

Caries Management by Risk Assessment

— A PRACTITIONER'S GUIDE

DOUGLAS A. YOUNG, DDS, MS, MBA; JOHN D.B. FEATHERSTONE, MSC, PHD; AND JON R. ROTH, MS, CAE

GUEST EDITORS

Douglas A. Young, DDS, MS, MBA, is associate professor in the Department of Dental Practice at the University of the Pacific, Arthur A Dugoni School of Dentistry, in San Francisco.

John D.B. Featherstone, MSC, PHD, is interim dean, University of California, San Francisco, School of Dentistry, and is a professor in the Department of Preventive and Restorative Dental Sciences at UCSF.

Jon R. Roth, MS, CAE, is executive director of the California Dental Association Foundation.

In February and March 2003, two issues of the *Journal of the California Dental Association* were dedicated to reviewing the scientific basis for the most current approach to caries management using risk assessment protocols for diagnosis, treatment and prevention, including nonsurgical means for repairing — or remineralizing — tooth structure. The science behind Caries Management by Risk Assessment, CAMBRA, introduced in these *Journals* culminated with a consensus statement of national experts and the production of risk assessment forms for clinicians to use in practice. The California Dental Association, through the CDA Foundation, makes these *Journals* available to the public at www.cdafoundation.org/journal.

Since the science of CAMBRA has now been well-cited in the literature, clinicians are increasingly placing this knowledge into practice to the benefit of their patients. In this two-part series, this month and next, we will move from the scientific basis of CAMBRA into practical methods for dentists to incorporate the concepts into practice. The clinical protocols mentioned in this series are suggestions from experts in the field of cariology, dental practice, academic research, as well as practitioners who are already successfully using these concepts in their offices. The guidelines are suggestions for dentists who want to begin incorporating CAMBRA into their practice and are based on the best scientific evidence to date for CAMBRA. It is meant to be a starting point to aid those offices who

have a desire to begin incorporating the CAMBRA principles into their practice.

In Part 1 of this series, we asked the leading researchers in dental caries, dental academic practice, and practicing dentists to set the stage with updated information relating to the application of CAMBRA risk assessment guidelines and clinical protocols for children and adults, as well as a review of the latest products available for dentists to employ CAMBRA in their offices.

Douglas A. Young, DDS, MS, MBA; John D.B. Featherstone, MSc, PhD; and Jon R. Roth, MS, CAE, set the stage with a review of the principles of CAMBRA, as well as base line definitions used throughout the papers.

Francisco J. Ramos-Gomez, DDS, MS, MPH; James J. Crall, DDS, ScD; Rebecca L. Slayton, DDS, PhD; Stuart A. Gansky, DrPH; and Dr. Featherstone, present the latest maternal and child CAMBRA assessment tools for children age 0 to 5 and how practitioners use these tools when seeing children in their practice.

Dr. Featherstone; Sophie Domejean-Orliaguet, DDS; Larry Jenson DDS, MA; Mark Wolff, DDS, PhD; and Dr. Young, continue with an article regarding practical caries risk assessment procedures and form for patients age 6 through adult.

Dr. Jenson; Alan W. Budenz, MS, DDS, MBA; Dr. Featherstone; Vladimir W. Spolsky, DMD, MPH; and Dr. Young, provide a practical, everyday clinical guide for managing dental caries for any patient based upon the risk assessment protocols presented.

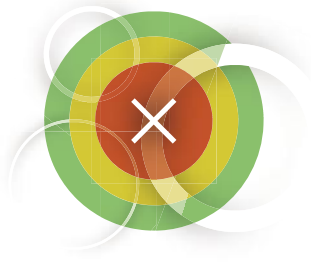
Dr. Spolsky; Brian P. Black, DDS;

and Dr. Jenson provide insights into the dental products that are currently available to assist the clinician in prudent recommendations for patient interventions using the CAMBRA principles.

Next month, we will provide practical implementation suggestions for dentists looking to begin CAMBRA in their practice, along with suggestions for educating dental team members and patients on the benefits of these approaches. That issue will culminate with a consensus statement demonstrating broad collaboration and support. ■■■■

The CDA Foundation will host a live Web cast featuring Drs. John D.B. Featherstone and Douglas A. Young, along with authors from this issue and next month's Journal, from 5 to 7 p.m. Dec. 5.

Participants will be able to submit questions on the topics covered in these issues for answers during the Web cast. This course is sponsored by CDA Foundation, through its grant from First 5 California, and is approved to confer two continuing education credits. To register for the event, to go: cdafoundation.org or first5oralhealth.org.



Curing the Silent Epidemic: Caries Management in the 21st Century and Beyond

DOUGLAS A. YOUNG, DDS, MS, MBA; JOHN D.B. FEATHERSTONE, MSC, PHD;
AND JON R. ROTH, MS, CAE

ABSTRACT Caries is the most prevalent disease of children and is epidemic in some populations. A risk-based approach to managing caries targets those in greatest jeopardy for contracting the disease, as well as provides evidence-based decisions to treat current disease and control it in the future. This paper outlines key concepts necessary to effectively manage and reduce caries based on the most current science to date. Subsequent articles will outline a roadmap to success in curing dental caries.

AUTHORS

Douglas A. Young, DDS, MS, MBA, is an associate professor, Department of Dental Practice, University of the Pacific, Arthur A. Dugoni School of Dentistry.

John D.B. Featherstone, MSC, PHD, is interim dean, University of California, San Francisco, School of Dentistry, and is a professor, Department of Preventive and Restorative Dental Sciences, at UCSF.

Jon R. Roth, MS, CAE, is executive director, California Dental Association Foundation.

The Silent Epidemic

“What amounts to ‘a silent epidemic’ of oral diseases is affecting America’s most vulnerable citizens: poor children, the elderly, and many members of racial and ethnic minority groups.”

— THE SURGEON GENERAL 2000

U.S. Department of Health and Human Services, 2000 Oral Health in America: A Report of the Surgeon General, Rockville, Md., U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health.

Dental caries, also known as the process leading to tooth decay, is the pathologic progression of tooth destruction by oral microorganisms that can affect individuals of all ages, cultures, ethnicities, and socioeconomic backgrounds. In 2000, it was determined that dental caries was the most common chronic

disease of childhood, with a rate five times greater than that seen for the next most prevalent disease of childhood: asthma.¹ Because dental infections are common and usually nonlife-threatening in nature, the significance of dental caries in overall health has historically been minimized until recently. On Feb. 28, 2007, the *Washington Post* reported that a 12-year-old Maryland boy died from untreated tooth decay. This news received national attention, not only from the dental profession but the public in general. Although overall dental caries prevalence and severity has been notably reduced in several western countries over the past couple of decades, dental caries continues to be a major health issue in the United States.

The third National Health and Nutrition Examination Survey (NHANES III)-Phase 1, collected data from 1988 to 1994 that indicated 50 percent of 5- to 8-year-old children in the United States had experienced caries in the primary dentition.² Remarkably, when the data are examined,

approximately 25 percent of children and adolescents in the 5- to 17-year-old range accounted for 80 percent of the caries experienced in the permanent teeth. These data indicate that dental caries continues to be a major oral health concern in children in the United States and worldwide.³ This suggests that the population of individuals susceptible to dental decay continues to expand with increased age. It is evident from numerous other studies that dental caries continues to affect individuals through childhood and beyond.³

Much of the dentistry is focused on restoring the symptoms of this transmissible bacterial infection rather than treating its etiologic cause, the infectious cariogenic biofilm in a predominantly pathologic oral environment. The core principles supporting risk-based caries management are decades old, and many practitioners are already using this as their current standard approach in patient care. Many clinicians still need help getting started with employing these principles in their practice.

This issue of the *Journal* provides current information on how to assess caries risk, what to do as a result, and provides the protocols to implement it in practice. The articles emphasize practical suggestions on how these current management techniques may be efficiently incorporated into a dental practice. This paper will present key concepts necessary for the most current management of dental caries and sets the stage for subsequent papers in this issue to cover the clinical implementation of a caries management by risk assessment model, or CAMBRA.

Caries Management by Risk Assessment

For more than two decades, medical science has suggested that physicians identify and treat patients by risk rather than treating all patients the

same.⁴ Throughout this *Journal*, the authors will refer to an evidence-based disease management protocol for Caries Management by Risk Assessment, or CAMBRA.⁵ Evidence-based dentistry, as defined by American Dental Association Council on Scientific Affairs in 2006, is an approach to oral health care that requires the judicious integration of systematic assessments of clinically **relevant scientific evidence relating to the**

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patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences (www.ada.org/prof/resources/pubs/jada/reports/index.asp).

Simply put, with the CAMBRA methodology the clinician identifies the cause of disease by assessing risk factors for each individual patient. Based on the evidence presented, the clinician then corrects the problems (by managing the risk factors) using specific treatment recommendations including behavioral, chemical, and minimally invasive procedures. Both the risk assessment and interventions are based on the concept of altering the Caries Balance (see Featherstone, et al. this issue). The Caries Balance is a model where pathological factors (bacteria, absence of healthy saliva, and poor dietary habits (i.e., frequent inges-

tion of fermentable carbohydrates) battle protective factors (saliva and sealants, antibacterials, fluoride, and an effective diet).⁶ With the use of CAMBRA, there is evidence that early damage to teeth from dental caries may be reversed and the manifestations of the disease perhaps prevented all together.

