Evaluation of the Canadian CRA tool in caries-free children <6yrs

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December 3, 2025

Abstract

Introduction: The Canadian Caries Risk Assessment (CRA) Tool is a six-item screening tool used to identify risk level for future caries development in children <6 years. The purpose of this study was to determine whether baseline CRA tool scores in caries-free children <6 years of age can predict future caries development.

Methods: Baseline and follow-up CRA tool scores were obtained as part of routine care from preschool children attending three publicly funded dental clinics in Winnipeg. Data for this study were restricted to children who were caries-free at baseline. Charts of children who had returned for follow-up one year later were then reviewed to determine the proportion developing caries, as evidenced by new carious lesions (including white spot lesions). Statistical analyses included descriptive statistics along with bivariate analyses. A p value ≤ 0.05 was significant.

Results: A total of 145 children were caries-free at baseline, of which, 96 returned and had completed follow-up data. The mean total CRA score significantly increased from baseline to follow-up (1.9 ± 1.0 vs. 2.4 ± 1.9, $p = 0.005$). While not statistically significant, not brushing teeth twice daily (OR = 1.89, 95% CI = 0.72-4.90, p = 0.19) and low family income (OR = 1.73, 95% CI = 0.65-4.57, p = 0.27) were the strongest indicators of caries development by follow-up. The CRA tool was found to have a sensitivity and specificity for baseline CRA rating and the development of new caries at follow-up of 30.4% and 75.3%, respectively, indicating a low sensitivity but high specificity.

Conclusions: The CRA tool has a high potential of identifying low risk children who truly do not develop future caries. This research emphasizes the use of CRA tools in preventive pediatric dentistry to improve children's oral health and maintain a caries-free state.

Introduction

Early childhood caries (ECC) is an extremely prevalent yet highly preventable chronic disease affecting the primary dentition in children under the age of six.[1] Caries development is multifactorial with ethnicity, socioeconomic status, dental care accessibility, oral health literacy, salivary flow, and oral

microflora all contributing to the progression of the disease.[2-3] ECC is also dependent on multiple modifiable factors such as oral hygiene, fluoride exposure, diet, and feeding habits.[2-4]

Protective factors and risk factors contribute positively and negatively, respectively, to the oral health of a patient and the cumulation of these risk factors increases the likelihood of a child developing ECC which, for many, must be treated with surgery under general anesthesia.[5] However, this treatment approach fails to address the underlying risk factors for ECC, and results in many children developing new or recurrent caries following surgery.[5] Repeat use of general anesthesia to treat caries is not ideal as there is a range of possible complications that can occur including cardiac arrest and respiratory failure.[6] Furthermore, children living in neighborhoods with higher Indigenous populations, lower socioeconomic status, and in rural regions have a higher incidence of dental surgery.[7] Therefore, the importance of preventive dentistry and the use of a caries risk assessment (CRA) tool to identify risk factors early is emphasized.

CRA tools are used to identify the likelihood of children developing caries and aim at understanding risk factors and protective factors for disease progression in order to individualize preventive discussions.[3] These screening tools place an emphasis on caries prevention rather than restorative treatment and incorporate factors such as oral hygiene, fluoride exposure, feeding practices, socioeconomic status, presence of plaque, and evidence of past or current dental caries in order to determine if a child is at high or low risk of developing future caries.[3,8] It then guides healthcare providers in patient-centered discussions and in recommending the implementation of protective factors or cessation of modifiable risk factors according to their individual risk status.[3] As caries is influenced by a broad range of behavioral, environmental, and biological factors, prevention efforts must be tailored to meet the specific needs and circumstances of each patient. Understanding the contribution of these various risk factors to the carious process is pertinent to prevention.

The Canadian Dental Association (CDA), along with other dental organizations, recommends caries risk assessments begin within 6 months of the first tooth erupting or by 12 months of age.[9]

However, many children are not accessing dental care until much later, thus increasing their risk for ECC.[10] This contrasts with how most North American children see a non-dental primary healthcare provider numerous times throughout their early years. Therefore, implementing a CRA screening tool in primary healthcare facilities for use by non-dental healthcare professionals is crucial. Non-dental healthcare professionals equipped with CRA tools enables early screening of children for caries and promotes the delivery of essential preventive services such as fluoride varnish application, anticipatory guidance, and oral hygiene instruction.[8] Use of CRA in non-dental health settings can also improve access to dental care for many children via referrals.[11] The Canadian CRA tool examined in this study was developed predominantly for the use by non-dental primary healthcare providers and dental providers in non-dental clinical settings for children under the age of six years.[8,12] The purpose of this study was to determine whether baseline Canadian CRA tool scores in caries-free children <6 years of age can predict future caries development.

