

Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies

Review Council

Council on Clinical Affairs

Latest Revision

2016

Purpose

Early childhood caries (ECC), formerly referred to as nursing bottle caries and baby bottle tooth decay, remains a significant public health problem.¹ The American Academy of Pediatric Dentistry (AAPD) encourages healthcare providers and caregivers to implement preventive practices that can decrease a child's risks of developing this disease.

Methods

This policy was originally developed in a collaborative effort of the American Academy of Pedodontics and the American Academy of Pediatrics, and adopted in 1978. This document is a revision of the previous version, last revised by the AAPD in 2014. The update used electronic and hand searches of English written articles in the dental and medical literature within the last 10 years, using the search terms infant oral health, infant oral health care, and early childhood caries. Recent references to ECC, along with full text, can be found on the Early Childhood Caries Resource Center database (<http://earlychildhoodcariesresourcecenter.elsevier.com>). When information from these articles did not appear sufficient or was inconclusive, policies were based upon expert and consensus opinion by experienced researchers and clinicians.

Background

In 1978, the American Academy of Pedodontics and the American Academy of Pediatrics released a joint statement "Juice in Ready-to-Use Bottles and Nursing Bottle Caries" to address a severe form of caries associated with bottle usage.² Initial policy recommendations were limited to feeding habits, concluding that nursing bottle caries could be avoided if bottle feedings were discontinued soon after the first birthday. An early policy revision added ad libitum breast-feeding as a causative factor. Over the next two decades, however, recognizing that ECC was not solely associated with poor feeding practices, AAPD adopted the term ECC to better reflect its multi-factorial etiology. These factors include susceptible teeth due to enamel hypoplasia, oral colonization with elevated levels of cariogenic bacteria, especially Mutans Streptococci (MS), and the metabolism of sugars by tooth-adherent bacteria to produce acid which, over time, demineralizes tooth structure.³

ECC is defined as the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of six. The definition of severe early childhood caries (S-ECC) is any sign of smooth-surface caries in a child younger than three years of age, and from ages three through five, one or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth or a decayed, missing, or filled score of greater than or equal to four (age 3), greater than or equal to five (age 4), or greater than or equal to six (age 5).⁴

Epidemiologic data from a 2011-2012 national survey clearly indicate that ECC remains highly prevalent in poor and near poor U.S. preschool children. For the overall population of preschool children, the prevalence of ECC, as measured by decayed and filled tooth surfaces (dfs), is unchanged from previous surveys, but the filled component (fs) has greatly increased indicating that more treatment is being provided.⁵ The consequences of ECC often include a higher risk of new carious lesions in both the primary and permanent dentitions,^{6,7} hospitalizations and emergency room visits,^{8,9} high treatment costs,¹⁰ loss of school days,¹¹ diminished ability to learn,¹² and diminished oral health-related quality of life.¹³

Microbial risk markers for ECC include MS and Lactobacillus species.¹⁴ However, new tools for bacterial identification (e.g., polymerase chain reaction [PCR] techniques, 16S rRNA gene sequencing) are revealing the complexity of the oral microbiome and other bacterial species that may be associated with ECC.¹⁵ MS maybe transmitted vertically from caregiver to child through salivary contact, affected by the frequency and amount of exposure.¹⁶ Infants whose mothers have high levels of MS, a result of untreated caries, are at greater risk of acquiring the organism earlier than children whose mothers have low levels.¹⁷ Horizontal transmission (e.g., between other members of a family or children in daycare) also occurs.¹⁷

ABBREVIATIONS

AAPD: American Academy Pediatric Dentistry. **ECC:** Early childhood caries. **MS:** Mutans streptococci. **PCR:** Polymerase chain reaction. **S-ECC:** Severe early childhood Caries.

An associated risk factor to microbial etiology is high consumption of sugars.¹⁸ Caries-conducive dietary practices appear to be established by 12 months of age and are maintained throughout early childhood.¹⁹ Frequent nighttime bottle-feeding with milk and ad libitum breast-feeding are associated with, but not consistently implicated in, ECC.²⁰ Night time bottle feeding with juice, repeated use of a sippy or no-spill cup, and frequent in-between meal consumption of sugar-added snacks or drinks (e.g., juice, formula, soda) increase the risk of caries.²¹ While ECC may not arise from breast milk alone, breast-feeding in combination with other carbohydrates has been found in vitro to be highly cariogenic.²² Frequent consumption of between-meal snacks and beverages containing sugars increases the risk of caries due to prolonged contact between sugars in the consumed food or liquid and cariogenic bacteria on the susceptible teeth.²³ The American Academy of Pediatrics has recommended that infants should not be given juice from bottles or covered cups that allow them to consume juice throughout the day, and intake of 100 percent fruit juice should be limited to no more than four to six ounces per day for children one through six years old.²⁴ Additionally, newly-erupted teeth, because of immature enamel, and teeth with enamel hypoplasia may be at higher risk of developing caries.²⁵

