CAMBRA: Best Practices in Dental Caries Management

A Peer-Reviewed Publication
Written by Michelle Hurlbutt, RDH, MSDH

Abstract
The current approach to dental caries focuses on modifying and correcting factors to favor oral health. Caries management by risk assessment (CAMBRA) is an evidence-based approach to preventing or treating dental caries at the earliest stages. Caries protective factors are biologic or therapeutic measures that can be used to prevent or arrest the pathologic challenges posed by the caries risk factors. Best practices dictate that once the clinician has identified the patient’s caries risk (low, moderate, high or extreme), a therapeutic and/or preventive plan should be implemented. Motivating patients to adhere to recommendations from their dental professionals is also an important aspect in achieving successful outcomes in caries management. Along with fluoride, new products are available to assist clinicians with noninvasive management strategies.

Learning Objectives
The overall goal of this course is to provide the reader with information on CAMBRA and dental caries management. On completion of this course the reader will be able to do the following:
1. Analyze the principles of caries management by risk assessment.
2. Recognize the value of performing a caries risk assessment on patients.
3. Describe and differentiate between clinical protocols used to manage dental caries.
4. Identify dental products available for patient interventions using CAMBRA principles.

Author Profile
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Michelle Hurlbutt is an Assistant Professor in the Department of Dental Hygiene, Loma Linda University School of Dentistry where she teaches pharmacology and nutrition courses. She is also the Director of Loma Linda University’s online BSDH degree completion program, where she teaches research and cariology courses. Michelle is the 2010-2011 co-chair of the Western CAMBRA Coalition.

Author Disclosure
Michelle Hurlbutt does not have a leadership position or a commercial interest with Ivoclar Vivadent, the commercial supporter of this course, or with products and services discussed in this educational activity.

CE Planner Disclosure: Michelle Fox, CE Coordinator does not have a leadership or commercial interest with Ivoclar Vivadent, the commercial supporter, or with products or services discussed in the educational activity.

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Registration: The cost of this CE course is $59.00 for 3 CE credits.

Requirements for Successful Completion: To obtain 3 CE credits for this educational activity you must pay the required fee, review the material, complete the course evaluation and obtain a score of at least 70%.

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Caries Balance Concept

The Caries Balance/Imbalance model was created to represent the multifactorial nature of dental caries disease and to emphasize the balance between pathological and protective factors in the caries process.16-18 If pathological factors outweigh protective factors, the caries disease process progresses. This is a dynamic and delicate balance, tipping either way several times a day. Progression or reversal of caries disease is determined by the imbalance/balance between disease indicators and risk factors on one side and the competing protective factors on the opposite.

Disease Indicators

Caries disease indicators are described as physical signs of the presence of current dental caries disease or past dental caries disease history and activity. These indicators do not speak to what initially caused the disease or how to treat the disease once it is present, but rather serve as strong predictors of dental caries continuing unless therapeutic intervention is implemented.19 The Caries Imbalance model uses the acronym WREC (‘pronounced 'wreck') to describe the following four disease indicators:

- White spots visible on smooth surfaces
- Restorations placed in the last three years as a result of cavitation
- Enamel approximal lesions (confined to enamel only) visible on dental radiographs
- Cavitation of caries lesions showing radiographic penetration into the dentin

Patient Examination

These findings are obtained from the patient interview and clinical examination. The CAMBRA philosophy advocates the detection of the carious lesion at the earliest possible stage before it penetrates the enamel. The goal is to prevent the subsequent restoration needs. Thus, the accurate detection and diagnosis of noncavitated carious lesions are high priorities. The most commonly used method for detecting carious lesions is visual-tactile inspection. This type of examination is not able to detect the surface roughness of noncavitated lesions; therefore, before cavitation or for subsequent restoration needs is required. Thus, the accurate detection and diagnosis of noncavitated carious lesions are high priorities.