Transitioning From Science to Practice

In February and March 2003, two issues of the *Journal of the California Dental Association* were dedicated to reviewing the scientific basis for CAMBRA, culminating with a consensus statement of national experts and the production of risk assessment forms. The California Dental Association, through the CDA Foundation, has made these journals available to the public at www.cdafoundation.org/journal. These issues of the *Journal* present reviews of the scientific literature on the caries process starting with the infectious nature of the pathogenic bacterial organisms that are part of an extremely complex biofilm community.⁷ These organisms utilize fermentable carbohydrates as an energy source and create small molecule acids that then enter the tooth via diffusion channels between the mineral crystals. The diffusion of acid causes mineral loss below the tooth surface and, if the process is not halted, the surface will cavitate. In the case of a noncavitated lesion, it is possible to halt or reverse the caries process. In this case, using the Caries Balance, the protective factors overcome the pathological factors and remineralization of the lesion is possible and preferred.⁸ Remineralization is the natural repair process for dental caries. Several articles in those *Journals* reviewed the individual chemotherapeutic agents such as xylitol, chlorhexidine, iodine, fluoride, as well

as fluoride releasing dental materials.⁹⁻¹³

More recently, a pivotal randomized clinical trial by Featherstone et al. investigated CAMBRA protocols compared to conventional care.¹⁴ In the intervention group, patients were assessed at levels of caries risk based upon the Caries Balance described previously. Depending upon their risk status, patients were treated with antibacterial therapy (chlorhexidine) to reduce the bacterial challenge and topical fluoride (daily fluoride mouthrinse) to enhance remineralization. The control group received examination, customary preventive care and restoration as needed, but no risk assessment or chemical interventions. Results showed a significant reduction of cariogenic bacteria and future carious lesions in the CAMBRA test group compared to the conventional care control group.¹⁴

Since the science of CAMBRA has been well-cited in the literature, clinicians are increasingly placing this knowledge into practice to the benefit of their patients. This issue of the *Journal* will present ways to incorporate CAMBRA into practice and will be added as a resource to the previously mentioned Web site. Protocols mentioned in this *Journal* are suggestions based on the best available scientific evidence to date as well as clinical practice in offices currently using the CAMBRA approach. It is meant to be a starting point to aid the offices that have not yet incorporated CAMBRA principles. This issue also contains updated risk assessment forms and procedures that should be adopted by those currently utilizing CAMBRA as the changes are based upon experience to date. This effort will continue to be updated as new research science and dental products are incorporated into the dental marketplace.

Why Define Terminology?

Changing paradigms in caries management does not happen without global involvement and collaboration from several sources, including updating terminology to reflect new scientific advances. Existing terminology does not always accurately reflect new advances in science. However, new terminology is not always universally accepted as new concepts are often described with different definitions, names,

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or labels. Some feel there should be globally accepted terminology, while others want the freedom to apply terminology that is more locally accepted. In any case, caries management by risk assessment accurately describes the new paradigm of treating the caries disease process and will be used throughout this *Journal*. Alternative terminology that has been used in the past includes the “medical model” or the “modern management of caries.” The limitations with these terms is that they do not describe the disease process.

CARIES

The term caries has been used to describe a multitude of manifestations, which may lead to confusion if not further defined.¹⁵ For purposes of this *Journal*, caries is defined as an infectious transmissible disease process where a

cariogenic biofilm in the presence of an oral status that is more pathological than protective leads to the demineralization of dental hard tissues.

Any resulting changes, visible on the teeth or not, are merely symptoms of this disease process. Therefore, caries is not a hole in the tooth, cavitation, nor should it be used to describe everything clinically detectable. Throughout this *Journal* there will be clear use of other descriptive terminology when referring to the symptoms of caries such as cavitation, carious lesions, radiographic caries, white or brown spot lesions, infected dentin, affected dentin, and so on.

CAMBRA, MID, AND MI

Minimally invasive dentistry, minimal intervention, and CAMBRA are relatively new terms developed in response to scientific advances in the field. They are used interchangeably by some, and by others a source of debate about which is the most proper term. For example, CAMBRA does not stop at prevention and chemical treatments; it includes evidence-based decisions on when and how to restore a tooth to minimize structural loss. In addition, minimally invasive dentistry and minimal intervention stand for much more than conservative cavity preparation. The term “minimal intervention” was endorsed by the Federation Dentaire Internationale in a 2002 policy statement and is globally recognized.¹⁶ The terms CAMBRA and MID are in 100 percent agreement with the FDI statement on minimal intervention. Thus, the authors support the interchangeability of all three terms and recognize the importance of local preferences as well as global collaboration.

DETECTION VERSUS DIAGNOSIS

Defining the terms detection and diagnosis as it relates to dental caries is best

done by example. Simply put, one *diagnoses* the caries disease but *detects* carious lesions. Detecting a white spot lesion, for example, is not diagnosing the disease of caries because the disease process involved with the lesion could be inactive and the lesion could be remineralized.

PREVENTION VERSUS MANAGING RISK FACTORS

Traditionally, the term “prevention” has become a common language term that has been blanded and simplified to only mean “brush and floss” and “don’t eat sugar.” That advice is historically what many consider when the term is used in the context of caries prevention. Utilizing CAMBRA archetype, managing risk factors is what is done after first performing caries risk assessment. Once the risk factors are identified, then evidence-based treatment decisions can be made to bring the balance of pathologic and protective factors positively back to favor health using an array of behavioral, chemical, minimally invasive surgical, and other techniques. Throughout this issue of the *Journal* the term prevention will be defined as risk factor management (by maximizing protective factors and minimizing pathological factors).

Western CAMBRA Coalition

The Western CAMBRA Coalition is a unique collaboration of diverse groups of independent organizations. This coalition represents an interorganizational collaboration that has evolved over four years and has led to significant progress in the clinical adoption of CAMBRA. The working group, assembled from different aspects of the dental profession, included unofficial representatives of education from all five California dental schools, as well as from Oregon, Washington, Nevada, and

Arizona. Additionally, representatives from research, industry, the California Dental Association Foundation, government, the Dental Board of California, third-party payers, and private practice clinicians were included in the working group. The strategy for including a diverse perspective of individuals was to break the traditional mold where only researchers, educators, and clinicians met for their specialties. The goal was

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to infuse new ideas into the conversation where no existing network for sharing this information existed.

Additionally, the cross-pollination provided support from nontraditional partners to implement changes in caries management. The coalition used this conduit of information based on reciprocity so that those in the network could share information freely and confidentially in the spirit of cooperation, collaboration, and coordination for the common good of improving the standard of caries management.

The coalition has used the World Congress of Minimally Invasive Dentistry annual meeting, attended mostly by clinicians, as a venue to gather each year because CAMBRA is a core value of the WCMID (www.wcmid.com). Recently,

new CAMBRA groups in the Eastern and Central United States have formed and begun to meet with the same agenda and principles as the Western CAMBRA Coalition. The regional groups have agreed to work together and collaborate with the newly formed ADEA Cariology Special Interest Group where opportunities exist.

Standard of Care

Standard of care involves many components and is more than just what a dentist does in his/her own practice, what a dental school teaches, or even what is published in refereed publications. Standards are never static, nor is there always complete agreement on the application. The California legal system defines the standard of care as what a reasonably careful dentist should do under similar circumstances. Reasonable care weighs the benefits versus the risks. If the benefits exceed the risks, then reasonable dentists should adopt these standards. The public expects that dentists and physicians will utilize current scientifically safe and effective practices.

CAMBRA procedures, as presented in this issue of the *Journal*, provide a framework for providing caries management by risk assessment for the benefit and improved dental health of the patient. Explaining the planned treatment to the patient and obtaining informed consent is, of course, necessary as part of this approach, as it is for any procedure. Although the CAMBRA protocols are based on the best available science we have now, there is much more involved in treatment decisions other than just science. As stated previously, the ADA definition of evidence-based dentistry implies that treatment decisions should also consider the clinical expertise of the clinician and, most importantly, the preferences of the fully informed patient just as much

as the science (www.ada.org/prof/resources/topics/evidencebased.asp).

Conclusions

It is the consensus of the Western CAMBRA Coalition that it is best for the profession to position itself for the future and embrace caries management by risk assessment. This means thinking of dental caries as a disease process with the possibility of intervention, arresting the progress of the disease, and even reversing it. Caries risk assessment should become a routine part of the comprehensive oral examination, and the results of the assessment should be used as the basis for the treatment plan.

This issue of the *Journal* provides caries risk assessment and treatment procedures for newborns to age 5 (Ramos-Gomez et al.); caries risk assessment for age 6 through adult (Featherstone et al.); caries management based on risk assessment (Jenson et al.); and dental products available for use in the CAMBRA approach (Spolsky et al.).

