Policy on Use of a Caries-risk Assessment Tool (CAT) for Infants, Children, and Adolescents

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2002

Revised
2006

Purpose
The American Academy of Pediatric Dentistry (**AAPD**) recognizes that caries-risk assessment is an essential element of contemporary clinical care for infants, children, and adolescents. This policy is intended to educate healthcare providers and other interested parties on the assessment of caries risk in contemporary pediatric dentistry.

Methods
This policy revision is based on a review of the current dental and medical literature related to caries-risk assessment tools and methodologies. A MEDLINE search was conducted using the terms "caries risk", "caries assessment", and "caries management tool". Expert opinions and best current practices also were relied upon for this policy.

Background
The caries process involves a combination of factors including diet, a susceptible host, and microflora that interplay with a variety of social, cultural, and behavioral factors.[1-5] Most young children appear to acquire some cariogenic microbes [ie, mutans streptococci (**MS**)] from their mothers or primary caregivers.[6,7] Traditionally, multifactorial caries-risk studies have focused on evaluation of biological, demographic, and dietary factors and have used cavitation of a carious lesion (prevalence or incidence) as the outcome variable.[8] Caries risk assessment is the determination of the likelihood of the incidence of caries (ie, the number of new cavitated or incipient lesions) during a certain time period.[9] It also involves the likelihood that there will be a change in the size or activity of lesions already present. With the ability to detect caries in its earliest stages (ie, white spot lesions), health care providers can help prevent cavitation.[10-12]

Strategies for managing caries increasingly have emphasized the concept of risk assessment.[13-19] In 2002, while recognizing that assessment of caries risk undoubtedly would benefit from emerging science and technologies, the AAPD took a first step toward incorporating available evidence into a framework for classifying caries risk in infants, children, and adolescents.[20] This tool was based on a set of physical, environmental, and general health factors and intended to be a dynamic instrument that would be evaluated and revised periodically as new evidence warranted.[21-24]

Risk assessment is a necessary component in the clinical decision making process.[25] Caries risk indicators are variables that either currently are thought to cause the disease directly (eg, micro-flora) or have been shown useful in predicting it (eg, socioeconomic status). These risk factors may vary with race, culture, and ethnicity[26-32] and may be useful in the clinical management of caries by helping to determine if additional diagnostic procedures are required, identify subjects who require caries control measures, assess the impact of caries control measures, guide in treatment planning decisions, and determine the timing of recall appointments.[16,33-35]

Since the etiology of caries is multi-factorial, it has been suggested that risk assessment should be directed at the evaluation of all factors involved with the disease.[36,37] Studies have indicated that for the success of a caries-risk assessment model, 1 or more social, behavioral, microbiologic, environmental, and clinical variables should be included.[31,33,38] However, requiring an oral examination can hamper the utility of this process in population subgroups that have not sought dental care (eg, many preschool children, especially those from minority populations).

A systematic review of literature concerning caries risk indicators concluded that, for caries prediction in primary teeth, previous caries experience was the best predictor,[25] followed by level of parental education[39] and socioeconomic status.[40] While previous caries experience may be the best indicator of future disease, using it to identify children at high risk comes too late to prevent caries initiation. Most studies do not report the presence of noncavitated lesions,[25,41,42] although such lesions have been shown to have predictive value.[43,44] Another important risk factor in young children is the age of MS colonization. The earlier in infancy that high levels of MS colonization

American Academy of Pediatric Dentistry
Caries–risk Assessment Tool (CAT)

RISK FACTORS TO CONSIDER	RISK INDICATORS		
(For each item below, circle the most accurate response found to the right under "Risk Indicators")	**High**	**Moderate**	**Low**
Part 1– History (determined by interviewing the parent/primary caregiver)			
Child has special health care needs, especially any that impact motor coordination or cooperation [A]	Yes		No
Child has condition that impairs saliva (dry mouth) [B]	Yes		No
Child's use of dental home (frequency of routine dental visits)	None	Irregular	Regular
Child has decay	Yes		No
Time lapsed since child's last cavity	<12 months	12 to 24 months	>24 months
Child wears braces or orthodontic/oral appliances [C]	Yes		No
Child's parent and/or sibling(s) have decay	Yes		No
Socioeconomic status of child's parent[D]	Low	Mid-level	High
Daily between-meal exposures to sugars/cavity–producing foods (includes on demand use of bottle/sippy cup containing liquid other than water; consumption of juice, carbonated beverages, or sports drinks; use of sweetened medications) [E]	>3	1 to 2	Mealtime only
Child's exposure to fluoride [E,G]	Does not use fluoridated toothpaste; drinking water that is not fluoridated and is not taking fluoride supplements	Uses fluoridated toothpaste; usually does not drink fluoridated water and does not take fluoride supplements	Uses fluoridated toothpaste; drinks fluoridated water or takes fluoride supplements
Time per day that child's teeth/gums are brushed	<1	1	2-3
Part 2– Clinical evaluation (determined by examining the child's mouth)			
Visible plaque (white, sticky buildup)	Present		Absent
Gingivitis (red, puffy gums) [H]	Present		Absent
Areas of enamel demineralization (chalky white-spots on teeth)	More than 1	1	None
Enamel defects, deep pits/fissures [I]	Present		Absent
Part 3– Supplemental professional assessment (Optional) [J]			
Radiographic enamel caries	Present		Absent
Levels of mutans streptococci or lactobacilli	High	Moderate	Low

Each child's overall assessed risk for developing decay is based on the highest level of risk indicator circled above (eg, a single risk indicator in any area of the 'high risk' category classifies a child as being 'high risk').