Materials and Methods

The Canadian CRA tool used in this study was developed following a systematic review of the literature and analysis of existing CRA tools, followed by a mixed methods approach to obtaining health care provider feedback which refined the final layout of the tool.[8,13] The CRA tool includes six questions. The first four questions are directed to the child's primary caregiver and includes inquiry about the child's oral hygiene, fluoride exposure, feeding practices, and family income whereas the last two questions are assessed visually by a health care provider and included assessment of visible plaque or food debris on the child's teeth and evidence of past or current caries.[8,13] Individual CRA questions are assigned point values based on the participant's responses and clinical assessment, from which a total score is summed. A total CRA score of three or greater is classified as high-risk status for developing future caries whereas a total CRA score of less than three is indicative of low-risk status for caries development. Depending on the risk status of the patient, preventive care information and anticipatory guidance are provided in accordance with the specifications outlined in the CRA tool.

A recent pilot validation of the Canadian CRA tool was undertaken[14] and the cohort of children for this study were obtained from that database. Participants were recruited between January 2019 and July 2024; at which time they had a baseline CRA and an initial clinical dental assessment. Participants were then re-evaluated approximately 12 months after their baseline assessment at a follow-up appointment. The inclusion criteria for study participants were children attending community-based dental clinics (Access Downtown, Children's Hospital Dental Clinic, or Mount Carmel Clinic) in Winnipeg, Manitoba and who were under 72 months of age at the time of their baseline assessment. Additionally, children were excluded from the study if they were not accompanied by their primary caregiver.

As described in our previous paper, CRA questions were verbally administered to the children's parents/caregivers by either a member of the study team or clinical staff member trained to use the CRA tool. Questions from the CRA that were answered by the parents regarding their child included their frequency of tooth cleaning, whether they were receiving daily exposure to fluoride, feeding practices associated with increased caries risk, and family income. The remainder of the CRA was conducted by the dentist wherein the child was assessed for the presence of visible plaque or food debris on their teeth and the presence of visible caries (including white spot lesions) or past evidence of caries treatment. Additionally, the number of decayed, missing, or filled primary teeth (dmft) and decayed, missing, or filled tooth surfaces (dmfs) due to caries were calculated from the oral health assessment and dental chart records. ECC and severe ECC (S-ECC) were defined according to established case definitions (AAPD 2024). This was all repeated approximately 12 months later at the child's follow-up appointment. Follow-up CRA and oral health assessments were completed to evaluate whether new carious lesions (including white spot lesions) had developed. Children who did not return for follow-up CRA but received dental treatment at the same clinic had their clinic chart records examined to assess the presence of new caries as well as to calculate their follow-up dmft and dmfs scores. In addition, any available radiographs at

baseline and follow-up were used to help determine the presence of caries. Data collection for this study was approved by the Health Research Ethics Board at the University of Manitoba.

All collected Canadian CRA and oral health assessment data from baseline and follow-up appointments were inputted into Excel and saved on the secure server at the Children's Hospital Research Institute of Manitoba. The full data were examined and only patients who were caries-free at baseline were analyzed in this study. Patients who were lost to follow-up were excluded from the analysis. Basic descriptive statistics such as counts, frequencies, mean, and standard deviation (SD) were calculated for each of the variables. Number Cruncher Statistical Software (NCSS) (version 25.0.2, Kaysville, Utah) was used for statistical analyses including t-tests, Chi-square tests, and crude odds ratio (OR) calculations. A paired sample t-test of the mean CRA score was used to assess whether there was a significant change in mean CRA score between baseline and follow-up. Spearman's rank correlation coefficient was used to detect difference between the distribution of baseline and follow-up scores. Chi-square tests were used to test associations of baseline CRA responses and baseline risk status with the development of new caries by follow-up. Crude ORs were also used to assess whether baseline CRA responses and baseline risk status were associated with the development of new caries. Sensitivity, specificity, positive predictive, and negative predictive values were calculated for each of the baseline CRA variables using MedCalc's online diagnostic test evaluation calculator (https://www.medcalc.org/calc/diagnostic_test.php).[15] A p-value of $\leq$ 0.05 was significant.