In summation, the Western CAMBRA Coalition urges that all dentists implement CAMBRA in their practices for the benefit of their patients and the improved oral health of the nation. The time to do it is now. The tools and rationale are provided in the following pages. ■■■■

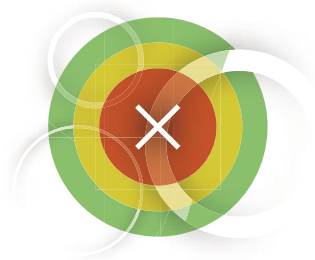
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CONTACT Douglas A. Young, DDS, MS, MBA, University of the Pacific, Arthur A. Dugoni School of Dentistry, 2155 Webster St., Room 400, San Francisco, Calif., 94115.





Caries Risk Assessment Appropriate for the Age 1 Visit (Infants and Toddlers)

FRANCISCO J. RAMOS-GOMEZ, DDS, MS, MPH; JAMES CRALL, DDS, SCD;
STUART A. GANSKY, DRPH; REBECCA L. SLAYTON, DDS, PHD;
AND JOHN D.B. FEATHERSTONE, MSC, PHD

ABSTRACT This article discusses caries management by risk assessment for children age 0-5. Risk assessment is the first step in a comprehensive protocol for infant oral care. The program includes opportunities to establish a “dental home” and provide guidance for improved health outcomes. Risk assessment forms, instructions for use, and guidance-related education points have been included. Collaboration among all health professionals regarding early and timely intervention to promote children’s oral health and disease prevention is emphasized.

AUTHORS

Francisco J. Ramos-Gomez, DDS, MS, MPH, is an associate professor, Department of Orofacial Sciences, Division of Pediatric Dentistry, University of California, San Francisco; CANDO Center to Address Disparities in Children’s Oral Health.

James J. Crall, DDS, SCD, is a professor and chair, Section of Pediatric Dentistry; director, MCHB National Oral Health Policy Center, University of California, Los Angeles, School of Dentistry.

Stuart A. Gansky, DRPH, is an associate professor, Preventive and Restorative Dental Sciences, University of California, San Francisco.

Rebecca L. Slayton, DDS, PHD, is an associate professor, University of Washington, Department of Pediatric Dentistry, Seattle.

John D.B. Featherstone, MSC, PHD, is interim dean, University of California, San Francisco, School of Dentistry, and is a professor, Department of Preventive and Restorative Dental Sciences, at UCSF.

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While the oral health of many children in the United States has improved dramatically in recent years, caries remains the most prevalent chronic childhood disease in the United States — five times more common than asthma.¹⁻³

Early childhood caries is prevalent among young children, particularly in underserved populations. For example, 8 percent of children age 2 to 5 have 75 percent of the caries experience.⁴ Moreover, the 2005 California Oral Health Needs Assessment of Children reported caries in kindergarten and third-grade children as disproportionately affecting children of migrants, in lower socioeconomic strata, and certain racial/ethnic groups such as Hispanics.⁵

INITIAL INFANT ORAL CARE VISIT

Evidence increasingly suggests that to be successful in preventing oral disease,

dentists and other health care professionals must begin preventive interventions in infancy.⁶ The American Dental Association, American Academy of Pediatric Dentistry, and the American Association of Public Health Dentistry currently recommend all children have their first preventive dental visit by 12 months of age.⁷⁻⁹

ESTABLISHMENT OF A DENTAL HOME

Parents and other care providers are encouraged to help every child establish a dental home for early dental care to provide caries risk assessment, education for parents/care givers and anticipatory guidance on the prevention of dental disease.¹⁰ In addition, periodic supervision of care interval (periodicity) should be determined by level of risk.¹¹ The “dental home” concept is derived from the American Academy of Pediatrics’ recommendation that every child should have a “medical home.”¹² The intention of the recommendation is to promote health

care for infants, children, and adolescents that ideally is accessible, continuous, comprehensive, family-centered, coordinated, compassionate, and culturally appropriate.

From the medical point of view, referring a child for an oral examination and risk assessment to a dentist who provides care for infants and young children, starting six months after the first tooth erupts or by 12 months of age, will establish the child's dental home, and provide an opportunity to monitor and implement preventive oral health habits that will meet each child's individual and unique needs. The intent of this effort is to maintain the child's cavity-free status and prevent other oral diseases. For this to become a reality, practicing clinicians must be committed to welcoming these young patients into their practices. If physicians are to refer children at age 1, the practicing dental community must take on the responsibility of being willing and well-prepared to accept them.

BENEFITS OF RISK ASSESSMENT

Risk assessment is an estimation of the likelihood that an event will occur in the future. An individualized caries risk assessment is the first step and an important part of a comprehensive protocol for the infant oral care visit by identifying characteristics that can help the health care providers and parents/caregivers to have a true understanding of the level of caries risk and oral health needs of infants and toddlers. Caries risk assessment guides the clinical decision-making process.¹³⁻¹⁵ Featherstone described a balance between pathological and protective factors that can be swung in the direction of early caries intervention and prevention utilizing the active role of the dentist and allied dental staff.¹⁶ To achieve the best management and outcomes for good dental health, an appropriate caries risk assessment screening must be executed as

early as possible and preferably prior to the onset of the disease process. Caries risk assessment and subsequent management of the disease in children is crucial due to the known fact that caries in the primary dentition is a strong predictor of caries in the permanent dentition.^{17,18}

CARIES MANAGEMENT BY RISK ASSESSMENT

In April 2002, a consensus conference was held in Sacramento, Calif., on caries management by risk assessment. A group

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of experts designed a caries risk assessment, CRA, form and proposed its use based upon the known literature at that time. One form was designed for patients 6-years-old through adulthood, and a second was for patients 0-5. All supporting review articles and summaries from this CAMBRA consensus, as well as the CRA forms and intervention procedures, were published in the *Journal of the California Dental Association* in February and March 2003. They are accessible in their entirety at www.cdafoundation.org/journal.^{19,20} Since then, our group has used and modified the form for infants and toddlers targeting 0-5, and has added a treatment protocol.²¹ Modifications include 0-5 age-specific threshold values for salivary, cariogenic bacterial assays, and both child and maternal caries risk and protective

factors. This article will present the considerably modified form and discuss our experiences with its use, as well as recommendations for managing different risk groups based on their individualized risk assessments. The 6-year-old through adult form is described in detail in a separate article by Featherstone et al. this issue.

Modified Caries Risk Assessment Form (CAMBRA 0-5) Targeted at Infants and Toddlers 0-5 Years-old

Featherstone and colleagues, at the California consensus conference in 2002, proposed that the progression or reversal of dental caries is determined by the balance between caries pathological factors and caries protective factors. The original age 0-5 form was designed to reflect the full range of pathological and protective factors.²⁰ The modified form presented here has been revised to improve ease of use while retaining essential components related to the caries balance.

The CAMBRA 0-5 form is a one-page questionnaire that is designed for use with children age 0-5 in a busy dental practice, and is laid out in a sequence that follows the normal flow from the patient/parent interview through the clinical examination of the child. The modified CAMBRA 0-5 form followed by a one-page revised summary of instructions is provided in **TABLE 1**. The form has interview questions comprising five subgroups:

■ *Caries disease indicators — parent interview.* Disease indicators are observations that indicate the presence of disease symptoms or the presence of an environment that indicates the child is likely to have the disease called dental caries. For example, past dental restorations indicate disease in the past, which most likely is still progressing. The socioeconomic status of the fam-

TABLE 1

CAMBRA for Dental Providers (0-5) Assessment Tool

Caries Risk Assessment Form for Age 0 to 5

Patient name: _____ I.D.# _____ Age _____ Date _____

Initial/base line exam date _____ Caries recall date _____

Respond to each question in sections 1, 2, 3, and 4 with a check mark in the "Yes" or "No" column	Yes	No	Notes
1. Caries Risk Indicators — Parent Interview**			
(a) Mother or primary caregiver has had active dental decay in the past 12 months			
(b) Child has recent dental restorations (see 5b below)			
(c) Parent and/or caregiver has low SES (socioeconomic status) and/or low health literacy			
(d) Child has developmental problems			
(e) No dental home/episodic dental care			
2. Caries Risk Factors (Biological) — Parent Interview**			
(a) Child has frequent (greater than three times daily) between-meal snacks of sugars/cooked starch/sugared beverages			
(b) Child has saliva-reducing factors present, including: 1. Medications (e.g., some for asthma or hyperactivity) 2. Medical (cancer treatment) or genetic factors			
(c) Child continually uses bottle - contains fluids other than water			
(d) Child sleeps with a bottle or nurses on demand			
3. Protective Factors (Nonbiological) — Parent Interview			
(a) Mother/caregiver decay-free last three years			
(b) Child has a dental home and regular dental care			
4. Protective Factors (Biological) — Parent Interview			
(a) Child lives in a fluoridated community or takes fluoride supplements by slowly dissolving or as chewable tablets			
(b) Child's teeth are cleaned with fluoridated toothpaste (pea-size) daily			
(c) Mother/caregiver chews/sucks xylitol chewing gum/lozenges 2-4x daily			
5. Caries Risk Indicators/Factors — Clinical Examination of Child**			
(a) Obvious white spots, decalcifications, or obvious decay present on the child's teeth			
(b) Restorations placed in the last two years in/on child's teeth			
(c) Plaque is obvious on the child's teeth and/or gums bleed easily			
(d) Child has dental or orthodontic appliances present, fixed or removable: e.g., braces, space maintainers, obturators			
(e) Risk Factor: Visually inadequate saliva flow - dry mouth			
**If yes to any one of 1(a), 1(b), 5(a), or 5(b) or any two in categories 1, 2, 5, consider performing bacterial culture on mother or caregiver and child. Use this as a base line to follow results of antibacterial intervention.	Parent/Caregiver Date: _____		Child Date: _____
(a) Mutans streptococci (Indicate bacterial level: high, medium, low)			
(b) Lactobacillus species (Indicate bacterial level: high, medium, low)			
Child's overall caries risk status: (CIRCLE) Extreme	Low	Moderate	High
Recommendations given: Yes _____ No _____	Date given _____	Date follow up: _____	

