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ONE HOUR

Evaluating denture cleanliness of patients in a regional dental hospital

P. Mylonas,¹ D. C. Attrill² and A. D. Walmsley³ outline the use of the Denture Cleanliness Index in a secondary dental care setting.

CPD questions

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Introduction

In order to achieve optimal oral health it is well documented in the literature that denture wearing patients should be advised to maintain high standards of both oral hygiene and denture hygiene.¹⁻⁶

Dentures can accumulate plaque and develop calculus deposits in a manner similar to natural teeth, and the composition of denture plaque differs when compared with dental plaque. Studies have shown that denture plaque can contain a number of potentially harmful microorganisms including: Methicillin-resistant *Staphylococcus aureus*, *Candida albicans*, and *Streptococcus mutans*.⁷⁻¹¹

Previous studies indicate that inadequate denture hygiene can lead to an increase in accumulation of denture plaque, which can then increase the risk of developing oral and dental diseases such as dental decay, periodontal disease, and denture stomatitis.^{4,10-13}

Unfortunately many patients have been shown to have inadequate denture hygiene and some still wear their dentures at night, despite evidence that nocturnal denture wearing is linked to a decrease in oral health and provides no benefit to patients' quality of sleep.^{5,12,14,15}

A number of different cleaning regimes are available for patients to clean their dentures and they can be classified into either chemical or mechanical methods. According to a number of different studies and surveys evaluating the denture hygiene habits of patients, the most commonly used mechanical method is a toothbrush with soap and water or toothpaste, while the most commonly used chemical method is either sodium hypochlorite-based cleaner or a peroxide-based cleaner.^{1,2,5,14,16,17}

Evidence from studies conducted outside the UK provides evidence of the denture care habits and the quality of denture hygiene of non-UK cohorts. Their results may potentially be used to inform on the denture care advice given to UK denture wearers, however, there likely will be potential differences in the availability of denture care materials and in patient denture care/hygiene attitudes. Few studies and surveys have been conducted in the UK which outline the quality of patients' denture hygiene, their denture cleaning habits, and the quality of clinical record keeping.

The purpose of this article is to outline the results of a clinical audit conducted in the prosthodontics department of a regional dental hospital. It follows on from work conducted within general dental practice and seeks to determine whether denture hygiene differs between a primary care and secondary care cohort; this comparison has yet to be published in the available literature.²

¹ DCT in Restorative Dentistry, Birmingham Dental Hospital; ²Senior Lecturer and Honorary Consultant in Restorative Dentistry,

³Professor and Honorary Consultant in Restorative Dentistry, School of Dentistry, University of Birmingham

Methodology

Sixty consecutive denture wearing patients were selected opportunistically, attending for treatment at the Prosthodontics Department of the Birmingham Dental Hospital.

Acrylic denture wearers only, both complete and partial, were included in the audit to maintain the simplicity of the audit. All patients were examined by one clinician. Informed consent was obtained from each patient before assessment.

Audit standard

Acceptable denture hygiene was defined as Denture Cleanliness Index (DCI) score of 2 or less. For patients observed, 90% or greater should have acceptable denture hygiene. One hundred percent of clinical notes should have evidence of denture hygiene instructions (DHI) recorded.

Patient examination

Quality of patient denture hygiene was assessed using the DCI (Mylonas *et al.* 2014), which grades the severity of denture hygiene according to the amount of staining on the denture fitting surface. A liquid plaque disclosing dye (Plaqsearch, Malmö, Sweden) was applied by the clinician to the fitting surface as this is where denture plaque is most likely to accumulate¹⁸ and therefore the aspect of denture where patients need to clean most effectively. The stained denture was then assessed according to the DCI rubric (Table 1), with scores ranging from 0 (best) to 4 (worst).

Patient assessment

Patients' baseline DCI scores were obtained, their clinical records were evaluated, and tailored denture hygiene instructions were provided. They were then reviewed after one month, and their denture cleanliness was reassessed to obtain second audit cycle results for their DCI scores; patients' clinical records were also reassessed for quality of record keeping.

