

Caries

LATEST CONCEPTS OF CARIES PREVENTION

Planning for Prevention

The contemporary rationale for prevention

Current concepts of the nature and aetiology of caries have considerable implications for today's dental practice. The recognition that the caries process is potentially reversible in its early stages implies that restorations should not be considered as the preferred management option for the precavitated lesion (Elderton, 1985). Not only is it possible to prevent new lesions developing, but also to arrest or repair the damage that has already occurred. Together, this information indicates that prevention should become the main objective of any treatment plan. The simplified management plan steps should include:

- thorough examination including risk assessment;
- temporary restorations and other measures to achieve stabilisation/protection if necessary;
- permanent restorative management if necessary.

In order to formulate a preventive oriented treatment plan the patient's risk of developing caries first needs to be assessed.

Risk Assessment

The overall examination of factors that can either cause or help to prevent caries, combined with thorough oral examination, contribute to risk assessment (Brook, 1991).

In the post-fluoride era, a simplified concept of caries risk is as follows:

Low risk:

- no current caries or few arrested lesions;
- adequate fluoride exposure;
- limited cariogenic dietary factors;
- patient not suffering from any medical condition affecting saliva production;
- patient not taking any medications containing sugar or reducing saliva flow.

Moderate risk:

- low fluoride exposure;
- cariogenic dietary factors;
- no more than one active cavitated lesion, or several precavitated lesions;
- patient taking medication that decreases salivary flow or contains sugar;
- recent change in socio-economic condition or stressful life events that could negatively influence diet or toothbrushing.

High risk:

- two or more active cavities or a number of active precavitated lesions;

For every patient, the clinician needs to assess whether there is a current or potential imbalance between the demineralising factors and those promoting remineralisation.

Risk assessment is a vital part of planning for prevention and forms a base for dental care as well as recall planning. Accurate risk assessment will increase the likelihood of successful treatment outcomes.

Risk management

Low caries risk cases:

Even if a clinical assessment has indicated a patient's status as low caries risk it is important to analyse risk factors and determine any potential changes in risk, eg. orthodontic treatment or stressful life events. Any change will determine both the recall period and whether any protective measures are indicated, eg. placement of fissure sealants or home use of fluorides.

Moderate caries risk cases:

Most patients are able to achieve only partial reduction in plaque and dietary carbohydrate factors. Therefore, it is recommended to supplement the protection and repair mechanisms. Factors that should be considered are: change in use of fluoride toothpaste (eg. spitting after brushing without rinsing), additional home use of fluoride, protective fissure sealants or use of restorative materials that release fluoride.

High caries risk cases:

Enhancement of the protective and repair mechanisms through additional use of fluoride products, and use of protective fissure sealants is almost always necessary.

Even though most cavitated lesions need to be restored, prior stabilisation of the oral environment:

- 1. improves the potential for the pulp to recover and remain vital where there is advanced demineralisation of dentine; and*
- 2. reduces the risk of recurrent caries.*

Other factors affecting planning for prevention

The nature and intensity of the preventive management plan does not solely depend on the patient's caries risk assessment. The patients' capability to achieve and maintain compliance, will play a vital role. For low risk patients compliance may not be important as no changes in daily

routine are required. However, where the risk is high, but interest and potential compliance with home care programs are doubtful, the risk management may best focus on an intensive sealant program, or regular application of fluoride eg. APF gel. The approach will require careful consideration of the patient's age, social circumstances, motivation, health factors and the nature of dental problems. The intention is to provide protection in the short term, while working with patients to achieve long term self control over their risk. It may take time for some patients to accept and act on the need for preventive action to control caries. Therefore, protective restorations to control caries, sealants and regular fluoride application are important ways to provide stabilisation and temporary protection. In the long term, it would not benefit the patient to immediately proceed with permanent restorative management of carious lesions without any stabilisation and protection.

Why stabilise

Our current knowledge of the caries process and the potential to arrest caries directs the objectives of preventive programs firstly towards stopping new carious lesions developing, and secondly, arresting or repairing those lesions which have already developed. Even though most

cavitated lesions need to be restored, *prior stabilisation of the oral environment:*

- 1 improves the potential for the pulp to recover and remain vital where there is advanced demineralisation of dentine; and*
- 2 reduces the risk of recurrent caries.*

Early enamel caries or root caries should be stabilised (Thylstrup & Fejerskov, 1994), rather than restored, though resultant staining may still require an aesthetic restoration to be placed. Where multiple early lesions are diagnosed, a specific intensive program of control may initially need to be implemented, until signs of stabilisation of the oral environment are evident. To maintain the stabilisation achieved, routine preventive measures are often sufficient.