SELF-MANAGEMENT GOALS 1) _____ 2) _____

Practitioner signature _____ Date _____

Instructions for Caries Risk Assessment Form — Children Age 0-5

1. Answer the questions: Respond to questions 1 to 5 with “yes” or “no” answers. You can make special notations such as the number of cavities present, the severity of the lack of oral hygiene, the brand of fluorides used, the type of bottle contents used, the type of snacks eaten, or the names of medications/drugs that may be causing dry mouth.

2. Determine the overall caries risk of the child: Add up the “yes” answers to the disease indicators/risk factors from caries risk categories 1, 2, and 5. Then add up the number of “yes” answers for the protective indicators/factors identified in categories 3 and 4. Make a judgment as to low, moderate or high overall caries risk based on the balance between the pathological factors (caries disease indicators and risk factors) and the protective factors. **Note:** Determining the caries risk for an individual child requires evaluating both the number as well as the severity of the disease indicators and risk factors. Certainly a child with caries presently or in the recent past is at high risk for future caries. A patient with low bacterial levels would need to have several other risk factors present to be considered at moderate risk. Some judgment is needed while also considering the protective factors to determine the risk.

3. Bacteria testing: If the answer is “yes” to any one of 1(a), 1(b), 5(a), or 5(b) questions regarding parent/caregiver’s recent active decay, or child’s recent restorations, or any obvious white spots, decalcifications or obvious decay; or any two of the questions in 1, 2, 5, consider performing bacterial cultures on parent/caregiver and child (see **notes on the form). See separate “Bacterial Testing” instructions for technique steps. Use the bacterial colony density level (low, medium, or high) to determine who would benefit from antibacterial therapy and to establish a base line to assess the impact of any prescribed antibacterial intervention(s) and whether to carry out antibacterial therapy for the parent/caregiver or child.

4. Plan for caries intervention and prevention: Develop a caries control and management plan for the child and parent/caregiver based on completed assessments incorporating antibacterial therapy and fluoride delivery forms as indicated. (See “CAMBRA Clinical Guidelines for Patients 0-5 Years,” **TABLE 2**.) High caries risk status is generally an indication for the use of both antibacterial therapy and fluoride therapy. If the answer is “yes” to any one of questions regarding the presence of white spots, decalcification or obvious decay on the child’s teeth or parent/child restorations (1(a), 1(b), 5(a), or 5(b)), strongly consider using antibacterial therapy for the parent/caregiver as well as the child. Once strategies have been planned to aggressively deal with caries as a bacterially-based transmissible infection, determine which teeth have cavitation and treatment plan for minimally invasive restorative procedures designed to conserve tooth structure.

5. Home care recommendations: Review with the parent/caregiver the individualized home care recommendations you have selected for them on the “Parent/Caregiver Recommendations for Control of Dental Decay in Children 0-5” form (**TABLE 4**). Use this interaction as an opportunity for a brief patient-centered approach to engage the parent/caregiver in two-way communication on strategies for caries control and management. During this motivational interviewing intervention, ask the parent/caregiver to commit to two goals and note them on the “Self-management goals 1) and 2)” area in the last section of the CAMBRA 0-5 form (**TABLE 1**). Inform the parent/caregiver that you will follow up with them on these goals at the next appointment. Give one copy of the signed recommendations form to the parent/caregiver and keep one in the child’s chart. Point out to the parent/caregiver that the back of the recommendations form includes additional information on “How Tooth Decay Happens” and “Methods of Controlling Tooth Decay” to help them further understand the caries disease process and ways to control it (**TABLE 4**).

6. Bacteria test results: After the inoculated media sticks or culture tubes have incubated for 72 hours (see **TABLE 3** for instructions), determine the colony density level, and inform the parent/caregiver of the results of the bacteria tests. Since showing the parent/caregiver the bacteria grown from their own mouth can be a good motivator, show them the culture tube at the next visit (the culture keeps satisfactorily for some weeks) or provide them with a photograph or digital image of their bacterial colonies. If the parent/caregiver has high cariogenic bacterial counts then work with them to lower their caries risk and get their caries infection under control. The goal is to eliminate this source of infection and reinfection for the child.

7. Follow up: After the parent/caregiver/child has been following your recommendations for three to six months, have them back to reassess how well they are doing. Some practicing clinicians report good motivational success in doing a bacterial culture immediately after the patient’s very first month of antibacterial treatment. Patients need encouragement early on when behavior change is required. Ask them if they are following your instructions and how often. If the bacterial levels were moderate or high initially, repeat the bacterial culture to see if bacterial levels have been reduced by antibacterial therapy. Make changes in your recommendations or reinforce protocol if results are not as good as desired or the parent/caregiver is not cooperating as much as expected. It is very important to inform patients that changing a pathogenic biofilm is not going to happen overnight. In fact, it may take several months to even years in some cases.

ily does not cause dental caries but has been associated strongly with its presence. Low health literacy of the primary caregiver is a good indicator that the environment is conducive to dental caries. Similarly, developmental defects and the absence of a dental home are indicators of a higher likelihood of the presence of dental caries.

■ *Caries risk factors (biological) — parent interview.* These are biological factors that explain why dental caries is in progress and helps us to determine how to arrest or reverse the process. These risk factors include frequency of ingestion of fermentable carbohydrates, sleep habits that provide a continual food source for the bacteria, medications that would reduce salivary flow, and continual bottle use.

■ *Protective factors (nonbiological) — parent interview.* These indicators, obtained during the parent interview, shed light on the possibilities of increasing or enhancing protective practices. Protective factors include such things as whether the mother/caregiver is free of decay (may not have cariogenic bacteria to transmit to the child), and the child's access to regular dental care (dental home).

■ *Protective factors (biological) — parent interview.* These are biological protective factors that can help arrest or reverse dental caries. They include the child's exposure to fluoride, or exposure to calcium phosphate paste or xylitol-based products by the mother/caregiver as well as the child.

■ *Caries disease indicators and risk factors — clinical examination of child.* Disease indicators include clinical observations such as obvious white spot lesions/denudations, obvious decay, and recent restorations. Biological risk factors include quantity of plaque and gingival bleeding (an indicator of heavy plaque),

dry mouth, and the presence of dental/orthodontic appliances. The presence of several disease indicators and risk factors indicates that the health care provider perform a bacterial culture for mutans streptococci and lactobacillus species on both the mother/caregiver and child to assess the need for antibacterial therapy.

A simple visual diagram of the interaction of the disease indicators and risk factors is presented by Featherstone et al. later in this issue of the Journal.

IDENTIFICATION OF
risk factors is essential
to understand why the
disease is where it is,
or whether
it is likely to manifest
symptoms in the future.

Desired Outcomes for the Caries Risk Assessment Form CAMBRA 0-5

The caries risk assessment form has been designed to ensure clear identification of disease indicators and caries risk factors. Identification of risk factors is essential to understand why the disease is where it is, or whether it is likely to manifest symptoms in the future. Risk assessment permits the dental health care provider to determine the balance of protective factors appropriate for the high, moderate, or low caries risk level in an individual. Findings from the child and parent/caregiver assessment regarding caries risk level and reasons for risk can be used to design and implement an intervention strategy that incorporates the appropriate protective factors. This permits the clinician

to use a more targeted approach in the management of the disease process.

IMPLEMENTATION OF CARIES RISK ASSESSMENT FOR CHILDREN 0-5 YEARS-OLD AS PART OF THE INFANT ORAL CARE VISIT

Protocol for a comprehensive CAMBRA 0-5/infant oral care visit includes the following components:

- Parent interview
- Examination of the child
- Assignment of caries risk level
- Individualized treatment based on risk level
- If indicated, bacterial culture on parent or care giver and child
- Show bacterial results to parent/care giver — effective motivator
- Individualized home care recommendations
- Motivational interview/strategies for caries control
- Setting of self-management goals with parent/child
- Anticipatory guidance according to a specific age category
- Determine the interval for periodic re-evaluation (periodicity of examination)
- Collaboration with other health care professionals

The CAMBRA 0-5 assessment components are further described below:

PARENT INTERVIEW

The parent interview before the child is examined will establish the presence of several important risk factors and disease indicators. It will also establish whether protective measures are already in place. If the mother and/or caregiver has active decay, this automatically places the child at high risk due to the high possibility of bacterial transmission and inoculation of the child's mouth at an early stage by the parent/caregiver.