Current best practice to reduce the risk of ECC includes twice-daily brushing with fluoridated toothpaste for all children in optimally-fluoridated and fluoride-deficient communities.^{26,27} When determining the risk-benefit of fluoride, the key issue is mild fluorosis versus preventing dental disease. A smear or rice-sized amount of fluoridated toothpaste (approximately 0.1 mg fluoride; see Figure) should be used for children less than three years of age. A pea-sized amount of fluoridated toothpaste (approximately 0.25 mg fluoride) is appropriate for children aged three to six.²⁸ Parents should dispense the toothpaste onto a soft, age-appropriate sized toothbrush and perform or assist with toothbrushing of preschool-aged children. To maximize the beneficial effect of fluoride in the toothpaste, rinsing after brushing should be kept to a minimum or eliminated altogether.²⁹

Professionally-applied topical fluoride treatments also are efficacious in reducing prevalence of ECC. The recommended professionally-applied fluoride treatments for children at risk for ECC who are younger than six years is five percent sodium fluoride varnish (NaFV; 22,500 ppm F).³⁰

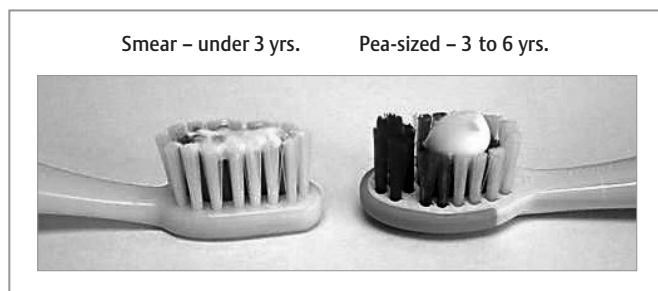


Figure. Comparison of a smear (left) with a pea-sized (right) amount of toothpaste.

Evidence increasingly suggests that preventive interventions within the first year of life are critical.³¹ This may be best implemented with the help of medical providers who, in many cases, are being trained to provide oral screenings, apply preventive measures, counsel caregivers, and refer infants and toddlers for dental care.³²

Policy statement

The AAPD recognizes early childhood caries as a significant chronic disease resulting from an imbalance of multiple risk and protective factors over time. To decrease the risk of developing ECC, the AAPD encourages professional and at-home preventive measures that include:

1. Avoiding frequent consumption of liquids and/or solid foods containing sugar, in particular:
 - Sugar-sweetened beverages (e.g., juices, soft drinks, sports drinks, sweetened tea) in a baby bottle or no-spill training cup.
 - Ad libitum breast-feeding after the first primary tooth begins to erupt and other dietary carbohydrates are introduced.
 - Baby bottle use after 12-18 months.
2. Implementing oral hygiene measures no later than the time of eruption of the first primary tooth. Toothbrushing should be performed for children by a parent twice daily, using a soft toothbrush of age-appropriate size. In children under the age of three, a smear or rice-sized amount of fluoridated toothpaste should be used. In children ages three to six, a pea-sized amount of fluoridated toothpaste should be used.
3. Providing professionally-applied fluoride varnish treatments for children at risk for ECC.
4. Establishing a dental home within six months of eruption of the first tooth and no later than 12 months of age to conduct a caries risk assessment and provide parental education including anticipatory guidance for prevention of oral diseases.
5. Working with medical providers to ensure all infants and toddlers have access to dental screenings, counseling, and preventive procedures.
6. Educating legislators, policy makers, and third party payors regarding the consequences of and preventive strategies for ECC.

References

1. Proceedings of the conference: Innovations in the prevention and management of early childhood caries. *Pediatr Dent* 2015;37(3):198-9.
2. American Academy of Pediatrics, American Academy of Pedodontics. Juice in ready-to-use bottles and nursing bottle caries. *AAP News and Comment* 1978;29(1):11.
3. Tinanoff N. Introduction to the conference: Innovations in the prevention and management of early childhood caries. *Pediatr Dent* 2015;37(4):198-9.