Results

The overall CRA database included data on 357 children. Analysis for this study was restricted to a total of 145 (40.6%) children who were caries-free at baseline. Of these, 96 children had completed follow-up data on caries status and/or a completed follow-up CRA. From the 96 participants, 2 did not have a follow-up CRA completed; however, were still included based on their follow-up dental records. Characteristics of the analyzed participant pool can be seen in Table 1. The mean age at baseline was 29.1 $\pm$ 15.8 months with the average time between baseline and follow-up assessments 13.1 $\pm$ 5.6 months.

Participants were recruited from either Access Downtown (71.9%), Children's Hospital Dental Clinic (6.3%), or Mount Carmel Clinic (21.9%).

Table 1 also shows that at baseline most children had their teeth brushed twice daily (51.0%), received daily fluoride exposure (79.2%), and had no visible plaque or food debris on their teeth (88.5%). In addition, most participants exhibited cariogenic feeding practices (51.0%), and were from a low-income family (55.2%). At follow-up, there were increases in the number of children brushing their teeth twice daily (67.0%) and those receiving daily fluoride exposure (91.5%); whereas the remaining CRA responses remained relatively the same between baseline and follow-up. The median baseline and follow-up total CRA scores were 2. However, Spearman's rank correlation was performed to contrast the distribution between baseline and follow-up total CRA scores, revealing a significant increase (slope = 0.71, 95% CIs 0.31-1.10, $p< 0.001$). Paired sample t-test analysis also revealed that the mean CRA score significantly increased from baseline to follow-up (1.9 ± 1.0 vs. 2.4 ± 1.9, $p = 0.005$). Of all the caries-free children at baseline, 26.0% were categorized as high risk (score ≥ 3) and 74.0% as low risk (score < 3). Overall, the proportion of children with high risk CRA scores significantly increased from baseline to follow-up period (25.5% vs. 40.4%, $p< 0.001$).

A total of 24.0% of children developed caries (ECC) between baseline and the follow-up period with follow-up dmft and dmfs score of 0.5 ± 1.2 and 0.6 ± 1.6, respectively. Furthermore, 15.6% of the total participants developed severe-ECC (S-ECC) at follow-up. Paired t-test analysis revealed significant increases in dmft scores from baseline to follow-up (0 vs. 0.5 ± 1.2, $p<0.001$) and dmfs scores (0 vs. 0.6 ± 1.6, $p<0.001$).

Table 2 shows the relationships between the participants' baseline CRA responses and CRA rating, with the development of new caries at follow-up. While not statistically significant, the highest crude OR values were for the absence of twice daily toothbrushing (Q1) and the development of new caries (OR = 1.89, 95% CI = 0.72-4.90, $p = 0.19$) as well as the association between low family income (Q4) and the development of new caries (OR = 1.73, 95% CI = 0.65-4.57, $p = 0.27$). This indicates that

those who did not brush their teeth twice daily had 1.89 times the odds of developing caries by follow-up and those that were from low-income families had 1.73 times the odds of developing caries by follow-up. In addition, those that were deemed high-risk at baseline had 1.34 times the odds of developing caries by follow-up (OR = 1.34, 95% CI = 0.47-3.76, p = 0.58). Additionally, there was no significant difference in baseline mean CRA scores between those who did and did not develop new caries (1.8 ± 1.0 vs. 2.1 ± 0.9, p=0.22).

Table 3 shows the sensitivity, specificity, positive predictive, and negative predictive values for new caries formation for each of the baseline CRA variables. Cleaning teeth twice daily and family income level individually both had the highest sensitivity (60.9% and 65.2%, respectively) for predicting the development of new caries by follow-up. Question 5 on the CRA (presence of visible plaque or food debris on teeth) had the highest specificity (86.3%) for predicting the absence of caries. Furthermore, the highest value for combined sensitivity and specificity (115.7%) was seen for cleaning teeth twice daily. Lastly, the highest individual positive predictive and negative predictive values were both observed for cleaning teeth twice daily (29.8% and 81.6%, respectively). For CRA risk status, the sensitivity and specificity for predicting new caries at follow-up was 30.4% and 75.3%, respectively.

