



Policy Statement—Early Childhood Caries in Indigenous Communities

abstract

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The oral health of Indigenous children of Canada (First Nations, Inuit, and Métis) and the United States (American Indian, Alaska Native) is a major child health issue: there is a high prevalence of early childhood caries (ECC) and resulting adverse health effects in this community, as well as high rates and costs of restorative and surgical treatments under general anesthesia. ECC is an infectious disease that is influenced by multiple factors, including socioeconomic determinants, and requires a combination of approaches for improvement. This statement includes recommendations for preventive oral health and clinical care for young infants and pregnant women by primary health care providers, community-based health-promotion initiatives, oral health workforce and access issues, and advocacy for community water fluoridation and fluoride-varnish program access. Further community-based research on the epidemiology, prevention, management, and microbiology of ECC in Indigenous communities would be beneficial.

Pediatrics 2011;127:1190–1198

Indigenous children of Canada (First Nations, Inuit, and Métis) and the United States (American Indian, Alaska Natives) face many health disparities compared with the general American and Canadian populations. Oral health disparities for Indigenous children exemplify many of the inequities and the major need for health promotion, disease prevention, and early care services in these communities. Various organizations have provided guidelines on health promotion, disease prevention, and early visits for dental care; however, the severity of dental disease and the barriers to care in Indigenous communities require special consideration.

Early childhood caries (ECC) is defined as the presence of tooth decay that involves any primary tooth in a child younger than 6 years.¹ Also referred to as early childhood tooth decay in the vernacular (and formerly called baby-bottle tooth decay), the term ECC better reflects that the disease process is much more complex and involves transmission of infectious bacteria, dietary habits, and oral hygiene. ECC is an infectious disease; *Streptococcus mutans* is the most dominant causative organism. The causative triad for caries includes the presence of cariogenic bacteria, diet (exposure to fermentable carbohydrate), and host susceptibility (integrity of tooth enamel). ECC has been termed the most prevalent pediatric infectious disease and the most common chronic disease of children.²

The effects of ECC go beyond the oral cavity and influence overall childhood health and well-being, which are already compromised for many

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KEY WORDS

dental caries, early childhood caries, oral health, Indigenous,
First Nations, American Indians

ABBREVIATIONS

ECC—early childhood caries

IHS—Indian Health Services

AI/AN—American Indian/Alaska Native

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www.pediatrics.org/cgi/doi/10.1542/peds.2011-0847

doi:10.1542/peds.2011-0847

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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Indigenous children. ECC has been associated with other infectious diseases, such as respiratory tract infections and acute otitis media, in the first year of life, but the relationships are weak and may indicate common risk factors.³ When left to progress, ECC can become painful and result in altered chewing, eating, and sleeping patterns in addition to potential growth restriction.³ Early tooth loss as a result of ECC may result in speech difficulties and associated self-esteem issues because of altered appearance. Children with ECC are known to be at increased risk of decay in both primary and permanent dentition and may also experience malalignment and crowding of permanent teeth that result in poor bite.⁴ Dental caries has also been associated with obesity in children from low socioeconomic status, possibly from common risk factors.⁵ The other consequence of more severe ECC is that it frequently requires extensive treatment under general anesthesia—a procedure all too common among Indigenous children.⁶

ORAL HEALTH STATUS IN INDIGENOUS CHILDREN

The poor oral health of Indigenous children in Canada and the United States is a major public health issue. In some Canadian Indigenous communities, the prevalence of ECC exceeds 90%.⁴ Similarly, in the United States, the disparities in oral health for Indigenous children are significant and may be increasing. A 1999 Indian Health Services (IHS) survey of 2663 American Indian/Alaskan Native (AI/AN) children between 2 and 5 years of age revealed that 68% had untreated decay, which is more than 3 times greater than the rate found in children from the National Health and Nutrition Examination Survey (19%).⁷ The same survey revealed that 60% of preschool-aged AI/AN children had severe ECC constituted by decay on a maxillary incisor or