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Clinical value in restoring the lesion. Traditional radiographic information about lesion activity. If a lesion is small and not for lesion detection is the fact that a radiograph will not give access for assessment using direct visual or tactile methods. Traditional radiographic images also tend to underestimate the actual lesion depth and cannot accurately identify early enamel carious lesions.29 Some clinicians are starting to use temporary elastic tooth separation to visually confirm the status of the approximal surfaces, used because these surfaces cannot be accessed for assessment using direct visual or tactile methods. Digital radiography has been shown to provide a slight but not statistically significant advantage in lesion detection compared with traditional film radiography.20,21 Noninvasive, non-radiation, light-emitting technologies have been developed that are designed to serve as adjuncts to the traditional visual-tactile methods of detection. Some of these technologies include fiber-optic transillumination (FOTI and DIFOTI), electronic caries monitors, quantitative light-induced fluorescence, diode laser fluorescence, and LED light reflectance and refraction. While many of these technologies tout higher precision in carious lesion detection than traditional visual-tactile and radiographic methods, it is important for clinicians to not rely solely on these modalities and to continue to use their clinical experience and judgment in their diagnosis.22

Despite advances, the reliable and reproducible detection of carious lesions by clinical examination continues to be a challenge for both clinicians and researchers. In response to the lack of a universally accepted carious lesion detection system, a group of cariologists and epidemiologists created the International Caries Detection Assessment System (ICDAS) in 2002 in Scotland.23 This visual system was developed as a detection system for occlusal carious lesions, with a two-digit coding system: The first digit (0–9) identifies the tooth status, and the second digit (0–4) describes the severity of the carious lesion (Table 2). ICDAS has been shown to be a valid system for describing and measuring different degrees of severity of carious lesions as well as having a significant correlation between lesion depth and histological examination.22-26 The examination protocol requires plaque to be removed from tooth surfaces prior to inspection, which can be accomplished using a toothbrush or a prophyl cup/brush. Initially the tooth is assessed wet and then dried for approximately five seconds. To confirm visual detection, a ball-end probe rather than a sharp explorer may be used gently across the surface to confirm the loss of surface integrity.

### Risk Factors

Caries risk factors are described as biological reasons that cause or promote current or future caries disease. Risk factors traditionally have been associated with the etiology of disease. Due to their pathologic nature, risk factors can also serve as an explanation of what could be corrected in order to restore imbalance that exists when disease is present.15 The CAMBRA philosophy identifies nine risk factors (Table 1) that are outcome measures of the risk for current or future caries disease. Due to their pathologic nature, risk factors can also serve as an explanation of what could be corrected in order to improve the imbalance that exists when disease is present.15

**Table 1.** Caries Risk Assessment Form — Children Age 6 and Over/Adults

<table>
<thead>
<tr>
<th>Patient Name</th>
<th>Chart #</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Date</td>
<td>Is this (please circle) baseline or recall</td>
<td></td>
</tr>
<tr>
<td>Visible caries or radiographic penetration of the dentin</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Radiographic appearance of lesions not in dentin</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>White spots on smooth surfaces</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Restorations less than 2 years</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Risk Factors (Biological/predisposing factors)</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Visible heavy plaque on teeth</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Frequency of toothbrushing/day</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Deep pits and fissures</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Recreational drug use</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Visible saliva flow by observation or measurement**</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Salivary reducing factors (medications).reduction/systemic)</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Oxidized saliva</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Orthodontic appliance</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Protective Factors</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Low/zero/skewed fluoridated community</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Fluoride mouthwash at least once daily</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Fluoride toothpaste at least 3x daily</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Fluoridemostriation&lt;0.5ppmppm daily</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>UDQM=urine fluoride concentration daily</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Fluoride varnish/cream 6 months</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Oral health index 0-6 months</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Chlorhexidine prescribed/used once weekly for 6 months</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Xyloald gum/lozenges as daily/last 6 months</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Adaptable saliva flow (1–2 ml/min) stimulated</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>**Bacteria/Saliva Test Results: NS=LB Flow Rate ml/min</td>
<td>Date</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.** Description of ICDAS scores