Permanent restorative procedures are likely to fail if performed in an unstable oral environment where aetiological factors for caries have not been modified or removed. It is preferable to advise the patient that this is so, and to attempt to persuade them to spend the early appointment(s) learning to control caries, while some temporary protective restorations are being placed. With appropriately placed temporary restorations, permanent restorations can be safely delayed until the prognosis is improved.

REASONS BEHIND FAILURE

When caries continues to develop despite access to water fluoridation, it is usually due to:

- excessive sugar consumption, often complicated by excessive intake of acidic beverages;
- an inadequate fluoride exposure through lack or a low use of water fluoridation or infrequent toothbrushing with toothpaste containing fluoride;
- an inadequate plaque control; or
- a deficiency in salivary protection.

Some of these factors can be addressed by further changes in the patient's use of fluorides,

oral or dietary behaviours, but others are beyond the patient's control. Further changes in the patient's habits may be very difficult to achieve. Therefore, the practitioner's role in these circumstances is to compensate for the unachievable goals as well as for those factors that are beyond the patient's control.

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Steps in

Planning for

Prevention

Not every patient requires provision of preventive services. However, careful risk assessment is always required. For patients in moderate or high risk category the following steps in planning for prevention need to be considered (for further discussion see Anderson, 1994).

1. Identification of the causes

Identification of factors responsible for the caries activity helps the clinician to set priorities in the preventive management plan, thereby enhancing the potential for success. It is very important to take a thorough fluoride history as this step is frequently overlooked. Issues such as frequency of brushing, methods of clearing toothpaste from mouth after brushing (eg rinsing or just spitting after brushing), type of toothpaste used (fluoridated or nonfluoridated) need to be investigated. Every practitioner should also be aware of the fluoride level in water that their patients usually drink (tank water, bottle water, local water supply fluoride level).

2. Setting up achievable goals

In all cases it is essential to help the patient control plaque and/or dietary sugar frequency to a level considered by both patient and dentist to be practically achievable. A clinician needs to be aware that the achievable goals will vary considerably between patients as well as with the same patient over time.

3. Consider supplementary action

Some patients may find it difficult to control sugar intake to the extent necessary as to tip the balance from demineralisation to remineralisation. When the necessary level of control is not achievable by the patient the natural protection and repair factors need to be supplemented. The available methods for supplementary action are:

- increased use of discretionary fluorides (eg. brushing 3+ times a day, encouraging a patient to spit and not to rinse after brushing);
- home fluoride programs (eg. using gels, rinses)
- fissure sealants to protect teeth from demineralising acids;
- stimulating the chewing activity of the patient to increase salivary flow where appropriate; and
- short term use of oral antiseptics to inhibit bacterial metabolism, especially where periodontal diseases are also diagnosed.

The objective at all times must be to help the patient gain control of caries and to maintain control independent of assistance from the dental professional.

A multifactorial, risk and protection factor approach to caries prevention has superseded the earlier concept that caries could be managed by complete control of one of the causative factors, eg. plaque or dietary carbohydrates. In practice, the traditional approach was unrealistic as complete control of any of the aetiological factors for caries is not achievable for a great proportion of the population.

In a recent clinical report on using the multifactorial approach to prevention, McIntyre and Blackmore (1992) found that 90 per cent of patients referred with very high caries rates (a mean of 15 carious surfaces per patient) had not developed any new carious lesions for two years and 49 per cent of early lesions had not progressed to cavitation after risk management was implemented. McIntyre and Blackmore also concluded that root surface caries was usually the easiest to control, while coronal caries resulting from strongly erosive acids in the diet, eg. cordials, soft or sport drinks, was the most difficult.

The role of monitoring visits in effective caries control

It is easier to achieve desirable behaviour changes in the short rather than the long term. Long term success can only be achieved by implementation of an adequate monitoring and reinforcement program through a proper monitoring system. Length of a course of care (the period from an initial examination to the completion of treatment/management) and the number and frequency of monitoring visits are likely to vary between patients and depend on the patient's motivation and their ability to follow recommendations on therapeutic measures or necessary lifestyle changes.

Initially, monitoring appointments should be frequent to ensure that modification in home care procedures is being maintained, including use of fluoride, diet or oral hygiene pattern changes. Following successful short

term control of a high caries risk patient, it would be unwise to extend the period between monitoring visits beyond six months. If home care does diminish within this period, the potential damage can still be reversed. When a medium risk patient is able to maintain effective control of cariogenic factors, intervals between visits can progressively increase from six to twelve months, and eventually even longer. However, for individuals at high risk it is reasonable not to increase the monitoring visits intervals beyond 12 months.