6 or more decayed teeth. When compared with a similar survey in 1991, a statistically significant increase in the number of decayed, missing, and filled teeth was found in AI/AN children.⁷

One of the major consequences of more severe ECC is the need for pediatric dental surgery under general anesthesia with the related economic burdens of health care fees and transportation and accommodation costs for families from remote communities to urban centers.⁸ In addition to the potential health risks of general anesthesia, the benefits of rehabilitative treatment under general anesthesia may be short-lived, because relapse and recurrent decay are common if proper oral hygiene behaviors are not maintained postoperatively.^{9,10} The reliance on and necessity for operative treatment of ECC is evidenced by the fact that pediatric dental surgery is the most common outpatient surgical procedure in many Canadian pediatric hospitals,¹¹ and wait times are substantial.^{12,13} Results of recent studies also suggest that a significant number of First Nations children with dental caries require repeat dental procedures under general anesthesia.⁶

RISK FACTORS FOR ECC

There are a multitude of risk factors associated with ECC; however, the single greatest risk factor for ECC is being poor.¹⁴ Unfortunately, Indigenous children in the United States and Canada face poverty rates more than double those of the general population; approximately 52% of Canadian First Nations children live in poverty,^{15,16} and 36% of US AI/AN children overall and up to 60% of children of single parents who reside on reservations live in poverty.¹⁷

The infectious disease model of caries indicates the influence of poverty, household crowding, family size, nutrition, health behaviors, parenting

practices, and other risk factors. An association is found between parents' oral health status and the oral health status of their infants.¹⁸ Dietary factors influence the availability of fermentable carbohydrates required for caries formation but also influence host susceptibility, because primary tooth enamel development is influenced by prenatal and early infant nutrition.¹⁹ Among American Indigenous populations, ECC has been found to be associated with parenting practices such as prolonged use of the bottle or training cups with sugar-containing drinks and a high frequency of sugary snacks per day.^{19–23} Environmental tobacco smoke and maternal smoking status also have been associated with increased risk of caries among children.^{24,25}

PREVENTION STRATEGIES

Restorative or surgical treatment of ECC is challenging and costly for children, but especially so for those from remote communities, and is unlikely to solve dental disease in Indigenous communities. Disease prevention is likely to be the most cost-effective alternative and the best long-term solution to oral health problems in these communities.²⁶ Primary prevention of dental disease not only preserves healthy teeth but also decreases the current tremendous demand for restorative and surgical care. With ECC being a result of the interplay of oral bacteria, substrate, and host as well as family, economic, and social conditions, health-promotion strategies that emphasize community development and address the determinants of health are required along with strategies that focus on disease prevention.^{27,28} This will take collaboration among Indigenous communities; dental, primary care, and public health practitioners; and decision-makers, policy-makers, and researchers involved with young children.

Oral Health Promotion

Oral health promotion, like overall health promotion, should be part of a total healthy-living strategy, because many health disparities have similar underlying issues, such as socioeconomic challenges, food availability and costs of nutritious choices in remote communities, exposure to environmental tobacco smoke, and unacceptably low rates of breastfeeding and nutritious food awareness, access, and availability.

Disease Prevention

The first dental experience for many Indigenous children is for dental treatment resulting from caries rather than for preventive care. In fact, regular dental visits are not the norm for many Indigenous children.²⁹ Perceptions that deciduous teeth are not important and the acceptance that ECC and dental surgery are inevitable parts of childhood can be a barrier to adopting available prevention strategies.^{29,30} These barriers may be reduced by increasing awareness of the importance of oral health to the overall well-being of the child; of the consequences of poor oral health, including the risks of general anesthesia; and that ECC is a potentially preventable disease.

ECC prevention should start during the prenatal period, progress through the perinatal period, and continue with the mother and infant within the context of the family and during preschool programs.^{31,32} Given the evidence for vertical transmission of cariogenic bacteria, primarily from mother to child, involving pregnant women in oral health screening, dental treatment, and education on oral health hygiene and bolstering their nutrition along with the use of fluoride toothpaste are strategies that can assist in the prevention or delay of ECC.³¹ Recent guideline documents support the safety of dental care in pregnancy to

reduce or delay ECC in infants.^{33–35} Prenatal visits may also provide an opportunity to build awareness of the importance of oral health for mothers and their infants.