Discussion

This prospective study attempted to determine whether baseline Canadian CRA scores and risk ratings were predictive of new caries occurrence in children < 6 years of age who were recruited from community dental clinics. While no significant associations existed between baseline CRA scores and new caries occurrence, children found to be at high-risk at baseline were 34% more likely to have caries at follow-up.

Children whose teeth were not cleaned twice daily at baseline were 1.89 times more likely to develop caries while those from low-income families were 1.73 times more likely to develop caries. The adoption of early home oral hygiene routines is an important preventive behaviour to ensure good early

childhood oral health. There is strong evidence that the lack of regular and supervised brushing is a risk factor for ECC.[8,16] Young children are particularly at risk since they are dependent on parents and caregivers for daily oral hygiene routines as they are unable to perform proper oral hygiene. Additionally, low socioeconomic status is also a significant predictor of ECC[8,16] as income can influence access to care and ability to purchase nutritious foods and oral hygiene products. Past caries experience is the greatest predictor of future caries risk in children[8]; however, when this risk factor is absent at baseline, as with this study, other factors that may contribute to caries incidence can still be studied. As seen from the p-values and crude ORs in Table 2, the two factors found to be most associated with predicting caries disease status at follow-up were twice daily toothbrushing and family income (Table 2), with those who did not brush their teeth twice daily and those from a low-income family at a greater risk of developing caries. This is consistent with another study on caries-free children that found dental brushing frequency to be one of the highest rating protective factors (OR=19.10) among various behavioural variables.[17] That study also found significance between multiple measures of socioeconomic status and caries formation, similar to the present study.[17] This affirms that brushing teeth twice daily and high socioeconomic status are protective factors for dental caries and the absence of these behaviors can contribute to caries risk. Thus, in caries-free children, toothbrushing is an essential factor in caries risk assessments which can be modified to drastically benefit patient health. This information has especially important applications for caries prevention and maintenance of a caries-free status. This also highlights the importance of anticipatory guidance and implementation of toothbrushing early-on in a child's life.

When baseline CRA responses were compared to follow-up CRA responses, there were some improvements noted. Particularly, more parents indicated that their child was exposed to fluoride daily and twice daily brushing was more common. Despite the increased frequency of protective behaviors at follow-up, the mean total CRA score increased from baseline to follow-up. This reflects the children whose CRA scores increased due to the development of caries, as this factor in the CRA tool is weighted heavier in the overall score. Furthermore, the majority of individuals remained caries-free at follow-up as

reflected by the low mean dmft and dmfs scores calculated in Table 1 as well as tabulated frequencies of ECC and S-ECC at follow-up. Of those that developed caries by follow-up, the majority developed S-ECC. This emphasizes the importance caries prevention as the progression of caries in the primary dentition is rapid and can quickly turn into S-ECC, requiring surgery as treatment.[5,18] Thus, the implementation of CRA tools to assess risk levels is reaffirmed.

In addition to promoting caries prevention, CRA tools can play an important role in guiding risk-based and equitable allocation of dental resources. Evidence shows that children living in higher socioeconomic areas have lower incidences of ECC; however, access dental services more frequently, whereas children from lower socioeconomic areas experience higher incidences of ECC but face greater barriers to care.[13,19-20] CRA tools can help address this imbalance by identifying patients at increased risk and ensuring that preventive and therapeutic resources are directed toward those in need. By facilitating targeted preventive interventions for high-risk children, CRA tools may reduce disease progression and, consequently, the need for more invasive treatments such as dental surgery under general anesthesia.[5]

The results in Tables 2 and 3 can be analyzed to assess the effectiveness of the Canadian CRA tool in predicting caries risk in caries-free children. In Table 2, those who were deemed high-risk at baseline had 1.34 times the odds of developing caries by follow-up. This supports the notion that the CRA tool can predict caries development. In addition, the sensitivity, specificity, positive predictive, and negative predictive values in Table 3 can be used to assess the ability of each factor on the CRA tool to predict caries onset in initially caries-free children. Again, cleaning teeth twice daily and family income individually showed the highest sensitivity, indicating absence of toothbrushing and low family income had a high accuracy in predicting caries development. In terms of specificity, visible plaque or food debris on teeth was found to have the highest value, indicating that the absence of baseline oral plaque and food debris had a high accuracy in predicting caries-free status.