<table>
<thead>
<tr>
<th>Restoration and Sealing Codes</th>
<th>Carious Lesion Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = Not sealed or restored</td>
<td>0 = Sound tooth surface, no or slight change after prolonged air drying</td>
</tr>
<tr>
<td>1 = Sealant, partial</td>
<td>1 = First visual change in enamel seen after prolonged air drying</td>
</tr>
<tr>
<td>2 = Sealant, full</td>
<td>2 = Distinct visual changes in enamel</td>
</tr>
<tr>
<td>3 = Tooth-colored restoration</td>
<td>3 = Localize enamel breakdown, no dentin involvement</td>
</tr>
<tr>
<td>4 = Amalgam restoration</td>
<td>4 = Underlying dark shadow from dentin (not cavitated into dentin)</td>
</tr>
<tr>
<td>5 = Stainless steel crown</td>
<td>5 = Distinct cavity with visible dentin</td>
</tr>
<tr>
<td>6 = Porcelain, gold, PFM crown or veneer</td>
<td>6 = Extensive distinct cavity with visible dentin</td>
</tr>
<tr>
<td>7 = Lost or broken restoration</td>
<td>8 = Temporary restoration</td>
</tr>
</tbody>
</table>

constitute an acidiogenic (acid-producing) and aciduric (thriving in acid) group of microorganisms associated with dental caries. LB prefer to live in low-pH niches that are difficult to cleanse and near plaque biofilm accumulation.10 They are often found in the deep parts of the carious lesion and are now considered more involved in the progression of the already-established lesion.11,12 LB are more resistant to bacteria-reducing substances than are MS. LB are somewhat fluoride-resistant, with fluoride not showing the same effect on its metabolism.13 It should not be surprising that there is a significant correlation between carious lesions and the LB count in both adults and children.14

Bacterial Testing

Medium to high levels of MS and LB are considered caries risk factors (Table 1). Studies have found a correlation between MS levels in plaque biofilm and MS levels in saliva.15-17 It has been shown that if saliva contains high bacterial counts, so does the plaque biofilm. High bacterial counts in saliva correlate to >10^5 colony-forming units (CFUs) of MS in plaque biofilm.18 Chairside tests to help clinicians quantify on its metabolism.19 It should not be surprising that there is a shift in the homeostatic balance of the resident microflora due to a change in local environmental conditions (such as pH) that favor the growth of pathogens.20 Further, in the presence of low pH levels (resulting in an acidogenic environment) and are now considered more involved in the progression of the already-established lesion.21 LB are more resistant to bacteria-reducing substances than are MS. LB are somewhat fluoride-resistant, with fluoride not showing the same effect on its metabolism.22 It should not be surprising that there is a significant correlation between carious lesions and the LB count in both adults and children.23

Saliva

While bacteria play an important role in dental caries disease, the oral environment is regulated via the influence of the salivary glands. Except for during meal times and the nights of sleep, saliva is produced in a continuous manner. Consequently, the characteristics of saliva have a direct impact on the oral environment and on the growth and survival of cariogenic bacteria. Saliva contains electrolytes such as sodium, potassium, calcium, magnesium, bicarbonate and phosphate, as well as other substances such as the enzymes, mucus, urea and ammonia.25 These components help modulate the bacterial attachment in plaque biofilm, the pH and buffering capacity of saliva, antibacterial properties, and tooth surface remineralization and demineralization. These components also describe the following four protective factors:

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2. Diet

Diet affects the pH, quantity and quality (composition) of saliva. Sugar (sucrose) and other fermentable carbohydrates, after being broken down by salivary enzymes, provide a substrate for oral bacteria to thrive and, in turn, lower salivary and plaque biofilm pH.26 It has long been understood that the development of a carious lesion is dependent upon this decrease in plaque pH, which occurs as a result of the metabolism of dietary carbohydrates by oral bacteria. Fermentable carbohydrates, those that begin digestion in the oral cavity through breakdown by salivary enzymes and then may be fermented by oral microflora. Simple sugars such as sucrose, fructose and glucose are more cariogenic than are more complex carbohydrates.27 The physical properties of foods and the frequency of eating influence the cariogenicity of the patient’s diet. The texture, consistency and temperature of food can affect mastication and oral clearance from the mouth. Oral sugar clearance is the reduction in the concentration of sugar in saliva over time and has been shown to be a strong predictor of the prevalence of dental caries disease.28 Likewise, the frequency of consumption, especially regular snacking or sipping of foods and beverages, can promote dental caries.

It is important for the clinician to realize that what patients eat is influenced by many factors, including socioeconomic status, culture, ethnicity, food cost, food availability, advertising and marketing.14 Having knowledge about patients’ dietary behaviors, especially those associated with caries risk, is important when developing interventions. At a minimum, clinicians should assess for diet-related risk factors such as the frequency of eating between meals and snacks, the type of beverages consumed, and the intake of sugar-sweetened beverages and high-sugar foods.29

3. Fluoride and other products that enhance remineralization

Fluoride and other products that enhance remineralization are key to the development and progression of dental caries disease.