Fluoride

Many national and international organizations, agencies, and governments, including the World Health Organization, the US Surgeon General, the Centers for Disease Control and Prevention, Health Canada, the American Dental Association, the American Academy of Pediatric Dentistry, the Canadian Dental Association, the Canadian Academy of Pediatric Dentistry, the American Academy of Pediatrics, and the Canadian Paediatric Society, strongly endorse the use of fluorides for the prevention and control of caries. Fluoride use is recognized by the American Dental Association, American Academy of Pediatric Dentistry, and Canadian Dental Association as a safe and highly effective strategy for preventing and controlling caries.^{36–40} Multiple products provide fluoride. Effectiveness may require adherence (eg, toothpastes) or access to dental care or funding (eg, fluoride varnish).

Water fluoridation is seen as effective and inexpensive, does not require daily adherence, and promotes equity, because it benefits everyone regardless of socioeconomic status.^{2,41} The World Health Organization has reported that fluoridation has substantial advantages, especially for high-risk groups, when it is culturally acceptable and technically feasible.⁴² A recent unpublished study performed in Alaskan communities revealed a reduction in caries of 30% to 50% with community fluoridation, even when other risk factors were accounted for (Michael Bruce, Arctic Investigations Program, Centers for Disease Control and Prevention, verbal communication, June 6, 2009). In North America, there is wide

disparity in the access to water fluoridation. It is estimated that 45% of Canadians benefit from access to fluoridated water,⁴³ whereas in 1998, less than 10% of First Nations people who lived on reservations had access to fluoridated water.⁴⁴ In 2006, 69% of US residents were served with community water fluoridation.⁴⁵ The role of public controversy in hindering the uptake of water fluoridation in Indigenous communities has not been documented.

Topical fluorides have been found to be effective in preventing caries. A Cochrane Collaboration review revealed that fluoride varnish substantially reduces tooth decay in both primary and permanent teeth.⁴⁶ A randomized controlled trial of fluoride varnish offered at least 2 times per year in Indigenous communities in northern Ontario, Canada, revealed an 18% reduction in the 2-year mean caries increment in participating Indigenous children and an adjusted odds ratio for caries incidence of nearly 2 times higher in the control group than in the fluoride-varnish group.⁴⁷ Lawrence et al suggested that the costs of fluoride varnish, although small, can be reduced and access could be improved through the expansion of providers of fluoride-varnish applications to include other health workers such as dental hygienists, dental therapists, dental assistants, and primary health care providers such as public health nurses, physician assistants, and other community health workers trained to administer fluoride varnish.⁴⁷ In more than 140 Canadian First Nations communities participating in the Children's Oral Health Initiative program, dental professionals and trained aides apply fluoride varnish.⁴⁸ Similar initiatives exist in the United States; 37 states provide primary care provider reimbursement for preventive oral health services, including fluoride-

varnish application, to Medicaid-eligible children younger than 3 years during well-child visits (Amos S. Deineard, Department of Pediatrics, University of Minnesota [Minneapolis, MN], verbal communication, November 22, 2009).⁴⁹ The application of fluoride varnish at the conclusion of “well-child” visits but before vaccinations at an IHS pediatric clinic was believed to be an effective way of reaching more AI/AN children.⁵⁰ IHS considers 4 or more topical applications of fluoride varnish between 9 and 24 months of age as best practice for children involved with Head Start programs.⁵¹

