Personalised biofeedback for behaviour change
Introducing PreViser

‘Give patients the information they need in a way they can understand so that they can make informed decisions’
General Dental Council Standard 2.3

PreViser assesses a patient’s risk of developing oral disease and their current health status. It presents this in a report that the patient can easily understand so that they can make informed decisions on their home and professional care.
Longitudinal validation of a risk calculator for periodontal disease


Abstract
Background: Risk assessment and utilization of the results are important components of prevention, diagnosis, and treatment of periodontal diseases. Risk assessment is relatively new to dentistry. Currently, risk is assessed by subjective evaluation and results vary widely among clinicians. We have developed a computer-based risk assessment tool, the Periodontal Risk Calculator (PRC), for objective, quantitative assessment of risk. The purpose of the study reported here was to evaluate the accuracy and validity of this tool.

Methods: Clinical records and radiographs of 532 subjects enrolled in the VA Dental Longitudinal Study of Oral Health and Disease, covering a period of 15 years, were used. Information from baseline examinations was entered into the risk calculator and a risk score on a scale of 1-5 for periodontal deterioration was calculated for each subject. Actual periodontal status in terms of alveolar bone loss determined using digitized radiographs, and tooth loss determined from the clinical records, was assessed at years 3, 9, and 15. The strength of the association between risk prediction and actual outcome was determined statistically.

Results: The risk scores were strong predictors of future periodontal status measured as worsening severity and extent of alveolar bone loss and tooth loss, especially loss of periodontally affected teeth. Over the entire 15-year period, risk scores consistently ranked groups from least to most bone loss and tooth loss. Risk groups differed greatly from one another. By year 3, the incidence rate of bone loss of group 1 was 3.7-fold greater than for group 2, and by year 15, the loss of periodontally affected teeth was 22.7-fold greater than for group 2 (p<0.0001). By year 15, 63.7% of subjects in risk group 5 had lost one or more periodontally affected teeth compared to 20.2% of subjects in group 2.

Conclusions: Risk scores calculated using the PRC and information gathered during a standard periodontal examination predict future periodontal status with a high level of accuracy and validity. Use of the risk assessment tool over time may be expected to result in more uniform and accurate periodontal clinical decision-making, improved oral health, reduced in the need for complex therapy and reduction in healthcare cost.

Key words: risk factors; periodontal diagnosis; periodontal treatment; quantification of risk

Accepted for publication 26 November 2002

Over the last three decades, research on dental diseases, especially periodontal diseases, has increased and our knowledge base and understanding have grown enormously. These studies have demonstrated that the host plays a major role in the pathobiology of periodontitis and that risk varies greatly from one individual to another (Hirschfeld & Wasserfallen 1978; McFall & Fields 1982, Lindhe et al. 1983, 1989, Lang et al. 1986, Jenkins et al. 1988, Beck et al. 1990, 1995, Beck 1998). Several determinants of risk have been identified (Ismail et al. 1990, Beck et al. 1990, Hujoer & Kornman 1997, Kornman et al. 1997, 1999, Page & Beck 1997, Page et al. 1997, Salvi et al. 1997). Heredity alone appears to account for roughly 50% of the risk for susceptibility to periodontal disease (Mehalov et al. 2000). As a consequence of these findings, management of the major dental diseases is undergoing a transition from the repair to the medical or wellness model of patient care.

The wellness model is new to dentistry and to periodontics, and its application requires an accurate and valid assessment of risk. Most dentists and periodontists are not trained or experienced in risk assessment or in using interventions aimed at risk reduction in prevention and management of periodontal diseases. Furthermore, tools for quantification of risk have not been
The mouth matters

Oral diseases are preventable
Our UK systems

PreViser

myDentalScore

DEPPA
Our Advisors

Prof. I. Chapple:
Perio

Prof. C. Scully:
Oral Cancer

Prof. A. Banerjee:
Caries

Prof. D. Bartlett:
Tooth Wear
How PreViser / DEPPA works

DENplan PreViser Patient Assessment (DEPPA)
• Patient data entry in reception (optional)
• Clinician accesses patient data and completes clinical assessment
• Encrypted data sent over the internet, returns reports instantly
• Print, save, email
• Communicate
• Monitor
Clinician Assessment
Periodontal Status

Tick all that apply

- Root surface debridement (RSD) for any tooth has been done
- Furcation involvement exists
- Patient has a history of periodontal surgery for pocket elimination
- Subgingival restorations are present
- Vertical bone lesions exist
- Subgingival calculus detected by x-ray or exam

Deepest Pocket per sextant

<table>
<thead>
<tr>
<th></th>
<th>Upper right</th>
<th>Upper anterior</th>
<th>Upper left</th>
<th>Lower right</th>
<th>Lower Anterior</th>
<th>Lower Left</th>
</tr>
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<td>&gt;7mm</td>
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<td>□</td>
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<td>□</td>
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<tr>
<td>No teeth</td>
<td>□</td>
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</tr>
</tbody>
</table>

Bleeding
### X-ray distance from CEJ to Bone Crest

<table>
<thead>
<tr>
<th></th>
<th>Upper right</th>
<th>Upper anterior</th>
<th>Upper left</th>
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<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>No teeth</td>
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<tr>
<td>No x-ray</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

### Status of Teeth

How many months has the patient been without primary caries?
- 36 or more
- 24-35
- 12-23
- Less than 12

Bacterial culture includes elevated MS and/or LB level
- Yes
- No
- No culture or test is available

Please answer the following questions (exclude third molars unless needed for function): How many erupted teeth are present in the oral cavity?
How many natural teeth have any type of restoration, including crowns and veneers?