CAMBRA Treatment Guidelines (0-5 years)

Caries Management by Risk Assessment (CAMBRA) Clinical Guidelines for Patients 0-5 years

Risk Level	Saliva Test	Antibacterials	Fluoride	Frequency of Radiographs	Frequency of Periodic Oral Exams (POE)	**** Xylitol and/or Baking Soda	Sealants ***	Existing Lesions
Low risk	Optional (Base line)	Not required or if saliva test was performed; treat main caregiver accordingly	Not required	After age 2: Bitewing radiographs every 18-24 months	Every 6-12 months to re-evaluate caries risk AND ANTICIPATORY GUIDANCE**		Optional	
Moderate risk	Recommended	Not required or if saliva test was performed; treat main caregiver accordingly	OTC fluoride-containing toothpaste twice daily (a pea-sized amount) Sodium fluoride treatment gels/rinses	After age 2: Bitewing radiographs every 12-18 months	Every 6 months to re-evaluate caries risk AND ANTICIPATORY GUIDANCE	Xylitol gum or lozenges Two sticks of gum or two mints four times daily for the caregiver Xylitol food, spray or drinks for the child	Sealants for deep pits and fissures after two years of age. High fluoride ionomer is recommended	Lesions that do not penetrate the DEJ and are not cavitated should be treated with fluoride toothpaste and fluoride varnish
High risk*	Required	Chlorhexidine 0.12% 10 ml rinse for main caregiver of the infant or child for one week each month. Bacterial test every caries recall. Health provider might brush infant's teeth with CHX	Fluoride varnish at initial visit and caries recall exams OTC fluoride-containing toothpaste and calcium phosphate paste combination twice daily Sodium fluoride treatment gel/rinses	After age 2; Two size #2 occlusal films and 2 bitewing radiographs every 6-12 months or until no cavitated lesions are evident	Every 3 months to re-evaluate caries risk and apply fluoride varnish AND ANTICIPATORY GUIDANCE	Xylitol gum or lozenges. Two sticks of gum or two mints four times daily for the caregiver Xylitol food, spray, or drinks for the child	Sealants for deep pits and fissures after two years of age. High fluoride ionomer is recommended	Lesions that do not penetrate the DEJ and are not cavitated should be treated with fluoride toothpaste and fluoride varnish ART might be recommended
Extreme risk*	Required	Chlorhexidine 0.12% 10 ml rinse for one minute daily at bedtime for two weeks each month. Bacterial test at every caries recall Health provider might brush infant's teeth with CHX	Fluoride varnish at initial visit, each caries recall and after prophylaxis or recall exams OTC fluoride-containing toothpaste and phosphate paste combination twice daily Sodium fluoride treatment gel/rinses	After age 2; Two size #2 occlusal films and 2 bitewing radiographs every 6 months or until no cavitated lesions are evident	Every 1-3 months to re-evaluate caries risk and apply fluoride varnish and anticipatory guidance	Xylitol gum or lozenges. Two sticks of gum or two mints four times daily for the caregiver Xylitol food, spray, or drinks	Sealants for deep pits and fissures after two years of age. High fluoride ionomer is recommended	Holding care with glass ionomer materials until caries progression is controlled (ART) Fluoride varnish and anticipatory management goals

* Pediatric patients with one (or more) cavitated lesion(s) are high-risk patients.

* Pediatric patients with one (or more) cavitated lesion(s) and hyposalivary or special needs are extreme-risk patients.

* Pediatric patients with daily medication such as inhalers or behavioral issues will have diminished salivary function.

** Anticipatory guidance – Appropriate discussion and counseling should be an integral part of each visit for care. AAPD

*** ICDA's protocol presented by Jensen et al. this issue may be helpful on sealant decisions.

**** Xylitol is not good for pets (especially dogs).

For all risk levels: Pediatric patients, through their caregiver, must maintain good oral hygiene and a diet low in frequency of fermentable carbohydrates.

Patients with appliances (RPDs, orthodontics) require excellent oral hygiene together with intensive fluoride therapy. Fluoride gel to be placed in removable appliances.

TABLE 3

Bacterial Testing Procedures

Bacterial tests for cariogenic bacteria, mutans streptococci and for lactobacilli species, can readily be done in a dental office or community clinic setting. There are two test kits currently available in the United States for chairside testing that tests for both MS and LB. One is the "Caries Risk Test" (CRT) marketed by Vivadent/Ivoclar (Amherst, N.Y.). The other is the "Dentocult SM" and "Dentocult LB" test, marketed by Edge Dental. Both are sufficiently sensitive to provide a level of low, medium, or high cariogenic bacterial challenge separately for MS and for LB. Each has selective media culture "sticks" that test MS and LB levels in saliva sampled from the patient.

The CRT kit has a single "media stick" with selective media for MS on one side and LB on the other. The Dentocult slides come as two separate sticks. The results obtained from the test sticks from either supplier can also be used as a motivational tool for patient compliance with an anti-bacterial regimen. Another system CariScreen/Caricult (Oral Biotech, Albany Ore.) uses a quick screening and culturing techniques targeting MS. Other bacterial test kits will likely be available in the near future.

The following is the procedure for administering the currently available caries risk test. The kit comes with two-sided selective media sticks that assess mutans streptococci on the blue side and lactobacilli on the green side. A starter kit that includes six "media sticks" in culture tubes, and an incubator is available (Ivoclar catalog #NA 6556001). Although the accompanying manufacturer's instructions recommend 48 hours of incubation, 72-hour incubation seems to give better results.

Procedure steps:

- a. For parent/caregiver and for children old enough to spit (probably 4 or 5 years-old), a bacterial culture should be taken as follows: The subject chews on the chewing gum (wax) provided in the kit for three minutes (accurately timed), and spits all mixed saliva into a measuring beaker. Measure the volume (in ml) and divide by 3 to give ml/minute stimulated saliva flow rate. Normal flow is greater than 1 ml/minute and low is less than 0.7 ml/minute. If the patient is unable to spit, collect a plaque sample using a sterile swab, agitate/vibrate in 2 cc of sterile saline and use the liquid to inoculate the culture tube as below.
- b. Remove the selective media stick from the culture tube. Peel off the plastic sheet covering each side of the stick. Pour the collected saliva over the media on each side until it is entirely wet.
- c. Place one of the sodium bicarbonate tablets (included with the kit) in the bottom of the tube.
- d. Replace the media stick in the culture tube, screw the lid on and label the tube with the patient's name, number, and date.
- e. Place the tube in the incubator at 37 degrees Celsius for 72 hours. (Incubators suitable for a dental office are sold by the company.)
- f. Remove the culture tube from the incubator after 72 hours and compare the densities of bacterial colonies with the pictures provided in the kit indicating relative mutans streptococci and lactobacilli bacterial levels, ranging from low to high. Colony densities in the middle of the range are medium. (The dark blue agar is selective for MS and the light green agar is selective for LB.) Record the level of bacterial challenge in the patient's chart as low, medium, or high.

Bacteria Testing for Young Children: Children age 0-3 are difficult to culture reliably in the fashion described previously. However, a good approximate indication for the child can be obtained by using a cotton swab to sample the surfaces of all teeth and gums in the mouth, thoroughly dispersing the sample in about 1 to 2 ml of sterile saline in a test tube (Fisher Scientific), and dispersing it for 1 minute on a laboratory vortex (Fisher Scientific, catalog 12-813-52). The suspension is then coated on the CRT stick as described previously for saliva samples and incubated for 72 hours. This will give a good estimate of the MS and LB challenge in the young child.²⁵ If this is not possible for whatever reason, the bacterial levels of the parent/caregiver could be used as a rough estimate of the child's likely bacterial challenge.

EXAMINATION OF THE CHILD

The examination of the child will complete the risk factor/disease indicator list. If the child has obvious decalcification (white spots) or cavities, this places the child at high risk for future cavities because caries can progress rapidly at this age.

ASSIGNMENT OF CARIES RISK LEVEL

Once the risk factors list has been checked (TABLE 1), the provider summarizes them and assigns a caries

risk level (low, moderate, or high). As stated previously, active decay in the parent/caregiver or in the child automatically places the child at high risk, signaling the need for antibacterial intervention and fluoride treatment for both parent/caregiver and child.

INDIVIDUALIZED TREATMENT BASED ON RISK LEVEL

An individualized treatment plan for each infant/caregiver is determined by items checked during the interview

process and the clinical examination of the child. A dual approach is essential for moderate and high caries risk children and their parent/caregivers. Strategies need to be employed to modify the maternal/caregiver transmission of cariogenic bacteria to infants through the potential use of chlorhexidine rinse, fluoride varnish, and xylitol-based products.

