Section E: Caries Diagnosis, Risk Assessment, and Management

Disclaimer: Extensive research continues to be conducted in the topics of caries diagnosis, risk assessment and management. This section of the OHPG was last revised in 2007, based extensively on materials developed by an IHS workgroup several years earlier. Therefore, much of the information in this section may no longer be up to date. Anyone interested in contributing to the revision of this topic should contact the DOH at IHS HQ, 301-443-1106**.**

Introduction

For many years, the scientific literature has suggested that a risk-based assessment of an individual patient's dental caries history and oral health status is an important prerequisite for appropriate preventive and/or treatment actions (1–7, 55). In the Indian Health Service (IHS), program managers and clinicians also support this risk-based approach. A practical guide entitled "Caries Diagnosis, Risk Assessment and Management" was developed by a work group of senior clinicians, general practice and pediatric specialists, epidemiologists and public health consultants. A risk classification table with preventive regimens and suggested recall intervals appropriate to risk category was also developed (54). The information provided in this section is a summary of this IHS practical guide.

This risk-based model provides a framework for decision making to determine a patient's risk of dental decay and appropriate preventive and treatment strategies. It considers the clinician's judgment, as well as available resources. In a public health program, clinicians should also assess resources and activities such as community water fluoridation and school-based programs, including sealant screening and placement, and fluoride mouthrinse programs. The overall objective is to work with patients and communities to improve the oral health of American Indian/Alaska Native (AI/AN) people in the most effective and efficient manner possible.

The underlying principle of a caries risk protocol is to approach dental caries as an infectious disease (8–12, 56). Most resources in our dental clinics are invested in the diagnosis, treatment and prevention of this infection. These resources are maximized by appropriately addressing the diagnosis, prevention and treatment of dental caries. Studies have shown that flexible recall systems and targeted care are cost effective and time effective, providing the greatest health benefits to defined populations (4, 13–15). Each patient's individual risk for caries impacts that patient's treatment plan. Since most restorative treatments result in irreversible changes in those teeth involved, establishing a treatment plan involves weighing the risk of dental disease progression against the risk of receiving irreversible dental intervention. The guidelines in this subsection can assist you in exercising your clinical judgment by organizing caries diagnosis, risk assessment, prevention and treatment strategies. Information provided in this program guide is derived from the IHS "Caries Diagnosis, Risk Assessment and Management: A Practical Guide" and can be referred to for more in-depth discussion of this topic.

Diagnosis

Dental caries must first be correctly diagnosed before appropriate interventions can be considered. Dental diagnosis is best accomplished longitudinally, comparing available examination and radiographic data over time. Single "snapshots" often do not supply information about disease progression/regression, especially when lesions are in the early stages of development. Exams are best completed in a dry field with bright illumination. The explorer is *not* the instrument of choice for diagnosing caries. A sharp explorer has been shown to cause cavitation of otherwise reversible active lesions, gives false information when diagnosing by "stick" and does not improve the validity of diagnosis (16–18). On rare occasions when the use of an explorer is indicated, the explorer should be dull and light pressure should be used. Radiographs are ordered to confirm, not establish, the diagnosis of caries. They should be used in longitudinal sequence to assess lesion activity whenever they are available from previous exams. Stained grooves and rough restoration margins are not of themselves indications of active caries or of caries potential (17–22). Only carious lesions which are active, frank and cavitated require the irreversible surgical intervention of operative dentistry. Carious lesions that are not active, frank and cavitated, such as "white spot lesions" (and/or incipient lesions) are best addressed using a medical model or non-surgical approach (12, 21). The clinician may rely on pharmacotherapeutic interventions such as professionally applied (foam, varnish and gels) and home-use topical fluoride products (toothpaste, rinses), as well as chlorhexidine to control the infection.

Caries Risk Assessment

There is evidence in the scientific literature that dental caries history or experience (usually expressed as DMFT/DMFS, deft/defs scores) is not evenly distributed in the general population (23–26). Within IHS, it has also been documented that dental caries experience is not evenly distributed (27–29). In contrast to the US population, most of our IHS subpopulations have a small proportion of people who have either low or high dental caries experience and a relatively large proportion who have moderate dental caries experience. One goal of the Dental Program is to increase the proportion of low-risk patients and decrease the proportion of high-risk patients in a given community. Targeting resources for high-risk patients and "moving" patients from high-risk to moderate-risk and from moderate-risk to low-risk categories can maximize the impact of limited program dollars. The more patients in the low-risk category, the more opportunity to increase access to those in the moderate- and high-risk categories and increase their opportunity for achieving better oral health. Since there is generally less disease if patients have better access to routine and preventive services, an effective public health approach to Oral Health Promotion/Disease Prevention (OHP/DP) includes improving access as a preventive strategy.