How many natural teeth currently require restoration because of caries or a defective restoration?

How many teeth have primary caries?
- 0
- 1 or 2
- 3 or more

How many natural teeth have a simple coronal restoration?

How many natural teeth have a complex coronal restoration?

How many natural teeth are root filled?

How many natural teeth have crown posts?

How many false teeth are removable by the patient?

How many false teeth are NOT removable by the patient?
Clinical conditions

Tick all that apply

☐ Oral hygiene improvement is needed
☐ 1 or more teeth has an exposed root
☐ Dry mouth or inadequate saliva flow

Treatment history and considerations

Tick all that apply

☐ Patient’s dental care frequency not as regular as advised
☐ Development problems or special health care needs
☐ Teeth extracted due to caries in last 36 months
☐ Has orthodontic appliance, space maintainer, or obturator

Preventive Measures Taken

Tick all that apply

☐ Chlorhexidine used for at least one week per month for last 6 months
☐ Sugar free gum (eg Xylitol) has been used 4 times daily for last 6 months
☐ Calcium and phosphate toothpaste used during last 6 months
☐ Fluoride varnish applied in last 6 months
Tooth Wear
Severity of tooth wear
- None / normal for age
- More than expected for age
- Much more than expected for age

Tick all that apply
- Cervical tooth wear
- Corrective measure in place for main cause of loss of incisal / occlusal surface

Occlusion
Number of teeth in contact
- At least ten natural or prosthetic teeth in each arch opposing
- Less than ten teeth in each arch opposing

Soft Tissue Status
Presence of soft tissue lesions
- None
- Observation only
- Needs treatment / referral
- Needs referral because of suspected malignancy

Report Settings
- Display Clinical Inputs on Report

[Complete Assessment]
## Your Risk of Dental Disease

**Report Produced:** John Taylor  
**Exam Date:** 23/01/2017  
**Prepared by:** Denplan Teal, Totally Teeth  
**Denplan Teal Victoria Rd, Winchester, SO23 7RG**  
**Tel:** 0800 169 3279  
**Website:** www.denplan.co.uk

### Reducing Your Risk

#### Gum Disease Risk

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High Risk</td>
<td>5</td>
<td>Indicators for high risk of gum disease include:杰瑞的解释</td>
</tr>
<tr>
<td>High Risk</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Low Risk</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Very Low Risk</td>
<td>1</td>
<td></td>
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</table>

#### Tooth Decay Risk

<table>
<thead>
<tr>
<th>Risk Level</th>
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<td></td>
</tr>
<tr>
<td>Low Risk</td>
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<td></td>
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<tr>
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#### Tooth Wear Risk

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<td>Low Risk</td>
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<td></td>
</tr>
<tr>
<td>Very Low Risk</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

#### Mouth Cancer Risk Indicators

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very High Risk</td>
<td>5</td>
<td>Indicators for high risk of mouth cancer include:杰瑞的解释</td>
</tr>
<tr>
<td>High Risk</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Moderate Risk</td>
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<td>Low Risk</td>
<td>2</td>
<td></td>
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<tr>
<td>Very Low Risk</td>
<td>1</td>
<td></td>
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</tbody>
</table>

**Please note:** All types of screening can produce false negatives/positives and no algorithms are 100% effective.

### Your Current Oral Health

**Report Produced:** John Taylor  
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**Prepared by:** Denplan Teal, Totally Teeth  
**Denplan Teal Victoria Rd, Winchester, SO23 7RG**  
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#### Your Current Oral Health Score

<table>
<thead>
<tr>
<th>Component</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comfort</td>
<td>6/8</td>
<td>You told us you are experiencing some pain or discomfort from your mouth.</td>
</tr>
<tr>
<td>Function</td>
<td>8/8</td>
<td>You told us that you can comfortably eat an unrestricted diet.</td>
</tr>
<tr>
<td>Appearance</td>
<td>8/8</td>
<td>You told us that you are happy with the appearance of your teeth.</td>
</tr>
<tr>
<td>Soft Tissues</td>
<td>8/8</td>
<td>We have noted no areas of current concern.</td>
</tr>
<tr>
<td>Bite</td>
<td>8/8</td>
<td>You have sufficient teeth in contact to function normally.</td>
</tr>
<tr>
<td>Tooth Health</td>
<td>24/24</td>
<td>Your score indicates that you have no active tooth decay and no restorations.</td>
</tr>
<tr>
<td>Tooth Wear</td>
<td>6/12</td>
<td>Your teeth show more than expected wear for your age.</td>
</tr>
<tr>
<td>Gum Health</td>
<td>12/24</td>
<td>You have bone loss and / or tissue damage typically associated with mild gum disease. Your score may reflect disease you have had in the past and indicates your likely treatment or maintenance needs.</td>
</tr>
</tbody>
</table>