While this was a prospective study, there were limitations. Among these is the possibility for recall bias, as some parents may have difficulty remembering their child's oral hygiene habits or feeding

practices. Response bias may also affect the accuracy of answers provided by parents due to embarrassment regarding poor oral hygiene habits or low-income status. Another important limitation is that successful anticipatory guidance provided after the initial patient assessment will result in improved patient outcomes and prevent caries progression; thus, negatively affect the accuracy of the baseline CRA responses in predicting caries formation. In addition, the use of a small sample size provides a source of error. Small sample sizes often provide insufficient statistical power to detect differences between the analyzed groups and give falsely negative results[21-22]; thus, the statistically nonsignificant results of this study (Table 2) could merely be due to inadequate sample size. The sample size was further limited by the sociodemographic used. The participant pool came from community clinics in Winnipeg which typically serve those of lower socioeconomic status who have a predisposition for high caries risk; therefore, very few children fit the inclusion criteria of being caries-free at baseline. In addition, the loss of patients to follow-up provided another challenge and further limited the participant pool. Lastly, the outcome of CRA tools can differ between populations, with different populations exhibiting unique risk factors.

Conclusion

The use of CRA is of vital importance in patient-centered caries prevention and management strategies, having a fundamental role in resource allocation and reducing the need for surgical intervention in children. By limiting the participant pool to caries-free children at baseline, fundamental risk factors influencing new caries onset in children can be analyzed and modifiable factors can be identified to aid in an individualized caries management strategy. The results of this study emphasize the complex multifactorial nature of the caries process and highlights toothbrushing as an integral factor in the maintenance of a caries-free status. Further studies can build on this research by examining the tool's performance and preventive impact in non-dental settings.

Table 1. Baseline and follow-up characteristics and CRA tool responses of caries-free participants.

Variables	**N (%)**	
Participants with complete (clinical) dental data:	96 (100%)	
Participants with both complete (clinical) dental and CRA form data:	94 (97.9%)	
Sex:		
Male	56 (58.3%)	
Female	40 (41.7%)	
Mean age at baseline (months):	29.1 ± 15.8	
Clinic attended:		
Access Downtown	69 (71.9%)	
Children's Hospital Dental Clinic	6 (6.3%)	
Mount Carmel Clinic	21 (21.9%)	
Mean time between baseline and follow-up assessments (months):	13.1 ± 5.6	
Variables	**Baseline**	**Follow-Up**
Q1. Teeth cleaned with brush (or cloth if infant) at least twice daily by parent or caregiver:		
Yes	49 (51.0%)	63 (67.0%)
No	47 (49.0%)	31 (33.0%)
Q2. Daily exposure to fluoride:		
Yes	76 (79.2%)	86 (91.5%)
No	20 (20.8%)	8 (8.5%)
Q3. Feeding practices (i.e., bottle-feeding > 12 months of age; use of bottle/sippy cup between meals with liquid other than water; bedtime/naptime bottle/sippy cup use; no oral hygiene routine established after solid foods have been introduced while still breastfeeding/bottle-feeding > 12 months of age; sugary snacks and drinks between meals):		
Yes	49 (51.0%)	51 (54.3%)
No	47 (49.0%)	43 (45.7%)
Q4. Family is low-income:		
Yes	53 (55.2%)	56 (59.6%)
No	43 (44.8%)	38 (40.4%)
Q5. Visible plaque and/or food debris on teeth:		
Yes	11 (11.5%)	13 (13.8%)
No	85 (88.5%)	81 (86.2%)
Q6. Visible caries (includes white spot lesions) and/or past evidence of dental treatment for caries (e.g., fillings, stainless steel crowns, extracted teeth):		
Yes	0 (0%)	22 (23.4%)
No	96 (100%)	72 (76.6%)
Total CRA score:		
0	8 (8.3%)	12 (12.8%)
1	24 (25.0%)	29 (30.9%)
2	39 (40.6%)	15 (16.0%)
3	22 (22.9%)	15 (16.0%)
4	3 (3.1%)	7 (7.4%)
5	0 (0%)	6 (6.4%)
6	0 (0%)	7 (7.4%)
7	0 (0%)	3 (3.2%)
8	0 (0%)	0 (0.0%)
Mean total CRA score:	1.9 ± 1.0	2.4 ± 1.9
Overall CRA rating:		
High risk (≥ 3)	25 (26.0%)	38 (40.4%)
Low risk (< 3)	71 (74.0%)	56 (59.6%)
Mean dmft:	0 ± 0	0.5 ± 1.2
Mean dmfs:	0 ± 0	0.6 ± 1.6
Early childhood caries at follow-up:		
Yes	23 (24.0%)	
No	73 (76.0%)	
Severe early childhood caries at follow-up:		
Yes	15 (15.6%)	
No	81 (84.4%)	