According to the American Academy of Pediatric Dentistry, the Canadian Dental Association, the American Academy of Pediatrics, and the Canadian Paediatric Society, fluoride supplements are appropriate for children at high risk of dental caries and may be necessary if the patient is not receiving adequate fluoride from other sources such as water and toothpaste.^{37–40} Most Indigenous children fit into the high dental-caries-risk category, and few Canadian Indigenous communities have access to fluoridated drinking water. However, adherence can be an issue with supplements, especially by children at greatest risk, and the authors of a recent systematic review of fluoride supplementation concluded that the evidence for the prevention of caries in primary teeth is weak and inconsistent.⁵² Health Canada’s First Nations and Inuit Health does not recommend fluoride supplementation for First Nations children but instead puts more emphasis on oral hygiene, fluoride varnish, and fluoridated toothpaste (P. Cooney, BDS, Chief Dental Officer, Health Canada [Ottawa, Ontario, Canada], verbal communication, March 23, 2010).⁵³

Canadian Dental Association and American Academy of Pediatric Dentistry guidelines support the use of

fluoridated toothpaste twice daily; they suggest that children (2–5 years of age in the American Academy of Pediatric Dentistry guideline and 3–6 years of age in the Canadian Dental Association guideline) be assisted during brushing and use a small amount (eg, green pea-sized portion) of fluoridated toothpaste and that infants (younger than 2 years in the American Academy of Pediatric Dentistry guideline and younger than 3 years in the Canadian Dental Association guideline) have their teeth brushed by an adult using a minimal amount or rice grain-sized portion of fluoridated toothpaste, especially for children at high risk of dental caries.^{37,38} Because of the high risk of dental caries in Indigenous children, supervised use of fluoridated toothpaste for Indigenous children starting at the first tooth eruption should be encouraged.

Sealants

Sealants have traditionally been used on occlusal tooth surfaces to protect pits and fissures from dental caries. Results of recent reviews have indicated that there is agreement that in populations at high risk of dental caries, such as First Nations and Inuit populations, all children should receive sealants, and some literature supports the placement of sealants on both primary and permanent molars.^{54,55} However, the use of sealants for primary teeth may need to be promoted, because some dental professionals consider sealants for permanent teeth only.

ACCESS TO EARLY ORAL HEALTH CARE AND THE ROLE OF PRIMARY HEALTH CARE PROVIDERS

A measure of the geographic and workforce barriers to ECC prevention and care is the 1999 survey of oral health in AI/AN, which revealed that 68% of AI/AN children 2 to 5 years of age had untreated caries, compared with just 19% of US children as a

whole.⁵⁶ In the face of this ECC epidemic in AI/AN communities, there are severe dental workforce shortages. The ratio of dentists per person is 1:2800 for AI/AN communities compared with the US average of 1:1500.⁵⁶ This situation is unlikely to improve in the near future, because the IHS vacancy rate for dentists is higher than it has been for many years and is currently at 24% despite recruitment efforts.⁵⁷ Innovative approaches for recruitment and human resource planning is required, including the expanded roles of other members of the dental health team and other primary care providers in oral health with a focus on the delivery of preventive strategies.

A number of professional associations, including the American Academy of Pediatric Dentistry, the Canadian Dental Association, the American Academy of Pediatrics, and the Canadian Paediatric Society, have called for comprehensive dental health care through dentists and an oral health examination for infants within 6 months after the first tooth erupts or by 12 months of age.^{58,59} A lack of access to dental care contributes to the oral health disparities experienced by AI/AN⁶⁰ and Canadian Indigenous children. Unfortunately, many dentists and primary care providers are still unaware of these new recommendations or are hesitant to examine and treat very young patients because of inadequate education or training, which limits access to early preventive care by high-risk populations.⁶¹ Inadequate numbers of dentists and the challenges of recruiting and retaining dentists in IHS clinics, tribal health facilities, and remote Indigenous communities cause significant issues for access. In some Indigenous communities, other members of the oral health team provide components of a comprehensive oral health program

supported by dentists. Health Canada supports training and utilization of dental therapists for First Nations communities.⁴⁸ Dental therapists are commonly used in northern communities in some Canadian provinces and territories, and more recently, a dental health aide program has evolved in Alaska. The effective use of appropriate dental health aides is seen by some in the American Dental Association as key to improving the oral health of Alaska Native people,²⁶ but there is some disagreement on the extent of the roles and scope of practice of the various types of dental health aides.