Table 1 The Denture Cleanliness Index (Mylonas *et al.*, 2014)

| | |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Clean denture. No plaque is visibly seen, no staining, no plaque detectable |
| 1 | Denture is visibly clean. Little staining (<25% staining of fit surface) |
| 2 | Denture has visible plaque and/or debris. Moderate staining of fit surface (25-50% staining of the fit surface) |
| 3 | Denture has visible plaque and/or debris. Severe staining of fit surface (>50% staining of the fit surface) |
| 4 | Denture has visible calculus deposit(s), on any surface |
| * | Visible defects in denture, in addition to any of the above score (Defects defined as those which are potentially plaque retentive, those which require repair or remake of denture) |

A patient information leaflet was written according to principles from Weinman (1990) and Mylonas *et al.* (2014), and given to patients to aid in patient education.^{2,19} The instructional leaflet detailed the importance of cleaning dentures and teeth, the frequency of cleaning, the manual and chemical methods according to the type of material it is made from and whether it has been relined.

For patients requiring a denture care pack (GlaxoSmithKlein, Brentford, Middlesex) these were provided and they contained a denture box and brush, a sample of effervescent tablets, a sample of denture adhesive cream and associated instructional leaflet.

Results

Sixty patients were seen for baseline assessment of their denture hygiene and their clinical records were evaluated for evidence that denture hygiene instructions had been given; 26 (43.3%) were male and 34 (56.7%) were female, ranging in age between 18 to 84 with a mean age of 63.1 years. At one month review 12 patients did not turn up for their review appointment, despite multiple attempts to contact patients and remind them of their review appointments, and 48 patients were seen for review.

Record keeping

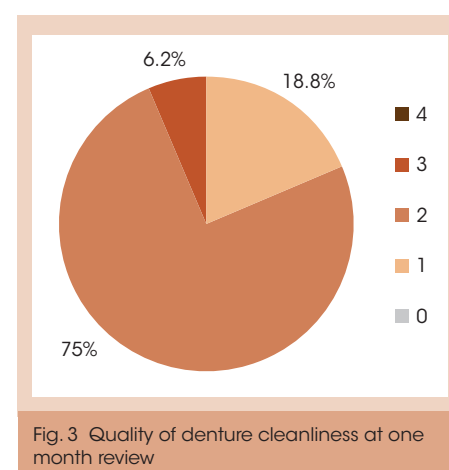
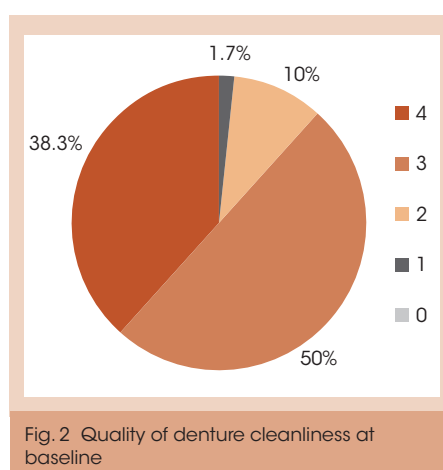
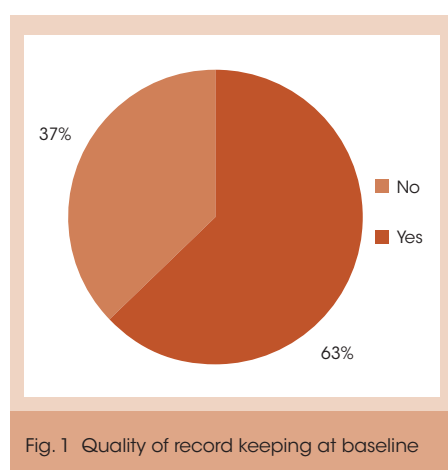
Results for the first cycle/baseline can be seen in Figure 1 and show that 63.3% (n = 38) of patient notes had evidence of denture hygiene instructions being given recorded, while 36.7% did not have any evidence at all. From the 63.3% of patient notes where DHI had been given, there was no evidence of standardisation of denture care instructions provided to patients.

After one month review, 100% of clinical notes had evidence of DHI being given after written instructions to be included in clinical notes was standardised.

Denture hygiene and cleanliness

At baseline 88.3% (n = 53) patients had DCI scores of 3 or greater: 50% (n = 30) with DCI score 3 and 38.3% (n = 23), which is poor when compared to the audit standard set (Fig. 2).