BACTERIAL CULTURE

If assessments reveal the presence of high-risk factors/indicators, providers

should consider performing a bacterial culture on the parent or caregiver and child. The salivary assay results should be shown to the parent/caregivers because seeing the bacterial growth may motivate behavioral change for them and their children. If the parents/caregivers have high cariogenic bacterial counts they should be advised to seek appropriate dental care to reduce their caries risk and control their caries by eliminating the infection source and reducing the early infant inoculation.

Relatively low bacterial levels have been demonstrated in several studies to be significantly associated with early demineralization and dental caries in infants and toddlers.^{23,24} As presented recently, children with significant levels of mutans streptococci and any level of lactobacilli were at greatest risk for developing early childhood caries.²⁴

INDIVIDUALIZED HOME CARE RECOMMENDATIONS

Home care recommendations are provided at the end of the infant oral care visit based on all information gathered through the assessment process. **TABLE 4**, first page for a “Parent/Caregiver Recommendations for Control of Dental Decay in Children 0-5 Years” form that includes a checklist for suggested home caries interventions and **TABLE 4**, second page, presents the suggested information designed to provide the parent or caregiver and patient with a simplified description of the dental decay process — “How Tooth Decay Happens,” as well as “Methods of Controlling Tooth Decay” (designed for the back page of the home care recommendations form).

MOTIVATIONAL INTERVIEWING AND STRATEGIES FOR CARIES CONTROL

Dental professionals can enhance the effectiveness of their preventive

communication by focusing on a patient-centered brief counseling approach called motivational interviewing.²⁶ Motivational interviewing relies on two-way communication that includes the following steps: establishing a therapeutic alliance (rapport and trust); asking questions to help parents identify the problem and listening to what they say; encouraging self-motivational statements; preparing for

WHEN PARENTS
hear themselves
acknowledging a problem
and voicing their
commitment to
solve the problem,
action is facilitated.

change (discussing the hurdles that interfere with action); responding to resistance; and scheduling follow-up, as well as preparing the parent for the inevitable bumps in the road. A patient/parent-centered approach to health promotion and caries prevention is showing promise in getting parents to engage in preventive parenting practices.²⁷ The more parents talk about their intent to act or change and their optimism, the better. When parents hear themselves acknowledging a problem and voicing their commitment to solve the problem, action is facilitated.²⁷ Peltier, Weinstein, and Fredekind discuss behavioral issues in greater detail later in the next issue of the *Journal*.²⁸

SETTING SELF-MANAGEMENT GOALS WITH PARENT AND CHILD

Following the brief motivational interviewing (counseling), the parent/caregiver is asked to select two self-management goals or recommendations as their assignments before the next re-evaluation dental visit. The parent/caregiver is asked to commit to the two goals selected and is informed that the oral health care providers will follow-up on those goals with them at the next appointment. (See **TABLE 5** for “Self-management Goals for Parent/Caregiver” with patient confidence scale and patient commitment signature section.)

How Tooth Decay Happens

Tooth decay is caused by certain types of bacteria (bugs) that live in your mouth. When they stick to the film on your teeth called dental plaque, they can do damage. The bacteria feed on what you eat, especially sugars (including fruit sugars) and cooked starch (bread, potatoes, rice, pasta, etc.). Within about five minutes after you eat or drink, the bacteria begin making acids as they digest your food. These acids can break into the outer surface of the tooth and melt away some of the minerals. Your spit can balance the acid attacks, as long as the acid attacks don't happen very often. However if: 1) your mouth is dry; 2) you have a lot of these bacteria; or 3) you snack frequently, then the acid causes loss of tooth minerals. This is the start of tooth decay and leads to cavities.

Methods of Controlling Tooth Decay

Diet: Reducing the number of sugary and starchy foods, snacks, or drinks can help reduce tooth decay. That does not mean you can never eat these types of foods. You should limit the number of times you eat these foods between main meals. A

TABLE 4

Parent/Caregiver Recommendations Form

Parent/Caregiver Recommendations for Control of Dental Decay in Children 0-5 Years

Daily Oral Hygiene/Fluoride Toothpaste Treatment

(These procedures reduce the bacteria in the mouth and provide a small amount of fluoride to guard against further tooth decay as well as to repair early decayed areas.)

- _____ Brush child's teeth with a fluoride-containing toothpaste (small smear or pea-sized amount on a soft small infant-sized toothbrush) twice daily (gently brushed by parent or caregiver)
- _____ Selective daily flossing of areas with early caries (white spots)
- _____ Other: _____

Diet

(The aim is to reduce the number of between-meal sweet snacks that contain carbohydrates, especially sugars. Substitution by snacks rich in protein, such as cheese will also help.)

- _____ OK as is
- _____ Limit bottle/nursing (to avoid prolonged contact of milk with teeth)
- _____ Replace juice or sweet liquids in the bottle with water
- _____ Limit snacking (particularly sweets)
- _____ Replace high carbohydrate snacks with cheese and protein snacks
- _____ Other _____

Xylitol (Parent/caregivers)

Xylitol is a sweetener that the bacteria cannot feed on. Using xylitol-containing chewing gum or mints/lozenges is a way that parents/caregivers of high-risk children can reduce the transfer of decay-causing bacteria to their baby/toddler. This is most effective when used by the parent/caregiver starting shortly after the child's birth. Parents/caregivers with dental decay place their children at high risk for early childhood caries. Xylitol is not good for pets (especially dogs).

- _____ Parents/caregivers of children age 3 and under with high bacterial levels should use xylitol mints/lozenges or xylitol gum two to four times daily.

Antibacterial Rinse (Parents/caregivers)

(In addition, parents/caregivers of high-risk children may require antibacterial treatment to decrease the transmission of cariogenic bacteria and lessen the infant/child's risk of early childhood caries.)

- _____ Parents/caregivers of children age 3 and under with high bacterial levels should rinse with 10 ml of chlorhexidine gluconate 0.12 percent (Periogard, Peridex, Oral Rx by prescription only). Rinse at bedtime for 1 minute 1x/day for one week. Repeat each month for one week until infection is controlled. Separate by one hour from fluoride use. Continue for six months or until bacterial levels remain controlled.

Practitioner signature _____ Date _____

Parent/caregiver signature _____ Date _____

TABLE 5

Self-management Goals for Parent/Caregiver

Patient Name _____ DOB _____



Regular dental visits for child



Family receives dental treatment



Healthy snacks



Brush with fluoride toothpaste at least twice daily



No soda



Less or no juice



Wean off bottle (At least no bottle for sleeping)



Only water or milk in sippy cup



Chew gum with xylitol



Drink tap water



Less or no candy and junk food

IMPORTANT:
The last thing that touches your child's teeth before bedtime is the toothbrush with fluoride toothpaste.

Circle the goals you will focus on between today and your next visit.

On a scale of 1-10, how confident are you that you can accomplish the goals? 1 2 3 4 5 6 7 8 9 10

Not likely

Definitely

My promise: I agree to the goals circled and understand that staff may ask me how I am doing with my goals.

Date: _____ Signed by: _____

Review Date: _____ Comments: _____ Staff Initials: _____

Review Date: _____ Comments: _____ Staff Initials: _____

good rule is three meals per day and no more than three snacks per day.

Fluorides: Fluorides help to make teeth stronger and to protect against tooth decay, and to heal tooth decay if it has not gone too far. Fluorides are available from a variety of sources such as drinking water, toothpaste, and rinses you can buy in the supermarket or drug store. They may also be prescribed by your dentist or applied in the dental office. Daily use of fluoride is very important to help protect against the acid attacks.

Plaque Removal: Plaque is a yellowish film that sticks to the surface of teeth. Toothbrushing removes plaque and should be done twice every day. Bacteria live in plaque, so removing the plaque from your teeth on a daily basis helps to control tooth decay. Plaque is very sticky and may be hard to remove from between the teeth and in grooves on the biting surfaces of back teeth. If your child has an orthodontic retainer be sure to remove it before brushing your child's teeth. Brush all surfaces of the retainer also.

Spit: Spit (saliva) is important for healthy teeth. It balances acids and provides other ingredients that protect the teeth. If one cannot brush after a meal or snack, one can chew sugar-free gum. This will stimulate the flow of saliva to help reduce the effect of acids. Sugar-free candy or mints can also be used, but some of these contain acids themselves. Acids in sugar-free candy will not cause tooth decay, but can slowly dissolve the tooth surface over time (a process called erosion). Some sugar-free gums are made to help fight tooth decay. Some gums contain baking soda that neutralize the acids produced by the bacteria in plaque.

Gum that contains xylitol as its first listed ingredient is the gum of choice. This type of gum has been shown to

protect against tooth decay and to reduce the decay causing bacteria.

Antibacterial mouthrinses: Rinses that your dentist can prescribe are able to reduce the number of bacteria that cause tooth decay and can be useful in patients at high risk for tooth decay. These rinses are only recommended for children who can rinse and spit.