Table legends on next page

Table legends

[A] Children with special health care needs are those who have a physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services. The condition may be developmental or acquired and may cause limitations in performing daily self-maintenance activities or substantial limitations in a major life activity. Health care for special needs patients is beyond that considered routine and requires specialized knowledge, increased awareness and attention, and accommodation.[50]

[B] Alteration in salivary flow can be the result of congenital or acquired conditions, surgery, radiation, medication, or age-related changes in salivary function. Any condition, treatment, or process known or reported to alter saliva flow should be considered an indication of risk unless proven otherwise.

[C] Orthodontic appliances include both fixed and removable appliances, space maintainers, and other devices that remain in the mouth continuously or for prolonged time intervals and which may trap food and plaque, prevent oral hygiene, compromise access of tooth surfaces to fluoride, or otherwise create an environment supporting caries initiation.

[D] National surveys have demonstrated that children in low-income and moderate-income households are more likely to have caries and more decayed or filled primary teeth than children from more affluent households. Also, within income levels, minority children are more likely to have caries. Thus, socioeconomic status should be viewed as an initial indicator of risk that may be offset by the absence of other risk indicators.

[E] Examples of sources of simple sugars include carbonated beverages, cookies, cake, candy, cereal, potato chips, French fries, corn chips, pretzels, breads, juices, and fruits. Clinicians using caries-risk assessment should investigate individual exposures to sugars known to be involved in caries initiation.

[F] Optimal systemic and topical fluoride exposure is based on use of a fluoride dentifrice and American Dental Association/American Academy of Pediatrics guidelines for exposure from fluoride drinking water and/or supplementation.

[G] Unsupervised use of toothpaste and at-home topical fluoride products are not recommended for children unable to expectorate predictably.

[H] Although microbial organisms responsible for gingivitis may be different than those primarily implicated in caries, the presence of gingivitis in an indicator of poor or infrequent oral hygiene practices and has been associated with caries progression.

[I] Tooth anatomy and hypoplastic defects (eg, poorly formed enamel, developmental pits) may predispose a child to develop caries.

[J] Advanced technologies such as radiographic assessment and microbiologic testing are not essential for using this tool.

occur, the more severe the caries in the primary dentition.[45-47] Early childhood caries is an infectious process that too frequently requires expensive and extensive intervention. Identifying factors that determine those individuals at highest risk—either prior to or very shortly after teeth begin to erupt—is imperative to allow for possible preventive intervention.[25,48] Once identified, these factors should be assessed using a reliable and valid tool that is useable by both dental practitioners and trained nondental health professionals.[49]

Risk assessment tools can aid in the identification of reliable predictors and allow health care professionals to become more actively involved in identifying and referring high-risk children. The accompanying table incorporates available evidence into a concise, practical tool to assist both dental and nondental health care providers in assessing levels of risk for caries development in infants, children, and adolescents. As new evidence emergences, this tool can be refined and aid in providing greater predictably of caries in children prior to disease initiation. Furthermore, the evolution of CAT can assist in providing evidence for and justifying periodicity of services, modification of third-party involvement in the delivery of dental services, and quality of care with outcomes assessment to address limited resources and workforce issues. Individuals using this tool should:

1. be able to visualize adequately a child's teeth and mouth and have access to a reliable historian for nonclinical data elements;
2. be familiar with footnotes that clarify use of individual factors in this instrument;
3. understand that each child's ultimate risk classification is determined by the highest risk category where a risk indicator exists (ie, the presence of a single risk indicator in any area of the "high-risk" category is sufficient to classify a child as being at "high risk"; the presence of at least 1 "moderate-risk" indicator and no "high-risk" indicators results in a "moderate-risk"classification; and a child designated as "low risk" would have no "moderate-risk" or "high-risk" indicators).

Users of CAT must understand the following caveats:

1. CAT provides a means of classifying caries risk at a point in time and, therefore, should be applied periodically to assess changes in an individual's risk status.

2. CAT is intended to be used when clinical guidelines call for caries-risk assessment. Decisions regarding clinical management of caries, however, are left to qualified dentists (ideally, the dentist responsible for the child's dental home).
3. CAT can be used by both dental and nondental personnel. It does not render a diagnosis. However, indiduals using CAT must be familiar with the clinical presentation of dental caries and factors related to caries initiation and progression.
4. Since clinicians with various levels of skill working in a variety of settings will use this instrument, advanced technologies (ie, radiographic assessment and microbiologic testing) have been included but are not essential for using this tool.

Evidenced-based recommendations for therapy or treatment according to risk status are minimal,[15,49] as are guidelines for frequency of caries risk reevaluation. Since the carious process is a fluctuating continuum, periodicity of reassessment should be based on risk status (ie, greater frequency for children at high risk).

Policy Statement

The AAPD:

1. encourages both dental and non-dental health care providers to use CAT in the care of infants, children, and adolescents and to provide basic preventive counseling;
2. recommends that non-dental health care providers refer all children, especially those at moderate or high risk, to a dentist for oral health care (ie, establish a dental home);
3. encourages dentists to use advanced technologies such as radiographic assessment and microbiologic testing with CAT when assessing an individual's caries risk;
4. recognizes the need to evaluate CAT periodically and revise the tool as new science and technologies warrant.

The AAPD also encourages the scientific community to:

1. identify additional predictors of caries experience (eg, survey parent for self-perception of health and determine correlation to child's health);
2. research genetic factors that contribute to an individual's susceptibility or resistance to caries;
3. develop technology to detect and quantify early carious lesions and to assess directly carious lesion status (active vs inactive);
4. provide evidence to establish clinical applications (eg, customized periodicity schedules, preventive regimens, and / or treatment strategies) of CAT.

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