Table 2. Comparison of new caries noted at follow-up with baseline responses and rating from Canadian Caries Risk Assessment form

Baseline Variable	**New Caries Clinically Noted at Follow-Up**		***p* Value***	**Crude ORs (95% CI)**
	Yes	**No**		
Q1. Teeth cleaned with brush (or cloth if infant) at least twice daily by parent/caregiver:				
No	14 (29.8%)	33 (70.2%)	0.19	1.89
Yes (reference)	9 (18.4%)	40 (81.6%)		(0.72, 4.90)
Q2. Daily exposure to fluoride:				
No	5 (25.0%)	15 (75.0%)	0.90	1.07
Yes (reference)	18 (23.7%)	58 (76.3%)		(0.34, 3.36)
Q3. Feeding practices:				
Yes	13 (26.5%)	36 (73.5%)	0.55	1.34
No (reference)	10 (21.3%)	37 (78.7%)		(0.52, 3.43)
Q4. Family is low-income:				
Yes	15 (28.3%)	38 (71.7%)	0.27	1.73
No (reference)	8 (18.6%)	35 (81.4%)		(0.65, 4.57)
Q5. Visible plaque and/or food debris on teeth:				
Yes	1 (9.1%)	10 (90.9%)	0.29	0.29
No (reference)	22 (25.9%)	63 (74.1%)		(0.03, 2.37)
Q6. Visible caries and/or past evidence of dental treatment for caries:				
Yes	0 (0.0%)	0 (0.0%)	-	-
No (reference)	23 (24.0%)	73 (76.0%)		
Baseline CRA rating:				
High risk	7 (28.0%)	18 (72.0%)	0.58	1.34
Low risk (reference)	16 (22.5%)	55 (77.5%)		(0.47, 3.76)

Notes: Participants with complete (clinical) dental data: $n = 96$; OR = odds ratio; CI = confidence interval; CRA = caries risk assessment; *Pearson's Chi-square test.

Table 3. Analysis of Canadian Caries Risk Assessment form questions with regard to sensitivity, specificity, positive predictive value, and negative predictive value for new caries formation

Baseline Variables	New Caries Clinically Noted at Follow-Up		Sensitivity (95% CI)	Specificity (95% CI)	Positive Predictive Value (95% CI)	Negative Predictive Value (95% CI)
	Yes	No				
Q1. Teeth cleaned with brush (or cloth if infant) at least twice daily by parent/caregiver:						
No	14 (29.8%)	33 (70.2%)	60.9	54.8	29.8	81.6
Yes	9 (18.4%)	40 (81.6%)	(38.5, 80.3)	(42.7, 66.5)	(21.9, 39.1)	(71.9, 88.5)
Q2. Daily exposure to fluoride:						
No	5 (25.0%)	15 (75.0%)	21.7	79.5	25.0	76.3
Yes	18 (23.7%)	58 (76.3%)	(7.5, 43.7)	(68.4, 88.0)	(12.0, 45.0)	(71.6, 80.5)
Q3. Feeding practices:						
Yes	13 (26.5%)	36 (73.5%)	56.5	50.7	26.5	78.7
No	10 (21.3%)	37 (78.7%)	(34.5, 76.8)	(38.7, 62.6)	(19.1, 35.6)	(68.8, 86.1)
Q4. Family is low-income:						
Yes	15 (28.3%)	38 (71.7%)	65.2	48.0	28.3	81.4
No	8 (18.6%)	35 (81.4%)	(42.7, 83.6)	(36.1, 60.0)	(21.4, 36.4)	(70.4, 88.9)
Q5. Visible plaque and/or food debris on teeth:						
Yes	1 (9.1%)	10 (90.9%)	4.4	86.3	9.1	74.1
No	22 (25.9%)	63 (74.1%)	(0.1, 22.0)	(76.3, 93.2)	(1.3, 42.5)	(71.6, 76.5)
Q6. Visible caries (includes white spot lesions) and/or past evidence of dental treatment for caries (e.g., fillings, stainless steel crowns, extracted teeth):						
Yes	0 (0.0%)	0 (0.0%)	-	-	-	-
No	23 (24.0%)	73 (76.0%)				
Baseline CRA rating:						
High risk	7 (28.0%)	18 (72.0%)	30.4	75.3	28.0	77.5
Low risk	16 (22.5%)	55 (77.5%)	(13.2, 52.9)	(63.9, 84.7)	(15.7, 44.8)	(71.8, 82.3)