After educational intervention, providing patients with tailored denture hygiene instruction, one month review results can be seen in Figure 3. It can be seen that patients' DCI scores improved, with 93.8% (n = 45) having DCI scores 2 or less which equates to 75% (n = 36) with DCI 2 and 18.8% (n = 9) DCI 1, as can be seen in Figure 3.



Discussion

Patients with removable dentures must be able to look after their prostheses properly and demonstrate good denture hygiene, as well as good oral hygiene, in order to maintain optimal oral health and minimise the risks of developing oral diseases.^{1–6}

The results of this clinical audit show that the quality of patients' denture hygiene at baseline was unfortunately inadequate, which was consistent with another audit conducted on patients within the primary dental care setting and with other studies.^{2,5,14,20} While the baseline results for patients in this audit was slightly better than for those seen in primary dental care, the reasons for the inadequacy of patient denture hygiene were similar: lack of

intervention in another audit conducted in primary care.²

Patients were advised to use both chemical and mechanical cleaning methods to optimise their denture hygiene, in agreement with current literature, following similar advice given by other authors.^{24–26}

The Denture Cleanliness Index provided a simple and quick method for evaluating the quality of denture hygiene within the secondary care setting, and allowed for standardisation of clinical record keeping with regards to denture hygiene assessment and denture hygiene instructions provided to patients. These results are similar to other studies where authors utilised their own methods for evaluating denture plaque.^{5,11,27} Patients could potentially be

hygiene care led to an improvement in their overall denture cleanliness, and must be reinforced at clinical examination.

The Denture Cleanliness Index provides the clinician with an easy tool to assess denture cleanliness, provide tailored denture hygiene instruction, and assess patient compliance.

Denture hygiene instructions and oral hygiene instructions should be provided to all denture wearing patients to reduce the chances of developing oral disease.

'AFTER INTERVENTION, ONE MONTH RESULTS

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standardisation of denture care instructions, and lack of evidence that denture hygiene instructions were previously given to patients.

Patients were provided with tailored educational intervention in the form of denture hygiene instructions and leaflets, and a denture care pack for those that required it. After intervention, one month results indicated that patients' denture hygiene improved and exceeded the audit standard. The effects of educational intervention also mirror those improvements seen within the primary care audit by Mylonas *et al.* and highlights the positive effects of patient education on the subsequent quality of the denture hygiene.^{2,5,14} These results differ from those of Burnett *et al.* in 1993, who found that after six months of educational intervention – written and verbal – there was no change in the denture cleaning habits of their subject group. Conversely, it has been demonstrated that illustrated denture instruction manuals and frequent recall intervals – with denture hygiene and oral hygiene reinforcement – aids in improving denture and oral hygiene habits, and can therefore be recommended.^{21–23}

The quality of clinical record keeping, at baseline, did not meet the clinical audit standards and after standardisation of terminology, improved dramatically at one month review, in accordance with similar

provided with disclosing solution for home-use in order to facilitate denture biofilm, however a study conducted in Brazil concluded that the provision of disclosing solutions for home-use by denture-wearing patients did not improve their ability to remove biofilm.²⁸ However, there is evidence to support that providing patients with disclosing agents for home-use improves their oral plaque control irrespective of whether they are undergoing general dental review,²⁹ active periodontal treatment,³⁰ or orthodontic fixed-appliance treatment.³¹ Further research will be needed to ascertain the effectiveness of denture care instructions with concomitant home-use of disclosing agents in improving denture wearing patients' ability to remove denture biofilm.

As clinicians we are obligated to provide patients with the necessary information and motivation required to look after their dentures as well as assess patients' compliance to said instructions as by doing so this can improve patients' oral and denture plaque control.^{21,22}

Conclusions

Denture wearers treated within a secondary care environment exhibited slightly better levels of denture hygiene compared with those in primary care, but the levels of denture hygiene were deemed to be inadequate overall.

Patient education on appropriate denture

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‘DENTURE HYGIENE AND ORAL HYGIENE

INSTRUCTIONS SHOULD BE PROVIDED TO ALL

DENTURE WEARING PATIENTS...’

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