4. Effective lifestyle habits

Best practices dictate that once the clinician has identified the patient’s caries risk (low, moderate, high or extreme), a therapeutic and/or preventive plan should be implemented. Evidence-based clinical guidelines related to oral health will also aid patients in reducing their risk for dental caries disease.
Several of these protective agents are used off-label, meaning their use in caries management is not cleared for marketing by the Food and Drug Administration (FDA). While dental professionals are not regulated by the FDA, manufacturers are, and dissemination of off-label information about an FDA-regulated product is limited. If an individual dental professional decides to use a product off-label, he or she must first ascertain that the product is effective and safe for the intended use.

Saliva and Sealants

The protection that saliva provides to the oral cavity is often overshadowed by the emphasis on oral disease. An evaluation of the quantity and quality of saliva should be conducted on all patients at the initial exam and then periodically assessed for changes. At a minimum, during the clinical examination, the viscosity and flow should be evaluated. Saliva is 99% water and should look like water, not thick and stringy or frothy and bubbly. As a quick and simple test to confirm function and duct occlusion, saliva can be “milked” from one of the major glands, such as the parotid gland.43 A quick and simple test to confirm function and duct occlusion is to “milk” one of the major glands, such as the parotid gland.43


Table 3. Clinical guidelines

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Recare Exam</th>
<th>Radiographs</th>
<th>Saliva Testing</th>
<th>Fluoride</th>
<th>Xyloplast</th>
<th>Antimicrobials (e.g., Chlorhexidine)</th>
<th>Calcium Phosphate</th>
<th>Sealants (non-based &amp; glass ionomers)</th>
<th>pH Neutralizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>6+: Every 6-12 months</td>
<td>&lt;6: Annual</td>
<td>6+:%BX every 18-24 months</td>
<td>6- &amp;&lt;6: Optional at baseline exam</td>
<td>6: Home; OTC toothpaste 2x daily</td>
<td>6+: If required</td>
<td>6-&lt;6: If required</td>
<td>6-&lt;6: If required</td>
<td>6+: Optional on sound tooth surfaces</td>
</tr>
<tr>
<td></td>
<td>&lt;6: Every 18-24 months</td>
<td>6: Every 6-12 months</td>
<td>6-&lt;6: Recommended at baseline &amp; recare exams</td>
<td>6+: Home; OTC toothpaste 2x day + OTC 0.05% NaF rinse daily</td>
<td>6-&lt;6: Home; OTC toothpaste 2x day</td>
<td>6+: If required</td>
<td>6-&lt;6: If required</td>
<td>6-&lt;6: Optional on sound tooth surfaces</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6+: Every 3-6 months</td>
<td>&lt;6: Every 1-3 months</td>
<td>6+: Every 6-18 months</td>
<td>6-&lt;6: Anterior PAX &amp; BXW every 6-12 months</td>
<td>6+: Home; 1.1% NaF toothpaste 2x day</td>
<td>6-&lt;6: Home; F/vamish initial visit &amp; recare</td>
<td>Caregiver: OTC NaF rinse</td>
<td>6+: If required</td>
<td>6-&lt;6: If required</td>
</tr>
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<td>6+: Home; 1.1% NaF toothpaste 2x day</td>
<td>6-&lt;6: Home; F/vamish initial visit &amp; recare</td>
<td>Caregiver: OTC NaF rinse</td>
<td>6+: If required</td>
<td>6-&lt;6: If required</td>
<td>6-&lt;6: Optional on sound tooth surfaces</td>
</tr>
<tr>
<td>MODERATE</td>
<td>6+: Every 6-12 months</td>
<td>&lt;6: Every 3-6 months</td>
<td>6+: Every 6-18 months</td>
<td>6-&lt;6: Anterior PAX &amp; BXW every 6-12 months</td>
<td>6+: Home; 1.1% NaF toothpaste 2x day</td>
<td>6-&lt;6: Home; F/vamish initial visit &amp; recare</td>
<td>Caregiver: OTC NaF rinse</td>
<td>6+: If required</td>
<td>6-&lt;6: If required</td>
</tr>
<tr>
<td></td>
<td>&lt;6: Every 3-6 months</td>
<td>6+: Every 6-12 months</td>
<td>6-&lt;6: Anterior PAX &amp; BXW every 6-12 months</td>
<td>6+: Home; 1.1% NaF toothpaste 2x day</td>
<td>6-&lt;6: Home; F/vamish initial visit &amp; recare</td>
<td>Caregiver: OTC NaF rinse</td>
<td>6+: If required</td>
<td>6-&lt;6: If required</td>
<td>6-&lt;6: Optional on sound tooth surfaces</td>
</tr>
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<td>6+: If required</td>
<td>6-&lt;6: If required</td>
<td>6-&lt;6: Optional on sound tooth surfaces</td>
</tr>
<tr>
<td></td>
<td>6+: High risk</td>
<td>&lt;6: High risk</td>
<td>6+: Every 6-12 months</td>
<td>6-&lt;6: Anterior PAX &amp; BXW every 6-12 months</td>
<td>6+: Home; 1.1% NaF toothpaste 2x day</td>
<td>6-&lt;6: Home; F/vamish initial visit &amp; recare</td>
<td>Caregiver: OTC NaF rinse</td>
<td>6+: If required</td>
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Antimicrobials