The American Dental Association (ADA) published a 1995 Journal Supplement outlining caries risk classifications and appropriate preventive regimens to complement them (12). The IHS used the ADA document as a framework to tailor a product (54) for our

populations, which have, in general, higher levels of decay. The IHS Table relies heavily on the clinician's judgment to use modifying factors (see below) in assigning risk categories. The IHS Table also redefines age groups from the ADA's child/adolescent and adult groupings to ages 0–4 and 5+. In addition, the IHS table adds a "very high risk" category to address that proportion of AI/AN populations with significantly high levels of dental caries and bolster treatment regimens for those individuals.

Sound clinical judgment is necessary to establish dental caries risk and prescribe appropriate interventions. Gathering information from and about patients is critical in determining this risk. In this model, the key decision, which drives caries risk assessment, is the presence of active cavitated lesions at the time of the examination. Many studies indicate that previous caries experience is one of the best predictors of future caries experience (1, 2, 4–7, 30–34).

Other factors, or modifiers, that may predispose an individual to dental decay include the following (57, 58):

- Age
- Family's dental experience.
- Diet
- White spot lesions.
- Tooth morphology.
- Fluoride exposure (both too much and not enough).
- Rate of caries progression.
- Oral hygiene.
- Socioeconomic status.
- Frequency of dental visits.
- Medical conditions and medications being taken.
- Salivary flow.
- Root exposure.
- Mutans streptococci levels.
- Special-assistance requirements.
- Orthodontics
- Removable appliances.

The type and nature of modifiers applicable to an individual may indicate that he/she should be moved into a different risk category. No attempt was made to regulate the number of modifiers, which would move a person into a different risk category; this decision has been left up to the *clinician's judgment*. However, patients should be reassessed and reclassified at subsequent recall visits for the appropriate risk category. A patient initially classified as "high-risk" or "moderate-risk" may fall into a "low-risk" category at recall if no new lesions are found and modifying factors such as fluoride exposure and oral hygiene have changed. "Low-risk" patients may also move into other categories if oral conditions change. Risk categories and classification are fluid.

The IHS "Caries Diagnosis, Risk Assessment and Management" manual defines the following risk categories and provides guidelines for preventive regimens as well as recall intervals for assessing caries risk status (54):

Patients 0–4 years:

- Low Risk: No active carious lesions of any type (cavitated or white spot) at exam.
- High Risk: Any cavitated or white spot lesions at exam. Continued bottle feeding after 12 months or a family history of caries.

Patients 5 years and older:

- **Low Risk:** No active cavitated or noncavitated lesions at exam.
- **Moderate Risk:** One active cavitated smooth surface lesion or any pit and fissure lesions at exam.
- **High-Risk:** Two to five active cavitated smooth surface lesions at exam or two new lesions of any type with a history of smooth surface lesions in permanent teeth. Former "very high risk" patients may also be placed in this group.
- **Very High Risk:** Six or more active cavitated smooth surface lesions at exam.

**To reiterate, modifying factors could place a patient in a higher or lower risk category.

Management

Treatment planning and management of active carious lesions involves three steps:

1. Arresting the infectious disease process and preventing disease using a medical model (Preventive Regimen).
2. Completing restorations and/or extractions (Surgical Treatment).
3. Evaluating the outcome of the chosen preventive regimen and surgical treatment (Recall).

It is imperative that the *prevention strategies* based on risk assessment are initiated prior to completing restorations or extractions. The prevention regimen should be based on the patient's risk category. If there is a high demand for services and few resources, preventive regimens should be focused on strategies proven to be effective like fluoride and sealants (35–39). Proven strategies that are cost effective for most IHS populations are identified with as asterisk on the IHS Risk Classification table. All preventive services should be specifically described as part of the overall treatment plan. The patient's risk status can be indicated on the line for "high-risk carries" target group on the exam form.