Primary care providers (eg, pediatricians, family physicians, nurse practitioners, community health nurses, physician assistants) in various Indigenous communities in North America are in unique positions to complement the work of dental health professionals. These health care providers often are afforded the opportunity to examine young children long before they are seen by dental personnel. In many Indigenous communities, well-infant, infant health, and immunization clinics are provided on a regular basis through community health nurses and physicians. These providers have an opportunity to emphasize the importance of good oral health practices as part of their overall health-promotion activities. In addition, they may be able to provide oral health screening for infants and young children and arrange referrals to dental health professionals. The American Academy of Pediatrics, through its Oral Health Initiative, has developed training programs for children's oral health to integrate these concepts into routine pediatric care.⁶² This training helps complement the current American Academy of Pediatrics policy statements on oral health for children.^{39,58}

ORAL HEALTH RECOMMENDATIONS FOR INDIGENOUS COMMUNITIES*

Clinical Care

- ECC should be considered an infectious disease that is influenced by a variety of factors including socioeconomic conditions, parenting practices, and maternal and infant nutrition.
- Early childhood oral health should be included as part of overall childhood health and well-being.
- Oral health should be discussed during well-child care visits by using motivational interviewing and anticipatory guidance on oral hygiene and diet for the parents and caregivers of infants and children.
- Supervised twice-daily use of fluoridated toothpaste should be promoted for all Indigenous and other high-risk children after the first tooth has erupted (rice grain–sized portion of toothpaste for infants and pea-sized portion for children).
- Community health nurses, family physicians, or pediatricians should perform oral health screening during early childhood health assessments and provide referrals as needed to dental health providers.
- Women in Indigenous communities should be provided the access to receive preconception and prenatal screening for oral health, anticipatory guidance for oral health and hygiene, and referral for dental care if required.
- Primary care providers should be aware of the access to fluoride in the drinking water for the various Indigenous communities in their service area.

*See Appendices 1–3 for evidence grades for the recommendations.

Community-Based Promotion Initiatives

- Change should be promoted in Indigenous communities to alter practices of frequent consumption of sugar-containing drinks and sugary snacks through education and improving the selection of foods available in the communities.
- Community-based activities should be used to emphasize the importance of oral health for the pregnant woman and her infant(s).

Workforce and Access Issues

- Early access to dental health professionals (to establish a dental home) should be provided by 12 months of age to provide the full range of oral health-promotion and interceptive disease-prevention services.
- All Indigenous children should have access to the evidence-based schedule for fluoride varnish and an assessment to determine the need for sealant placement on deep grooves and fissures on primary teeth. Alternative health or child care professionals and dental auxiliaries (or trained lay child care workers such as early childhood development workers) should be used to ensure access to fluoride-varnish programs. Fluoride varnish can be provided as part of a regular child health clinic program (well or sick visit) by trained health auxiliaries, community health workers, family physicians, or pediatricians. When specific programs are available, participation should be encouraged.
- Oral health services should be provided to pregnant women in Indigenous communities to get their teeth cleaned and examined and to have any needed periodontal and dental work performed before their infant is born.
- Roles that other dental health and primary health care providers can

assume should be considered in areas where it is difficult to recruit and retain an adequate number of dentists to provide oral health services and promote an early dental visit by the first year of life.

- Adequate cultural competency training opportunities should be provided for dentists, dental hygienists, therapists, and assistants to work in Indigenous communities. Advocate for increased representation of Indigenous people in oral health professions.
- Oral health training should be incorporated into pediatric and family medicine residency programs.

Advocacy

- Indigenous communities should be provided with information on water fluoridation, and opportunities for fluoridation (capital and maintenance costs and training for operators) of the community drinking water should be advocated within and for Indigenous communities.
- Appropriate funding for access to fluoride-varnish programs and for other oral health prevention and treatment services to Indigenous populations should be advocated.