4. Drury TF, Horowitz AM, Ismail AI, et al. Diagnosing and reporting early childhood caries for research purposes. *J Public Health Dent* 1999;59(3):192-7.
5. Dye BA, Hsu K-L, Afful J. Prevalence and measurement of dental caries in young children. *Pediatr Dent* 2015; 37(3):200-16.
6. O'Sullivan DM, Tinanoff N. The association of early childhood caries patterns with caries incidence in preschool children. *J Public Health Dent* 1996;56(2):81-3.
7. Al-Shalan TA, Erickson PR, Hardie NA. Primary incisor decay before age 4 as a risk factor for future dental caries. *Pediatr Dent* 1997;19(1):37-41.
8. Ladrillo TE, Hobdell MH, Caviness C. Increasing prevalence of emergency department visits for pediatric dental care 1997-2001. *J Am Dent Assoc* 2006;137(3):379-85.
9. Griffin SO, Gooch BF, Beltran E, Sutherland JN, Barsley R. Dental services, costs, and factors associated with hospitalization for Medicaid-eligible children, Louisiana 1996-97. *J Public Health Dent* 2000;60(3):21-7.
10. Agency for Healthcare Research and Quality. Total dental care expenditure, 2010, Medical Expenditure Panel Survey. Available at: "http://meps.ahrq.gov/mepsweb/data_files/publications/st415/star415.pdf." Accessed April 9, 2015. (Archived by WebCite® at: "<http://www.webcitation.org/6XezI3w7Y>"). Accessed April 9, 2015.
11. Edelstein BL, Reisine S. Fifty-one million: A mythical number that matters. *J Am Dent Assoc* 2015;146(8): 565-6.
12. Blumenshine SL, Vann WF, Gizlice Z, Lee JY. Children's school performance: Impact of general and oral health. *J Public Health Dent* 2008;68(2):82-7.
13. Filstrup SL, Briskie D, daFonseca M, Lawrence L, Wandera A, Inglehart MR. The effects on early childhood caries (ECC) and restorative treatment on children's oral health-related quality of life (OHRQOL). *Pediatr Dent* 2003; 25(5):431-40.
14. Kanasi E, Johansson J, Lu SC, et al. Microbial risk markers for childhood caries in pediatrician's offices. *J Dent Res* 2010;89(4):378-83.
15. Li Y, Tanner A. Effect of antimicrobial interactions on the oral microbiota associated with early childhood caries. *Pediatr Dent* 2015;37(3):226-44.
16. Li Y, Caufield PW. The fidelity of initial acquisition of mutans streptococci by infants from their mothers. *J Dent Res* 1995;74(2):681-5.
17. Berkowitz RJ. Mutans streptococci: Acquisition and transmission. *Pediatr Dent* 2006;28(2):106-9.
18. Moynihan PJ, Kelly SAM. Effect on caries of restricting sugars intake: Systematic review to inform WHO guidelines. *J Dent Res* 2014;93(1):8-18.
19. Kranz S, Smiciklas-Wright H, Francis LA. Diet quality, added sugar, and dietary fiber intake in American preschoolers. *Pediatr Dent* 2006;28(2):164-71.
20. Reisine S, Douglass JM. Psychosocial and behavioral issues in early childhood caries. *Comm Dent Oral Epidem* 1998;26(suppl 1):32-44.
21. Tinanoff NT, Kanellis MJ, Vargas CM. Current understanding of the epidemiology mechanism, and prevention of dental caries in preschool children. *Pediatr Dent* 2002;24(6):543-51.
22. Erickson PR, Mazhari E. Investigation of the role of human breast milk in caries development. *Pediatr Dent* 1999;21(2):86-90.
23. Tinanoff NT, Palmer C. Dietary determinants of dental caries in preschool children and dietary recommendations for preschool children. *J Pub Health Dent* 2000; 60(3):197-206.
24. American Academy of Pediatrics Committee on Nutrition. Policy statement: The use and misuse of fruit juices in pediatrics. *Pediatrics* 2001;107(5):1210-3. Reaffirmed October, 2006.
25. Caufield PW, Li Y, Bromage TG. Hypoplasia-associated severe early childhood caries: A proposed definition. *J Dent Res* 2012;91(6):544-50.
26. Santos AP, Oliveira BH, Nadanovsky P. Effects of low and standard fluoride toothpastes on caries and fluorosis: Systematic review and meta-analysis. *Caries Res* 2013; 47(5):382-90.
27. American Dental Association Council on Scientific Affairs. Fluoride toothpaste use for young children. *J Am Dent Assoc* 2014;145(2):190-1.
28. Wright JT, Hanson N, Ristic H, Whall CW, Estrich CG, Zentz RR. Fluoride toothpaste efficacy and safety in children younger than 6 years. *J Am Dent Assoc* 2014; 145(2):182-9.
29. Sjögren K, Birkhed D. Factors related to fluoride retention after toothbrushing and possible connection to caries activity. *Caries Res* 1993;27(6):474-7.
30. Weyant RJ, Tracy SL, Anselmo T, Beltrán-Aguilar EJ, Donly KJ, Frese WA. Topical fluoride for caries prevention: Executive summary of the updated clinical recommendations and supporting systematic review. *J Am Dent Assoc* 2013;144(11):1279-91.
31. Lee JY, Bouwens TJ, Savage MF, Vann WF. Examining the cost-effectiveness of early dental visits. *Pediatr Dent* 2006;28(2):102-105, discussion 192-8.
32. Douglass AB, Douglass JM, Krol DM. Educating pediatricians and family physicians in children's oral health. *Academic Pediatr* 2009;9(6):452-6.