Patients with initially poor compliance who need professional stabilisation, monitoring and reinforcement, or patients who are unable to look after themselves because of disability will require more frequent visits and usually longer periods of management.

Assessing success

The available diagnostic tools used in caries detection are limited, making the assessment of success very difficult. The diagnosis of a remineralised lesion depends on careful visual and tactile examination. Where the root surface is involved, successful stabilisation of caries will result in considerable hardening of cementum/dentine to tactile pressure with a blunt probe, but the hardening process may take several months. Where precavitated coronal lesions are concerned (white spot lesions) signs of remineralisation can be detected by careful prolonged drying. The longer the lesion takes to appear white the greater the remineralisation achieved. Deep dentinal cavities should be temporarily sealed but it is often helpful to leave some cavitated lesions with very superficial dentine involvement unsealed for a few months before restoration. The hardening of the underlying dentine in the unsealed cavities provides a very good indicator of whether stabilisation has been achieved.

Changes in brushing habits can often be checked by examining gingival status as good brushing will usually result in improvement in gingival health.

CLINICIAN-PATIENT TEAM APPROACH

Effective prevention of any disease requires a comprehensive understanding of its aetiology and the host defence mechanisms. The effective prevention of caries therefore depends not only on understanding of the role of the primary causative factors, and effectiveness of the protective mechanisms (see Practice Information Sheet No.1), but also their potential for enhancement. The basis for the reduction in caries prevalence over the last three decades has been the use of fluoride. Low concentration fluorides enhancing natural protection have played a major role at a time when dietary and plaque control factors have largely remained unchanged.

A clinician-patient team approach to caries prevention and management is based on **assisting a patient to regain control** over factors contributing to demineralisation, and promoting protective and repair mechanisms.

The task of the team is to determine whether caries is currently under control, and if not, what is required to adjust risk and protective factors toward remineralisation. It is then possible to determine the most effective plan of preventive management for the patient based on his or her individual needs.

The clinician-patient team approach also requires understanding by both parties that it is often after the initial short term success that old habits can gradually reappear. It is relatively easy to achieve short-term success, but only frequent reinforcement of the introduced changes to the oral behaviours will result in the long-term success.

IN CARIES PREVENTION

The role of a dental team

As in many other aspects of dental treatment, every member of a dental team has an important role to play in the patient's management (Baltutis & Morgan, 1998).

The dental provider's effort is only one of the factors necessary to ensure success of dental care. Other factors such as support from the rest of the dental team and patient's compliance with a recommended management plan are all equally important. A dental hygienist or a dental therapist can frequently be involved in monitoring the patients' progress during some of the early monitoring visits. Dental hygienists can also provide professional applications of fluoride for stabilisation of caries and guidance to change patient's oral hygiene behaviours.

A dental nurse and a receptionist have also an important role to play in ensuring the patient's satisfaction and comfort as well as providing the patient with appropriate literature, for example – patient pamphlets.

The limitations of effectiveness of caries control

The major limitations to successful caries control and prevention are:

- limited ability of the patient to comply with home care procedures;

- severe medical, physical or social factors which make it impossible for the patient to regain sufficient control over their risk and protective factors;
- the periodic or sustained presence of complicating erosive acids, whether of an exogenous or endogenous nature. Damaging effects of these acids can still be reduced by a combination of changes in the toothbrushing habits, increased use of fluorides, and sealants. Such cases provide the greatest management challenge and fluoride gels or varnishes are frequently used. The lower concentration fluorides may be unable to protect or repair erosion from strong acids.

Conclusion

Successful caries management requires careful diagnosis and thorough planning of caries control linked to the patient's needs and followed by monitoring of outcomes over long periods of time. In high caries risk patients, caries control may sometimes be difficult to achieve, but perseverance and effective work within the dental team and with the patient will ensure success.

The dental profession now has the ability to help almost every patient control caries. It is time clinicians judged their success on how many patients are maintained without new caries rather than on the number and complexity of restorations and prostheses provided.

Further information

can be obtained from the
Dental Practice Education Research Unit
Department of Dentistry
The University of Adelaide
Australia 5005

Phone (08) 8303 5438

Toll free 1800 805 738 • Fax (08) 8303 4858

Email dperu@dentistry.adelaide.edu.au

Website [//www.adelaide.edu.au/socprev-dent/dperu](http://www.adelaide.edu.au/socprev-dent/dperu)

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