Antimicrobial agents destroy or suppress the growth or multiplication of microorganisms, including bacteria. CAMBRA clinical guidelines recommend the use of antimicrobials for patients over six years of age who are classified as being at high or extreme risk for caries, and for caregivers of noncompliant moderate through extreme risk children under the age of six.44,45 Antimicrobials require repeated applications at various intervals, depending on the agent. Chlorhexidine gluconate rinse has been widely studied, and in addition to being FDA-approved to treat gingivitis, when used off-label as a 30-second rinse every day of the first week of every month, it is effective in reducing the levels of MS bacteria but is not as effective against LB.45 In the United States, chlorhexidine gluconate rinse is available as a 0.12% rinse with or without alcohol. The use of 0.12% chlorhexidine gluconate rinse in caries management is not without controversy, and the long-term effects of bacteria suppression have been questioned.45 Long-term use of chlorhexidine rinse can lead to discoloration of teeth, the
mucous membrane, the tongue and composite restorations; it can also lead to taste disturbances. These undesirable side effects can be avoided by using a chlorhexidine-containing varnish. Chlorhexidine varnish, approved for desensitization in the United States, has also been shown to be effective against cariogenic bacteria, especially highly susceptible S. mutans. It has been concluded that the most persistent reductions of MS have been achieved by chlorhexidine varnishes. Chlorhexidine gels are the next most effective, followed by oral rinses for patients at moderate to extreme risk.54 For children, the risk associated with chlorhexidine gels is not seen with chlorhexidine varnishes, and the application of the varnish is easy and moisture-tolerant. It has also been shown to reduce the incidence of root carious lesions in a geriatric population.64,65 The application of chlorhexidine varnish every three to four months may be a more viable option than the use of chlorhexidine rinses, especially for caregivers of children.

Xylitol CAMBRA clinical guidelines recommend the use of xylitol to control the cariogenic bacteria S. mutans for patients over six years of age who are classified as being at moderate to extreme risk for caries.55 For children under six, xylitol wips and xylitol products to replace sugary snacks are recommended for children and adolescents who are classified as being at moderate to extreme risk, including caregivers.64

Xylitol has been well-studied, and it is generally accepted that this naturally occurring sugar alcohol reduces the amount of MS and the quantity of plaque biofilm when habitually consumed. Stannous fluoride (NaF) has also demonstrated to increase fluoride levels at the tooth surface and home-use fluoride rinses has also been recommended.56

Fluoride is a cost-effective and safe form of daily fluoride treatment with fluoridated toothpaste as a means to decrease caries rates, and for preventing caries in children and adolescents, toothpastes of at least 1,000 ppm fluoride should be used.54 For very young children, when brushing with concentrations greater than 1,000 ppm fluoride, a risk-benefit decision needs to be discussed with caregivers regarding the development of mild fluorosis. While research emphasizes the positive use of fluoridated toothpaste, other toothpastes with professional topical application of fluorides that have endorsed the use of in-office fluoride gels and fluoride varnishes.66,67 As with chlorhexidine varnish, the use of fluoride varnish for caries management is considered off-label, as it is cleared for marketing by the FDA for the treatment of dentin hypersensitivity associated with the exposure of root surfaces. The use of 5,000 ppm prescription fluoride toothpaste and home-use fluoride rinses has also been recommended.68