Sealants: Sealants are plastic or glass ionomer coatings bonded onto the

ACIDS IN SUGAR-FREE
candy will not
cause tooth decay,
but can slowly dissolve
the tooth surface
over time (a process
called erosion).

biting surfaces of back teeth to protect the deep grooves from decay. In some people the grooves on the surfaces of the teeth are too narrow and deep to clean with a toothbrush. They may decay even if you brush them regularly. Sealants are an excellent preventive measure used for children and young adults at risk for this type of decay. They do not last forever and should be inspected once a year and prepared if needed.

ANTICIPATORY GUIDANCE (EARLY PARENTAL EDUCATION AND TIMELY INTERVENTION AND/ OR REFERRAL)

In addition to caries risk assessment and parent/caregiver commitment to specific caries prevention self-manage-

ment goals, the infant oral care appointment should include anticipatory guidance about age-specific, oral hygiene, growth and development issues (i.e., teething, digit, or pacifier habits), oral habits, diet, and nutrition and injury prevention. See **TABLE 6** for "Age-specific Anticipatory Guidance Table" for the age categories of prenatal, birth to first year, 2- to 3-years-old, and for the child age 3 to 5. The anticipatory guidance approach is designed to take advantage of time-critical opportunities to implement preventive health practices and reduce the child's risk of preventable oral disease.²⁹

DETERMINE THE INTERVAL FOR PERIODIC RE-EVALUATION (PERIODICITY OF EXAMINATION)

The clinician must consider each infant and child's individual needs and caries risk assessment to determine the appropriate interval and frequency for oral examination.²⁹ Some infants and toddlers with white spot lesions and caregivers with high-risk behaviors should be re-evaluated on a monthly basis. Most children at high risk should be seen on a three-month interval for re-evaluation; those in the moderate risk category should be placed on a six-month interval and the low-risk child at a six- to 12-month range interval. At each of these infant oral care visits, it is essential to reassess the risk status and monitor improvement on the previously set self-management goals.

If the bacterial levels were moderate or high initially, repeat the bacterial culture to see if bacterial levels have been reduced by the antibacterial therapy recommended to the parent/caregiver and the multiple fluoride varnish applications on the infant. Make changes in recommendations or keep reinforcing the protocol if results are not as good as desired, or the

TABLE 6

Age-Specific Anticipatory Guidance (from Ramos-Gomez, reference 21)

	PRENATAL	BIRTH TO ONE YEAR	TWO TO THREE YEARS	THREE TO FIVE YEARS
Take home message for caregivers	<ul style="list-style-type: none"> • Baby teeth are important. • Parents'/caregivers' oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-up and get treatment if necessary. • Schedule child's first dental appointment by age 1. • Use of fluorides, including toothbrushing with fluoride toothpaste, is the most effective way to prevent tooth decay. 	<ul style="list-style-type: none"> • Baby teeth are important. • Parents'/caregivers' oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-up and get treatment if necessary. • Parents/caregivers should avoid sharing with their child things that have been in their mouths. • Schedule child's first dental appointment by age 1. • Prevention is less costly than treatment. • Use of fluorides, including toothbrushing with fluoride toothpaste, is the most effective way to prevent tooth decay. 	<ul style="list-style-type: none"> • Baby teeth are important. • Parents'/caregivers' oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-up and get treatment if necessary. • Parents/caregivers should avoid sharing with their child things that have been in their mouths. • Schedule child's first dental appointment by age 1. • Prevention is less costly than treatment. • Use of fluorides, including toothbrushing with fluoride toothpaste, is the most effective way to prevent tooth decay. 	<ul style="list-style-type: none"> • Baby teeth are important. • Parents'/caregivers' oral health affects child's overall health. • Parents/caregivers should obtain regular dental check-up and get treatment if necessary. • Parents/caregivers should avoid sharing with their child things that have been in their mouths. • Prevention is less costly than treatment. • Use of fluorides, including toothbrushing with fluoride toothpaste, is the most effective way to prevent tooth decay.
Oral health and hygiene	<ul style="list-style-type: none"> • Encourage parents/caregivers to obtain dental check-up and, if necessary, treatment before birth of baby to reduce cavity-causing bacteria that can be passed to the baby. • Encourage parents/caregivers to brush teeth with fluoride toothpaste. 	<ul style="list-style-type: none"> • Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce spread of bacteria that can cause tooth decay. • Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths. • Encourage parents/caregivers to become familiar with the normal appearance of child's gums. • Emphasize using a washcloth or toothbrush to clean teeth and gums with eruption of the first tooth. • Encourage parents/caregivers to check front and back teeth for white, brown, or black (signs of cavities). 	<ul style="list-style-type: none"> • Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce spread of bacteria that can cause tooth decay. • Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths. • Review parent's/caregiver's role in brushing toddler's teeth. • Discuss brush and toothpaste selection. • Problem solve on oral hygiene issues. • Schedule child's first dental visit by age 1. 	<ul style="list-style-type: none"> • Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce spread of bacteria that can cause tooth decay. • Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths. • Discuss parents/caregivers continued responsibility to help children under age 8 to brush their teeth. • Encourage parents/caregivers to consider dental sealants for primary and first permanent molars.
Oral development	<ul style="list-style-type: none"> • Describe primary tooth eruption patterns (first tooth usually erupts between 6-10 months old). • Emphasize importance of baby teeth for chewing, speaking, jaw development and self-esteem. 	<ul style="list-style-type: none"> • Discuss primary tooth eruption patterns. • Emphasize importance of baby teeth for chewing, speaking, jaw development and self-esteem. • Discuss teething and ways to soothe sore gums, such as chewing on teething rings and washcloths. 	<ul style="list-style-type: none"> • Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem. • Discuss teething and ways to soothe sore gums, such as teething rings and washcloths. 	<ul style="list-style-type: none"> • Emphasize importance of baby teeth for chewing, speaking, and jaw development.

TABLE 6

Age-Specific Anticipatory Guidance (from Ramos-Gomez, reference 21) *continued*

	PRENATAL	BIRTH TO ONE YEAR	TWO TO THREE YEARS	THREE TO FIVE YEARS
Fluoride adequacy	<ul style="list-style-type: none"> • Evaluate fluoride status in residential water supply. • Review topical and systemic sources of fluoride. • Encourage mother to drink fluoridated tap water. 	<ul style="list-style-type: none"> • Evaluate fluoride status of residential water supply. • Review topical and systemic sources of fluoride. • Encourage drinking fluoridated tap water. • Consider topical needs (e.g., toothpaste, fluoride varnish). 	<ul style="list-style-type: none"> • Re-evaluate fluoride status of residential water supply. • Review topical and systemic sources of fluoride. • Encourage drinking fluoridated tap water. • Review need for topical fluorides. 	<ul style="list-style-type: none"> • Re-evaluate fluoride status in residential water supply. • Review sources of fluoride. • Review need for topical or other fluorides..
Oral habits	<ul style="list-style-type: none"> • Encourage mother to stop smoking. 	<ul style="list-style-type: none"> • Encourage breastfeeding. • Advise mother that removing child from breast after feeding and wiping baby's gums/teeth with damp washcloth reduces the risk of ECC. • Review pacifier safety. 	<ul style="list-style-type: none"> • Remind mother that removing child from breast after feeding and wiping baby's gums/teeth with damp washcloth reduces the risk of ECC. • Begin weaning of non-nutritive sucking habits at 2. 	<ul style="list-style-type: none"> • Discuss consequences of digit sucking and prolonged non-nutritive sucking (e.g. pacifier) and begin professional intervention if necessary.
Diet and nutrition	<ul style="list-style-type: none"> • Emphasize eating a healthy diet and limiting number of exposures to sugar snacks and drinks. • Emphasize that it is the frequency of exposures, not the amount of sugar that affects susceptibility to caries. • Encourage breastfeeding. • Remind parents/caregivers never to put baby to bed with a bottle with anything other than water in it or to allow feeding 'at will'. 	<ul style="list-style-type: none"> • Remind parents/caregivers never to put baby to bed with a bottle with anything other than water in it or allow feeding 'at will'. • Emphasize that it is the frequency of exposures, not the amount of sugar that affects susceptibility to caries. • Encourage weaning from bottle to cup by 1 year of age. 	<ul style="list-style-type: none"> • Remind parents/caregivers never to put baby to bed with a bottle or allow feeding 'at will'. • Discuss healthy diet and oral health. • Emphasize that it is the frequency of exposures, not the amount of sugar that affects susceptibility to caries. • Review snack choices and encourage healthy snacks. 	<ul style="list-style-type: none"> • Review and encourage healthy diet. • Remind parents/caregivers about limiting the frequency of exposures to sugar. • Review snacking choices. • Emphasize that child should be completely weaned from bottle and drinking exclusively from a cup.
Injury prevention	<ul style="list-style-type: none"> • Review child-proofing of home including electrical cord safety and poison control. • Emphasize use of properly secured car seat. • Encourage caregivers to keep emergency numbers handy. 	<ul style="list-style-type: none"> • Review child-proofing of home including electrical cord safety and poison control. • Emphasize use of properly secured car seat. • Encourage caregivers to keep emergency numbers handy. 	<ul style="list-style-type: none"> • Review child-proofing of home including electrical cord safety and poison control. • Emphasize use of car seat. • Emphasize use of helmet when child is riding tri/bicycle or in seat of adult bike. • Remind caregivers to keep emergency numbers handy. 	<ul style="list-style-type: none"> • Emphasize use of properly secured car seat. • Have emergency numbers handy. • Encourage safety in play activities including helmets on bikes and mouthguards in sports. • Remind caregivers to keep emergency numbers handy.

parent/caregiver is not cooperating. Many have reported value in bacterial testing after the first month of antibacterial treatment. By doing so it motivates patients to keep on the regimen when they see positive results. Pathogenic biofilms do not change immediately and patients/caregivers should be informed that it could take months or years to re-establish a healthy normal flora in the family unit.