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Research

- Further community-based participatory research on the epidemiology, prevention, management, and microbiology of ECC in Indigenous communities and ECC-prevention projects should be supported.

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ACKNOWLEDGMENTS

This positionpaper was developed collaboratively between the American Academy of Pediatrics and the Canadian Paediatric Society. We thank Rebecca L. Slayton, DDS, PhD, Rocío Quinonez, DMD, MS, MPH, FRCDC Michael J. Young, MD, and Peter Cooney, BDS, LDM, DDPH, MSc, FRCDC for reviewing the statement.

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APPENDIX 1 Levels of Evidence and Grade of Recommendations for Individual-Level “Clinical/Prevention” Recommendations

Recommendation	US Preventive Services Task Force ⁶⁵		Canadian Task Force on Preventive Health Care ⁶⁴	
	Grade	Level of Certainty	Grade	Level of Evidence
Use motivational interviewing and anticipatory guidance on oral hygiene and diet for the parents and caregivers of infants and children	B	Moderate	B	II-3
Promote the supervised use of fluoridated toothpaste for all Indigenous and other high-risk children after the first tooth has erupted (“smear” of toothpaste for infants and pea-sized amount for children)	A	High	A	I
Community health nurses, family physicians, or pediatricians should perform oral health screening during child health assessments and provide referrals as needed to dental health providers	B	Moderate	B	II-3
Provide women with preconception and prenatal screening for oral health, anticipatory guidance for oral health and hygiene, and referral for dental care if required	B	Moderate	B	I
Ensure that all Indigenous children have access to (1) the series of fluoride varnish and (2) an assessment to determine the need for sealant placement on deep grooves and fissures	A A	Moderate High	A A	II-1 I

APPENDIX 2 Grades of Recommendations

Grade	US Preventive Services Task Force ⁶⁵	Canadian Task Force on Preventive Health Care ⁶⁴
A	High certainty that the net benefit is substantial	Good evidence to recommend
B	High certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial.	Fair evidence to recommend
C	Recommends against routinely providing the service. There may be considerations that support providing the service in an individual patient. At least moderate certainty that the net benefit is small.	Existing evidence is conflicting and does not allow to make a recommendation for or against; however, other factors may influence decision-making.
D	Recommends against the service. Moderate or high certainty that the service has no net benefit or that the harms outweigh the benefits.	Fair evidence to recommend against the action.
I	Current evidence is insufficient to assess the balance of benefits and harms. Balance of benefits and harms cannot be determined.	Insufficient evidence (in quantity or quality) to make a recommendation; however, other factors may influence decision-making.

APPENDIX 3 Levels of Evidence/Certainty Regarding Net Benefit

US Preventive Services Task Force ⁶⁵		Canadian Task Force on Preventive Health Care ⁶⁴	
Level of Certainty	Description	Level of Evidence	Description
High	Evidence usually includes consistent results from well-designed, well-conducted studies in representative primary care populations. These studies assess the effects on health outcomes. This conclusion is unlikely, therefore, to be strongly affected by the results of future studies.	I	Evidence obtained from at least 1 properly randomized trial
		II-1	Evidence obtained from well-designed controlled trial without randomization
Moderate	The evidence is sufficient to determine the effects of the service on health outcomes, but confidence in the estimate is constrained by factors such as Number, size, or quality of studies Inconsistency of findings across studies Limited generalizability of findings Lack of coherence in the chain of evidence As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion	II-2	Evidence obtained from well-designed cohort or case-controlled analytic studies, preferably from >1 center or research group
		II-3	Evidence obtained from comparisons between times and places, with or without the intervention; dramatic results in uncontrolled experiments could also be included in this category
Low	The available evidence is insufficient to assess effects on health outcomes. Evidence is insufficient because of Limited number or size of studies Important flaws in study design/methods Inconsistency of findings across studies Gaps in the chain of evidence Findings not being generalizable Lack of information on important health outcomes More information may allow estimation of effects of health outcomes.	III	Opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees

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Canadian Paediatric Society, First Nations, Inuit and Métis Committee

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