Notes: Participants with complete (clinical) dental data: $n = 96$; CI = confidence interval.

Figure 1. Canadian Caries Risk Assessment Tool.

Canadian Caries Risk Assessment Tool (< 6 years)

Child's Name:

Child's Date of Birth:

Date of Assessment:

Factors	Yes	No
Teeth cleaned with brush (or cloth if infant) at least twice daily by parent or caregiver	☐ (0)	☐ (1)
Daily exposure to fluoride (e.g. fluoridated toothpaste, fluoridated water)	☐ (0)	☐ (1)
Feeding practices (one or more – please check all that apply): ☐ Bottle-feeding > 12 months of age; ☐ use of bottle or sippy cup between meals with liquid other than water (e.g. pop, fruit juices, milk, chocolate milk) ☐ Bedtime/naptime bottle or sippy cup use ☐ No oral hygiene routine established after solid foods have been introduced while still breastfeeding or bottle-feeding after 12 months ☐ Sugary snacks and drinks between meals (e.g. cookies, candy, sugary cereal, chips, pop, fruit juices, chocolate milk)	☐ (1)	☐ (0)
Family is low income (e.g. "has difficulty making ends meet at the end of the month")	☐ (1)	☐ (0)
Visible plaque and/or food debris on teeth	☐ (1)	☐ (0)
Visible caries (including white spot lesions) and/or past evidence of dental treatment for caries (e.g. fillings, stainless steel crowns, extracted teeth)	☐ (3)	☐ (0)
Total Score (please add up points from each row)		

Overall caries risk status: ☐ **High Risk** (score ≥ 3) ☐ **Low Risk** (score < 3)

RECOMMENDATIONS **(Please check all that have been reviewed with parent/caregiver)**

HIGH RISK:

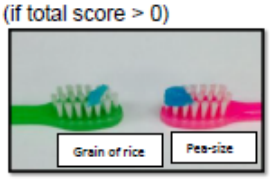
If **overall caries risk status is high**, recommend the following *in addition* to the below:
☐ Refer to dental office for treatment if there is caries present.
☐ Apply fluoride varnish *today*.

FOR ALL CHILDREN:

☐ Refer to dental office (if child has not yet been to a dental office in the last year).

Caregiver Information – Recommend:
☐ That adult brushes child's teeth (< 8 years old) at least twice daily for 2 minutes with:
- Water or non-fluoridated toothpaste only for 0-3 years of age if total score = 0
- Smear (grain of rice size) of fluoridated toothpaste for 0-3 years of age (if total score > 0)
- Green pea size of fluoridated toothpaste for 3-6 years of age

☐ Lowering sugar consumption or limiting sugary drinks/snacks
☐ Avoiding overnight bottle and sippy cup use with liquids other than water
☐ Initiate weaning off bottle by 12 months of age
☐ Initiate switching to an open cup/lidless sippy cup by 12 months of age
☐ Other: _____



ADDITIONAL COMMENTS:

Dental referral made to: _____ ☐ **Not required (child has already been to dental office)**
Provider signature: _____

University of Manitoba · Canadian Paediatric Society / Société canadienne de pédiatrie · CAPD ACSD · CAPHD ACSDP · Canadian Association of Public Health Dentistry / Association canadienne de santé dentaire publique

December 20, 2019

Public Health Agency of Canada / Agence de la santé publique du Canada

Canadian Caries Risk Assessment Tool (< 6 years)
Signs of Plaque and Caries Lesions

Visible Plaque and/or Food Debris	
Early Caries (White Spot Lesions)	
Advanced Caries	  

Images courtesy of Dr. Robert Schroth

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