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Fluoride has been the cornerstone of prevention, supports clinicians in making decisions based on research, appropriate and successful management strategy. CAMBRA guidelines suggest that applications of fluoride varnish two to three times daily for patients classified as being at extreme risk.54 For patients 0-6 years old, CAMBRA clinical guidelines suggest alternating brushing between toothpaste and calcium phosphate, leaving the latter on at bedtime for patients classified as noncompliant and at moderate to extreme risk.68-70

For those patients with high or extreme risk, a power toothbrush may be beneficial. While most research concerning power toothbrushes focuses on the ability of the brush to remove plaque biofilm, recent research has shown that power toothbrushes may be helpful in the delivery and retention of fluoride. Recent research has shown that one sonic toothbrush enhances fluoride effects on the plaque biofilm, causing increased fluoride delivery and retention at the tooth surface.71

While the use of fluoride has decreased the need for strict dietary control of sucrose, dental caries disease does not occur in the absence of dietary fermentable carbohydrates. Reducing the amount and frequency of sugar consumption, including the “hidden sugars” in many processed foods, continues to be important for patients at high risk for caries.72

Consuming foods or snacks that do not promote carious lesion formation or progression would be ideal for patients at risk for dental caries. Hard cheese has been shown to coat teeth with a lipid layer, protecting surfaces from acid attack.73 Emerging science suggests increasing arginine-rich proteins in the diet, as it has been shown that consumption of these foods can rapidly increase plaque pH.74,75 Arginine-rich proteins include a variety of nuts (peanuts, almonds, cashews, pistachios), seeds (sunflower, pumpkin, squash), kidney beans, soybeans, watermelon and tuna. Ammonia production from arginine and urea metabolism has been identified as the mechanism by which oral bacteria are protected against acid killing, and it maintains a relatively neutral environmental pH that may support the emergence of a more cariogenic microflora.

Dental products that can assist in neutralizing acid and encouraging an acidic environment includes sodium bicarbonate in commercially available toothpastes, and rinses. The use of baking soda rinses has been suggested to neutralize an acidical oral environment. Chewing gum, especially high-dose xylitol gum, can raise plaque pH and reduce MS at the same time.76 Calcium phosphate products have also been shown to help reduce caries incidence. Two applications of calcium and phosphate to the tooth surface can enhance remineralization.77 A variety of calcium phosphate technologies are currently available, including amorphous calcium phosphate (ACP), casein phosphopeptide-amorphous calcium phosphate (CPP-ACP), casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) and calcium sodium phosphosilicate (TCP). The use of most calcium phosphate products is considered off-label because most of these products are accepted by the FDA as tooth-polishing or desensitizing ingredients only rather than as agents of remineralization. Sugar-free gum with CPP-ACP has shown to increase the rate of remineralization by approximately 20% compared with plain, sugar-free gum.78 Calcium phosphate therapy supports fluoride therapy and is not designed to replace the use of fluoride. For pediatric patients, the use of CPP-ACP has been shown to increase salivary flow, lower pH and poor buffering capacity; the use of these agents may be beneficial. CAMBRA clinical guidelines (>6 years old) suggest the use of calcium phosphate for patients with excessive root exposure or sensitivity and is recommended for use several times daily for patients classified as being at extreme risk.79

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Conclusion

Multiple factors, such as the interaction of bacteria, diet and host response, influence dental caries initiation, progression and treatment. Time has proven that this disease cannot be stopped and must be controlled. While research exists for these newer dental professional is also an important aspect in determining an appropriate and successful management strategy. CAMBRA supports clinicians in making decisions based on research, practice guidelines and evidence-based clinical trials are needed to establish their true clinical relevance. This does not mean that clinicians should not consider these products, strategies and guidelines but rather that they should carefully weigh the benefits and risks of recommending these
products for their patients. Best practices are evolving approach to exceptional patient care, and CAMBRAS offers clinicians the ability to apply the most relevant, research-based and helpful interventions to real-life practice.

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