are white spots or lines on the tooth surfaces	33.5	50.0
Baby teeth are important even though they fall out	96.3	100.0
Children should have 3 meals and 2-3 snacks per day	92.0	87.5
Parents should limit juice to 4-6 ounces per day	88.3	87.5
I feel confident enough to identify tooth decay in children.	57.9	81.3
I feel knowledgeable enough to discuss and counsel parents/caregivers regarding their children's dental hygiene	71.4	81.3
Knowledge about community water fluoridation and topical fluorides		
Community water fluoridation is important for preventing tooth decay	88.4	93.8
Topical fluoride therapies are important for preventing tooth decay	77.6	93.8
Awareness of community water fluoridation		
Water supplies in the Niagara Region are not fluoridated	47.2	64.7

Table 5. Preventive oral-health care practices in medical settings

	Family physicians			Pediatricians		
	Never (%)	**1-50% patients**	**>50% patients**	**Never (%)**	**1-50% patients**	**>50% patients**
Visually examine the oral cavity?	3.2	16.5	80.3	12.5	6.3	81.3
Visually examine the teeth?	5.7	32.1	62.2	18.8	12.5	78.8
Determine the child's risk for developing tooth decay?	23.7	40.3	35.9	25.0	0.0	75.0
Advise parents/caregivers on tooth cleaning methods?	20.5	39.8	39.8	18.8	43.7	37.5
Advise parents/caregivers on the use of bottles or sippy cups?	9.5	24.1	66.5	18.8	6.3	75.0
Advise parents/caregivers on the use of fluoride toothpaste?	26.1	23.6	50.3	18.8	31.2	50.0
Prescribe fluoride supplements?	77.6	16.0	6.4	68.8	25.0	6.2

Table 6. Willingness of family physicians to preform preventive oral health care activities

Willingness to preform preventive oral health measures	Most Willing (%)				Least willing (%)
	1	2	3	4	5
Lift the child's top lip to check for tooth decay.	69.1	16.7	9.9	3.7	0.6
Advise parents/caregivers regarding prevention measures for tooth decay (e.g. tooth brushing).	74.1	14.2	8.6	2.5	0.6
Formally refer suspected cases of tooth decay to dental professionals.	46.2	22.4	19.2	6.4	5.8
Obtain more education about prevention measures for tooth decay (e.g. fluoride varnish).	41.3	26.9	16.9	6.9	8.1
Implement prevention measures for tooth decay (e.g. fluoride varnish).	30.0	16.3	18.8	14.4	20.6

Table 7. Willingness of pediatricians to preform preventive oral health care activities

Willingness to preform preventive oral health measures	Most Willing (%)				Least willing (%)
	1	2	3	4	5
Lift the child's top lip to check for tooth decay.	81.3	6.3	0.0	0.0	12.5
Advise parents/caregivers regarding prevention measures for tooth decay (e.g. tooth brushing).	87.5	0.0	0.0	0.0	12.5
Formally refer suspected cases of tooth decay to dental professionals.	56.3	6.3	12.5	0.0	25.0
Obtain more education about prevention measures for tooth decay (e.g. fluoride varnish).	37.5	31.3	6.3	12.5	12.5
Implement prevention measures for tooth decay (e.g. fluoride varnish).	18.8	12.5	18.8	6.3	43.8

Table 8. Steps family physicians and pediatricians take to identify a child with tooth decay

Steps taken (can be more than one)	Family physicians (%)	Pediatricians (%)
Advise the parent/caregiver to take the child to a dentist	89.0	94.1
Make a note in the medical chart	44.8	68.8
Give the parent/caregiver the name(s) of a dentist	23.9	50.0
Do not formally refer children to dentists	8.6	12.5
Have never seen a child with tooth decay	6.1	6.3
Make a formal referral to a dentist	6.1	0.0
Other	5.5	18.8

Table 9. Reasons for not carrying out prevention measures aimed at dental problems

Perceived barriers to carry prevention measures (can be more than one)	Family physicians (%)	Pediatricians (%)
Lack of clinical time	65.8	62.5
Dentists should perform these activities	42.2	50.0
Lack of knowledge in identifying dental problems	52.2	25.0
Lack of office staff to assist in prevention measures	37.3	43.8
Lack of reimbursement	36.6	37.5
Lack of parent/caregiver's perceived need for dental care	37.9	31.3
Infants and toddlers are too young and uncooperative for oral examinations	23.0	12.5
Other	9.9	12.5

Table 10. Attitude and willingness to perform oral health care activities

Most willing or willing to do following activities	Practice's role in promoting oral health among children (%)		P value
	Moderate to very important	Unimportant to less important	
Lift the child's top lip to check for tooth decay	88.3	69.6	0.016
Advise parents/caregivers regarding prevention measures for tooth decay (e.g. tooth brushing)	90.9	69.6	0.003
Formally refer suspected cases of tooth decay to dental professionals	71.3	42.9	0.009
Obtain more education about prevention measures for tooth decay (e.g. fluoride varnish)	71.1	47.0	0.026
Implement prevention measures for tooth decay (e.g. fluoride varnish)	48.0	21.7	0.018