A BEST PRACTICES APPROACH TO CARIES MANAGEMENT

Michelle Hurlbutt, RDH, MSDH,[a] and **Douglas A. Young, DDS, EdD, MBA, MS**[b]

SORT SCORE

A	B	C	NA

SORT, Strength of Recommendation Taxonomy

LEVEL OF EVIDENCE

1	2	3

See page A8 for complete details regarding SORT and LEVEL OF EVIDENCE grading system

ABSTRACT

Caries management by risk assessment represents best practices and is an evidence-based model that focuses on treating and preventing disease at the patient level rather than a surgical/restorative approach at the tooth level.

Background

Dental caries is a multifactorial, biofilm and pH mediated disease that affects people of all ages and disproportionally affects certain populations at epidemic proportions. Simply restoring cavitated teeth does nothing to resolve the disease. At the heart of the CAMBRA philiosphy is identifying the patient's unique risk level for future caries disease. This can be done by completing a caries risk assessment (CRA). Several easy to use CRA questionnaires are available. Once the patient's unique risk level has been determined, preventive and therapeutic interventions, based on the specific risk level, can then be implemented.

Methods

Landmark publications, original research, and systematic reviews are analyzed and reviewed to form the basis for this shift in patient care related to caries disease.

Conclusions

Caries management by risk assessment has emerged as the new paradigm in patient care and represents an evidence-based, best practices approach with the potential for significant advantages over traditional methods.

Key words: Best practices, dental caries, CAMBRA, caries management, caries risk assessment, risk

[a]Department of Dental Hygiene, Loma Linda University School of Dentistry, 11092 Anderson Street, Loma Linda, CA 92350, USA

[b]Department of Dental Practice, University of the Pacific, Arthur A. Dugoni School of Dentistry, 2155 Webster St. Suite 400, San Francisco, CA 94115, USA

Corresponding author. E-mail: mhurlbutt@llu.edu

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INTRODUCTION

Great advances in knowledge about dental caries have been realized over the last century, yet this disease remains one of the most common seen in America. In the United States, the prevalence of caries disease remains persistently high, especially among young children and selected populations. Data from the most recently analyzed national survey, the 2005–2008 National Health and Nutrition Examination Survey (NHANES), unveiled that one in five people had untreated dental caries and 75% of the population had at least one restoration.[1] Almost 23% of people aged 65 and older were edentulous and dental caries varied significantly by race, ethnicity, and poverty level for all age groups. Children of color continued to have more caries experience and less exposure to preventive interventions such as sealants; approximately one in four children, aged 3–5 and 6–9 years, living in poverty, had untreated carious lesions.[2] Even with the knowledge of caries prevention and treatment, caries disease continues to disproportionately burden the population and remains a significant problem for both children and adults. This problem may be grossly underestimated considering that caries experience was typically measured by decayed-missing-filled teeth (DMFT) or decayed-missing-filled surfaces (DMFS), which reflect the very late stages of caries disease when visible

cavitation was present and ignores the earlier stages of caries disease (non-cavitated lesions).

The typical method in treating dental caries remains focused on tooth restoration as it was a century ago. Most dentists continue to rely on a surgical-restorative approach where the carious lesion is identified, removed, and a restoration is placed. This approach has resulted in the gradual accumulation of restored tooth surfaces; because all restorations have a limited clinical life, the surgical-restorative model promotes increased restoration size or more invasive procedures over time. It is estimated that over two-thirds of all restorative treatments are performed on previously restored teeth, with recurrent carious lesions reported as the predominant cause.[3] In addition, recent research demonstrated that restoring teeth alone does not stop the disease or future tooth decay.[4] It can be argued that the manner in which this disease has been managed represents a public health failure on the part of oral health care providers.

DENTAL CARIES

It is well understood that dental caries disease is preventable and can be arrested.[5,6] Caries disease is a consequence of a shift in the homeostatic balance of the resident microflora due to a change in local environmental conditions (such as pH), which favor the growth of cariogenic pathogens.[7,8] If the cariogenic bacteria present in the plaque biofilm continue to produce acid, the plaque pH falls to an acidic range where dissolution of the carbonated hydroxyapatite mineral (demineralization) of the enamel surface may lead to a carious lesion. Under normal physiological conditions, saliva neutralizes the acid attack and provides supersaturation of calcium and phosphate ions and when combined with fluoride will have a good chance of slowing or halting caries disease via the remineralization process. Therefore, it is the local chemistry, at any given tooth site, that determines whether the plaque biofilm will create enough acid to result in demineralization and cause visible changes to the tooth site (carious lesions).

Dental caries can be considered an imbalance in the demineralization-remineralization process favoring demineralization. Although acid-generating bacteria present in plaque biofilm are often considered the etiologic agents, dental caries is also influenced by dietary and host factors. The caries process is dependent upon the interaction of protective and pathologic factors in saliva and plaque biofilm as well as the balance between the cariogenic and noncariogenic microbial populations. The caries balance/imbalance model is one way to visualize the multi-factorial nature of the caries process just described (**Figure 1**).[9] This model illustrates the factors contributing to caries disease and the dynamic interaction of the biofilm with the oral environment. This balance or imbalance amongst disease indicators, risk factors, and protective factors determines whether dental caries is arrested, reversed, or progresses.

The key to caries management and disease prevention lies with modifying the behavior of complex dental biofilm as well as transforming factors to favor health.[6,10,11] This evidenced-based approach represents a major paradigm shift away from the surgical-restorative only model and although embraced by dental education, is still in the process of evolution.[12–14] There is less acceptance of this 'best practices' approach to dental caries disease identification and prevention among mainstream dental practices than in the education arena, with the most frequent adherents being younger, more recently-graduated dentists.[15,16]

Oral health care providers need to acknowledge that the procedure-oriented practice of simply removing and restoring the carious lesion has not resulted in successful resolution of caries disease across a lifetime. This is an after-the-fact irreversible repair approach that does not address the complex nature of caries disease and is no longer grounded in evidence. Modern caries management includes a more patient-centered, evidence-based approach to determine an individual's unique risk for caries disease and more targeted treatment and preventive therapies to be implemented. This approach fits perfectly within dental hygiene practice because dental hygienists actively promote evidence-based oral disease prevention and disease management within their scope of dental hygiene practice.

EVIDENCE-BASED CARIES MANAGEMENT

Evidence-based practice differs from traditional practice in that it requires the incorporation of the highest levels of research evidence available to help guide decisions rather than treating all patients alike regardless of their underlying disease indicators or risk factors. Levels of evidence refer to a hierarchy of research study designs and are often used to determine the strength of the evidence being reviewed. Most consider a systematic review and meta-analyses as providing the strongest support, followed by randomized clinical trials. The wisdom of restricting decisions or the willingness to change clinical technique solely on the highest levels of evidence is being questioned with regard to caries management. This is because as the complexity of caries disease continues to be elucidated, there may not be a systematic review or randomized clinical trial available which addresses a specific clinical decision for a particular patient. There are often several variables that need to be addressed simultaneously to effectively treat a patient's multiple risk factors, which would be problematic with randomized clinical trials (and thus systematic reviews) since these study designs usually focus on few variables to minimize confounding factors. A study design that is gaining popularity is outcomes-based research from dental practice based research networks (PBRNs). PBRNs are unique research models where a network of private practices interested in conducting practice-based research jointly apply the scientific method to 'everyday' issues in the delivery of oral health care.