Restorative treatment and extractions are *surgical processes* that are destructive. They are justified only if the risk of destruction caused by an irreversible, frank, active carious lesion is greater than that of the surgical procedure itself. In low- and moderate-risk

patients, more concern should arise from a false-positive diagnosis of dental caries leading to unnecessary surgical tooth destruction than from a false-negative caries diagnosis (53). Carious lesions in permanent teeth usually progress slowly and may be arrested or reversed. Therefore, conservative treatment options such as sealants, preventive resin restorations, avoiding “extension for prevention” and appropriate recall based on risk are preferred. The goals of this conservative approach are twofold: First, to avoid unnecessarily placing the first restoration, which likely commits the patient and the dental program to a series of future replacement restorations of increasing size at the expense of natural tooth structure; and second, to minimize the unnecessary replacement of restorations. High- and very high-risk patients, however, require more aggressive preventive and restorative treatment. Their lesions, even in permanent teeth, are often rapidly progressive. Treating too conservatively may result in adverse outcomes such as pulpal involvement and tooth loss. Although it is easy for most dentists to focus solely on restorative needs of high- and very high-risk patients, necessary preventive regimens should not be ignored. The need for restorative treatment should not overshadow the provision of preventive services and, for these patients, they should be provided concurrently. Remember, the decision to do one thing is often a decision to not do something else, even if this decision is not consciously made. In our programs, decisions to provide extensive treatment frequently translate to the provision of services to one patient at the expense of access to care for another.

Individual treatment plans will be impacted by the patient’s oral and systemic conditions, dental program resources and priorities, as well as the dental staff’s capabilities and interests. The ability of a dental program to provide access is influenced by the choices each dentist makes about when to treat each individual patient and when to have each patient return to the clinic for follow-up and recall care. Of course, the patient’s responsibility and commitment to oral health are critical to any intervention. Patients should be informed that their commitment to their oral health is critical to any intervention. Recall is an important component for evaluating a patient’s specific needs. Appropriate recall allows for longitudinal assessment of carious lesions, patient modifiers and the efficacy of interventions to date. A patient’s willingness or ability to comply with recall appointments is a modifier in judging their risk classification. A clinical program without an active recall system is typically limited to “snapshots” of patient status and has fewer opportunities for consistent intervention to successfully control their patient’s caries infections.

The success of a caries risk management program can be observed both programmatically and individually. Programmatically, a properly functioning program will increase clinic utilization by patients who are in the greatest need of care. Treatment choices using this philosophy will result in preservation of tooth structure by increased use of sealants and preservative dentistry. With this early intervention, you can expect to see fewer destructive restorations even though the disease is not totally eliminated from the patient population. Individually, patients in higher risk categories will move into lower risk categories and/or require longer recall intervals upon return. Success can be defined when moderate- and high-risk patients return with no new lesions or exhibit healing of incipient lesions upon recall exam.

Summary

This subsection is not a cookbook; clinical judgment is required. The information presented here is to serve your caries diagnosis, risk assessment and treatment planning process regarding your patient's actual risk, relative to the infectious disease of dental caries. With limited resources and high dental disease rates, it is critically important that clinicians manage the infectious disease process rather than focus only on surgical restorative treatment. Assessing the patient's risk, applying appropriate preventive regimens and evaluating compliance with these regimens before providing invasive restorative procedures are essential. Following these guidelines should ensure wise expenditure of limited resources and increased access to the health care delivery system.

Additional Resources/Articles of Interest

IHS "Caries Diagnosis, Risk Assessment and Management: A Practical Guide" (24 hours of continuing dental education offered) (54)

NIH Consensus Development Program Web site:
consensus.nih.gov/2001/2001DentalCaries115html.htm

March 2003 Journal of the California Dental Association:
http://www.cda.org/Portals/0/journal/journal_032003.pdf

University of Iowa Caries Risk Factors and Activity Assessment:
uiowa.edu/~op2l/caries98.html

American Academy of Pediatric Dentistry Oral Health Policy:
aapd.org/media/Policies_Guidelines/P_CariesRiskAssess.pdf

Caries Management by Risk Assessment (CAMBRA) (CDA Journal):
http://www.cda.org/Portals/0/journal/journal_102011.pdf and
http://www.cda.org/Portals/0/journal/journal_112011.pdf

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