

Personalised Biofeedback to Promote Behaviour Change in General Dental Practices

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Abstract

Oral diseases, largely preventable through behaviour change, have a major impact on an individual's quality of life and also affect longevity¹. The first step in prevention is to empower the patient to take control of their health by understanding their personal health status. We report on an evidence based system which delivers, in a dental setting, a traffic light report detailing the patients' risk of developing oral diseases together with their current health status.

Introduction

PreViser Corporation² is the world's leading developer of evidence based oral disease risk and health assessment technology. OHI Ltd, a joint venture with the University of Birmingham, employs this technology to offer on-line oral disease risk and health assessments, PreViser and DEPPA (the **DE**nplan **Pre**Viser **P**atient **A**ssessment)³ to patients in UK dental practices. To ensure we reflect the latest evidence base in our communications, we consult with top UK Professors in each of the oral health disciplines.

General Dental Council Standard 2.3⁴ requires dental professionals to 'give patients the information they need, in a way they can understand, so that they can make informed decisions'. Our systems take both clinical and patient reported data to produce a traffic light coded personalized report that enables patients to easily understand their current health status and the likelihood of disease progression in the absence of behaviour change. Information on the report advises how to reduce risk, and improvements or deterioration in risk and disease scores are tracked on follow up appointments.

Methods

Patients attending UK dental surgeries are provided with an iPad or alternative device in the reception area to complete a health / lifestyle questionnaire on subjects such as diabetic status, smoking, snacking habits and use of fluoride. The dentist or hygienist accesses this data in the dental surgery and continues with a clinical assessment. Clinical inputs include, for example, active caries, pocket depths, bone loss and number of restorations. The encrypted data is submitted and run through PreViser Corporation's algorithms to instantly produce a patient report.

PreViser's algorithm for assessing periodontal (gum) disease risk was validated in a study of 523 patients over 15 years⁵. For caries, tooth wear and oral cancer, in the

absence of validated predictive algorithms, PreViser uses the known risk factors with the aim of highlighting to the patient lifestyle changes and clinical improvements they can make to reduce their risk of disease.

The patient is presented with a traffic light coded report giving their current health status and risk of developing oral disease. This is then printed or emailed to the patient. The application also provides the dental practice with an analysis of their results compared to those of other dentists in the UK utilizing the same technology.

Anonymised data from the assessments has provided us with a powerful research database which has enabled us to publish a series of papers. Questionnaire data and that pertaining to risk and disease score comparisons are presented as descriptive data and oral general health associations analysed by logistic regression models.

Results

To date over 80,000 assessments have been performed in general dental practice by over 650 dentists.

The most important finding with respect to the PreViser application is that it is effective: an independent study by health psychologists demonstrated that the use of PreViser increases patients' motivation to improve their oral health⁶ and a further study by the same group (submitted for publication) demonstrated that it improves clinical outcomes. Dentists surveyed in an initial pilot were 95% in agreement with the statement that an assessment such as this was essential in modern day dentistry⁷.

Key findings of our research on the data collected include that DEPPA's oral health scoring systems provide an assessed population oral health profile which is consistent with that of the Adult Dental Health Survey 2009⁸. We have also shown that the cost of providing oral health care tends to rise significantly with age and have discussed the significance of this with respect to capitation fee banding⁹. Our latest paper¹⁰ presents evidence from a large group of patients (attending general dental practices) demonstrating that worsening oral health correlates with worsening general health and provides further evidence from this group on the association between high-risk lifestyle factors such as smoking and heavy drinking and poor oral health outcomes.

Discussion

Historically a repair model has pervaded dental service provision i.e. disease is treated as it presents. Public funding can no longer support the needs of an ageing population and personal responsibility has to be taken for the prevention of chronic non-communicable diseases.

Risk assessment is the basis of prevention: by identifying the high risk patient, dental practices can tailor their preventive and treatment strategies accordingly and patients, armed with their personalised biofeedback, can make informed decisions on the extent and nature of their home and professional care.

The anonymised data collected is used for research purposes to study the nature of disease in the population and, in due course, to refine the algorithms which drive our application.

Conclusion

Public healthcare in an ageing population requires patients to take responsibility for their teeth. Personalised biofeedback using validated risk and health tools appear to impact positively on patient understanding and engagement in self-care. This particular system has been extremely well received by dentists and offers a powerful public health analysis tool.

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