**Total Oral Health Score:** 78/100

**Please note:** All types of screening can produce false negatives/positives and no algorithms are 100% effective.
Findings

It works:

• 80,000+ assessments done by 650+ dentists
• Increases patient motivation to improve their oral health\(^1\)
• Improves clinical outcomes
• Dentists 95% in agreement with need to do such an assessment\(^2\)

* The effects of providing periodontal disease risk information on psychological outcomes – a RCT: K Asimakopoulou, T Newton, B Daly, Y Kutzer and M Ide, Journal of Clinical Perio 2015
The relationship between oral health risk and disease status and age, and the significance for general dental practice funding by capitation

M. Badey,* M. A. Marinic,** R. Matthews†, J. J. Burke† and I. Chappell‡

VERIFICABLE CPD PAPER

Aim The aim of this paper was to review the oral health and fatal disease risk scores compiled in the Dentplan JRA (Premier Dental) Assessment (DHA) data base by patient age group, and to consider the significance of these outcomes for general practice funding by capitation payments. Methods Between September 2003 and January 2004, 2,767 patient assessments were conducted by about 100 dentists from across the UK using the DHA. A population study was conducted on the data at 10-year spans. Results The composite Dentplan JRA Oral Index (DHA) risk scores were significantly higher in older patients with increasing age from a mean value of 9.0 in the 17-24 age group to a mean value of 25 in the 75+ years age group. Both periodontal disease and oral health risk scores tended to increase with age in an almost linear pattern. DPIPA evidence for cash capitation followed this trend by advising higher costs for patients aged 75+. Conclusion As in the case with general health, these contemporary data suggest that the risk of providing oral healthcare costs tend to rise with age. Where capitation is used as a method for funding, these costs either need to be passed onto those patients, or a conscious decision made to subscribe older age groups.


Background

The cost of providing dental care is a major concern for dental practitioners and practice managers. The cost of providing care is often higher for older patients. This study aimed to assess the relationship between oral health and disease status and age, and the significance for general dental practice funding by capitation payments.

Methods

The authors conducted a population study on the data at 10-year spans. The composite Dentplan JRA Oral Index (DHA) risk scores were significantly higher in older patients with increasing age from a mean value of 9.0 in the 17-24 age group to a mean value of 25 in the 75+ years age group. Both periodontal disease and oral health risk scores tended to increase with age in an almost linear pattern. DPIPA evidence for cash capitation followed this trend by advising higher costs for patients aged 75+. Conclusion

As in the case with general health, these contemporary data suggest that the risk of providing oral healthcare costs tend to rise with age. Where capitation is used as a method for funding, these costs either need to be passed onto those patients, or a conscious decision made to subscribe older age groups.

References


The relationship between general health and lifestyle factors and oral health outcomes

F. Sharma,* M. Badey,* L. Chappell, R. Matthews† and I. Chappell‡

VERIFICABLE CPD PAPER

Aim The primary research question addressed in this paper was: can you improve oral health outcomes for these patients who report problems with general health and lifestyle factors such as smoking? Methods A population analysis was conducted on the data of 4,000 patients, aged 65 and over, who reported poor general health and lifestyle factors. The data were collected from the Dentplan JRA Oral Index (DHA) assessment conducted in 2003. Results The mean age of participants was 75 years, 70% were female, 70% reported poor general health and 70% reported poor lifestyle factors. Conclusion As in the case with general health, these contemporary data suggest that the risk of providing oral healthcare costs tend to rise with age. Where capitation is used as a method for funding, these costs either need to be passed onto those patients, or a conscious decision made to subscribe older age groups.


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References

How risk assessment is used in dental funding models

<table>
<thead>
<tr>
<th>Market</th>
<th>Example</th>
<th>Financial drivers</th>
<th>Relevant to all models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>Denplan</td>
<td>Self pay - informed choice. Monthly payment banding determined by DEPPA</td>
<td>Informed patients taking responsibility for their own wellness</td>
</tr>
<tr>
<td>State sponsored</td>
<td>NHS</td>
<td>Advanced treatment restricted to the healthy</td>
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</tr>
<tr>
<td>Insured</td>
<td>Delta Dental</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; evidence based plans: enhanced benefits for high risk determined by PreViser</td>
<td></td>
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</table>
Conclusions

• Healthy ageing requires prevention and prevention requires patients to take responsibility for own health
• Personalised biofeedback works
• System well received by dentists and patients
• Implications for funding models
• Offers a powerful public health analysis tool
Thank you for listening