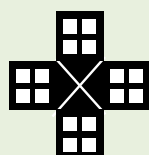
COLLABORATION

The overall objective of the *Journal of the California Dental Association's* February and March 2003 issues and current documents in this issue on caries management by risk assessment is to reduce or eradicate dental caries in children in every county, community, and culture in California by the year 2010.^{19,20} It will take a cross-disciplinary approach among

medicine, dentistry, nursing, and other agencies that affect dental health to reach that objective. In order to support collaborative approaches, to more aggressively deal with dental caries as a bacterially based transmissible disease, instruments have been developed specifically for medical/nondental professionals to provide appropriate tools (TABLE 7 — "Medical CAMBRA Risk Assessment Form 0-5

CAMBRA Form for Medical Providers (0-5 year patients), Assessment Tool

(Adapted from UCSF/San Francisco General Hospital Department of Family and Community Medicine.)



Family Health Center
Pediatric Oral Health Screening
Progress Notes

Name
DOB
Community Health Network
San Francisco General Hospital
Medical Center

MRN
PCP
Patient ID/Addressograph

MEDICAL CAMBRA RISK ASSESSMENT FORM 0 TO 5 INFANTS & TODDLERS

Chief complaint or reason for referral ☐ Initial

☐ Follow-up

Caries risk indicators — based on parent interview	Y	N	Notes
(a) Mother/ primary caregiver has had active dental decay in past 12 months			
(b) Older siblings with history of dental decay			
(c) Continual use of bottle containing beverages other than water/milk. Bottle use > 24 months old.			
(d) Child sleeps with a bottle or nurses on demand			
(e) Frequent (greater 3x/day total) candy, carbohydrate snacks (junk food), soda, sugared beverages (including processed juice)			
(f) Medical Issues 1. Saliva-reducing meds (asthma, seizure, hyperactivity etc.) 2. Developmental problems etc. 3. H/O anemia or Fe+ Rx:			
Protective factors — based on parent interview	Y	N	Notes
(a) Child lives in fluoridated community AND drinks tap water daily			
(b) Teeth cleaned with fluoride toothpaste (pea-size) daily			
(c) Fluoride varnish applied to child's teeth in last 6 months			
Oral examination	Y	N	
Obvious white spots (decalcifications), or obvious decay present on the child's teeth: NOTE ON DIAGRAM			
(b) Plaque is obvious on the teeth and/or gums bleed easily ECC (Early Childhood Caries) Diagnosis: <input type="checkbox"/> No visible Early Childhood Caries (ECC) <input type="checkbox"/> Non-cavitated ECC <input type="checkbox"/> Cavitated ECC			
Assessment: Child's caries risk status (cavities in the mother/caregiver, white spots or cavities in the child indicate high caries risk. The balance between the checked shaded areas (risk indicators) and the checked un-shaded areas (protective factors) provides the risk status as high or low): <input type="checkbox"/> LOW <input type="checkbox"/> HIGH			
Plan: <input type="checkbox"/> Health education handouts <input type="checkbox"/> Self-management Goals 1. _____			
<input type="checkbox"/> Dispense fluoride toothpaste and toothbrush <input type="checkbox"/> Prophylaxis and fluoride varnish <input type="checkbox"/> FHC Oral Health Clinic follow-up appointment (high risk) _____ months <input type="checkbox"/> Urgent outside dental referral (high risk, needs tracking) <input type="checkbox"/> Routine dental referral for dental home (all others)			

Signature of Rendering Provider: _____ Name: _____ CHN # _____

Supervising Attending: _____ CHN # _____ Date of Service: _____

Infants & Toddlers/Self-management Goals”) to assess and assist infants/toddlers and their caregivers according to their caries risk status. Please share this form with your medical colleagues.

Traditionally, the first contact an infant has with a health care provider is with the pediatrician or family health care practitioner. It is therefore crucial these practitioners be trained to identify children at high risk for caries. There is some evidence these providers have knowledge in early dental preventive interventions.^{30,31} Some effective caries control programs have been addressed by Rozier and colleagues where they demonstrated that nondental professionals were able to successfully integrate preventive dental services into their practices.³² However, Ismail et al. concluded that a majority of United States physicians do not screen for early signs of early childhood caries nor do they look for white spot lesions which are the precursors of cavitation.³³

It is our ethical and moral responsibility to ensure the best prevention management model for this vulnerable group of young children. By being proactive on prevention, we can surely decrease the prevalence of early childhood caries and ensure healthy kids with healthy smiles.³⁴

Summary

Determining a child’s caries risk level (high, moderate, low) is the primary goal of utilizing an appropriate caries risk assessment instrument that is age specific. The caries risk assessment process for the infant/toddler is comprised of parent/caregiver interview, examination of the child, assignment of caries risk level, and bacterial cultures, if indicated. Completing a caries risk assessment (CAMBRA 0-5) is the critical element in the infant oral care visit and vital com-

ponent of caries management. Once risk level is determined, the provider develops an individualized treatment plan, customizes home care recommendations, engages the parent/caregiver in the process by conducting a motivational interview, involves the parent/caregiver in setting their self-management goals, educates the parent/caregiver about age-specific interventions for prevention (anticipatory guidance), and determines

**A MAJORITY OF
United States physicians
do not screen for early
signs of early childhood
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which are the precursors
of cavitation.**

the interval for periodic re-evaluation.

In order to effectively treat early ECC, we need to treat the disease rather than just the results of the disease. Rather than abdicating the responsibility for addressing this growing epidemic to the pediatric dental specialists, the profession must expand the approach to infant/toddler caries risk assessment and prevention to include general dental practices as well as medical care providers. As stated previously, the study by Ismail and colleagues found that although physicians in the United States would refer a child with a high caries risk level for a dental visit, the majority of respondents did not regularly screen for signs of ECC. Expansion of opportunities for addressing ECC also means increasing risk assess-

ment awareness among public health programs and community clinics as well.

Dental providers need to be trained and educated to utilize an age-appropriate risk assessment tool that can assist them to monitor and manage their patients individually and effectively to prevent future dental disease for their pediatric population. In addition, physicians, as well as other nondental providers, need to be trained and educated in appropriate screening, risk assessment of infants and toddlers and referral to a dental home.

Further information to assist in expansion of related knowledge and skills may be found on the “First Smiles” Web site, www.first5oralhealth.org, part of a statewide oral health initiative funded by First 5 California and managed by the California Dental Association Foundation and the Dental Health Foundation regarding oral health of children 0-5.³⁴ Web site resources include complementary continuing education courses (2 C.E. units) designed specifically for dental and medical professionals to address the “silent epidemic” of ECC affecting children age 0-5.

The program reflects changes in the modern management of caries and improved diagnosis of noncavitated, incipient lesions and treatment for prevention and arrest of these lesions.³⁵ Additional skills emphasized for the initial infant oral care visit (within six months of eruption of the first tooth and no later than 12 months of age) include: infant/toddler positioning (knee to knee exam), when to treat/refer, parent/caregiver education and managing behavior of very young children.

The authors have provided caries risk assessment forms (CAMBRA 0-5) for dental and medical (nondental) providers as models for use or modification. The one-page forms are designed for use with infants/toddlers age 0-5. Instructions for

the clinician have been included to guide the health care providers through the risk assessment process. Supplemental forms for use following caries risk assessment (CAMBRA o-5) are included as well. For example, once the pathological and protective factors are assessed to determine if the patient is at risk of progression or initiation of dental caries, decisions need to be made regarding indications for bacterial cultures, and home care recommendations for the parent/caregiver and child. With this easily identifiable information, both health care providers and guardians can be made aware of the treatment needs, set self-management goals, anticipate age-specific concerns, as well as refer the child to the correct resources and, most importantly, prevent the development of future dental disease. ■■■■

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TO REQUEST A PRINTED COPY OF THIS ARTICLE, PLEASE CONTACT Francisco J. Ramos-Gomez, DDS, MS, MPH, Department of Orofacial Sciences, Division of Pediatric Dentistry, University of California, San Francisco, 707 Parnassus Ave., Box 0753, Room D1021, San Francisco, Calif., 94143.