

IN BRIEF

- There are multiple influences on compliance with wearing partial dentures.
- GDPs feel the NHS fee structure has been a barrier to provision of RPDs, especially cobalt chromium based dentures.
- Respondents would, in general, prefer to provide cobalt chromium based rather than acrylic based dentures.
- Respondents do not appear to routinely arrange follow-up maintenance visits for patients provided with partial dentures.

Attitudes and practice in the provision of removable partial dentures

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Objective To identify the factors shaping the pattern of removable partial denture (RPD) provision by dentists in England.

Design Cross sectional survey of general dental practitioners.

Methods Details of current practice and provision, influences, attitudes and demographic details were collected using a self-completion questionnaire mailed to general dental practitioners identified through the Dental Practice Board register.

Results Three hundred and eighty-five questionnaires were returned by general dental practitioners from 62 health authorities throughout England. The most important factor reported as influencing both the GDP's decision to provide a partial denture and its subsequent success was patient desire to have a partial denture. Constructing the denture from cobalt chrome, advising the patient on aftercare, making time available to make minor adjustments and being responsible for design were all factors dentists associated with success of a RPD. However, for a number of dentists there was a reported divergence between knowledge and practice.

Conclusion Overall it is clear that provision of partial dentures continues to be patient led. However, the decision making process is also influenced by a number of factors including time, cost and the NHS fee structure.

INTRODUCTION

As the population ages, dental health surveys indicate that the proportion of partially dentate older adults is increasing.¹ A major challenge for the dental profession will be to plan oral

healthcare for this group of patients. Of fundamental interest will be attitudes of older adults to healthcare, and acceptance of treatment.

Removable partial dentures (RPDs) are a simple method for replacing teeth for patients missing some of their natural teeth. In 2005, over 500,000 partial dentures were provided in the UK at a cost of over £56 million to the NHS.² Approximately one third of adults aged 55 years and over in the UK has a partial denture.¹ In the last 30 years, the proportion of partial denture wearers in the over 55 age group has increased and among adults aged 65 years and over this proportion has doubled.¹ If, as anticipated, this trend continues, this will have a direct effect on provision and cost to the NHS.

Irrespective of an intended benefit to appearance and function, a number of studies have indicated poor patient acceptance of RPDs, with findings of some 30-50% of patients never or only occasionally wearing their denture commonly reported.^{3,4} Further, cross sectional studies and longitudinal clinical trials have reported an increased incidence of caries and periodontal breakdown when RPDs are worn.⁵⁻⁸ This apparent poor compliance with wearing RPDs, together with their potential to generate an additional long-term treatment need, represents a considerable potential waste of resource within the NHS. The reasons for this discrepancy are unclear but may reflect the attitudes and expectation of patients, the clinical knowledge and technique of dentists, or administrative and financial restrictions. If these are identified accurately, practical guidelines can be developed to target RPD treatment more effectively in the NHS.

The aim of the present study was to explore the factors shaping the pattern of RPD provision by dentists in the UK.

METHODS

Sampling

The sampling frame was the Dental Practice Board (DPB) register. Samples were drawn from 65 health authorities (HAs) in England. HAs were randomly selected after stratification based on NHS Executive region, Jarman Index (quartiles),

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ratio of dentists/1,000 population (above and below median) and population density, to include sparsely populated areas. General dental practitioners (GDPs) were randomly sampled after stratification to provide 25% working in deprived areas and 25% in areas of low population density. Based on pilot data, we estimated that a sample of 400 would enable us to achieve confidence limits of 10 percentage points in the analysis of categorical variables.

To ensure confidentiality and comply with UK research governance requirements, the DPB administered all correspondence and dispatch of postal questionnaires. The study team were blind to the identity of the practitioners sampled, while the DPB itself did not receive individual responses.

An initial questionnaire and covering letter were sent to dental practitioners, followed by two reminders at three weekly intervals.

Data collection

A postal self-completion questionnaire was developed, derived from themes identified through a literature review and interviews with dental practitioners.⁹ The questionnaire contained the following sections:

- a) *Current practice and provision of RPDs.* GDPs were asked to estimate their prescription rates for both acrylic and cobalt chrome RPDs during the previous year
- b) *Factors influencing the success or failure of a RPD.* GDPs were asked to indicate how likely a list of factors were to result in the success or failure of an RPD including dental factors, patient factors, design and aftercare. Each factor was scored from -5 to +5 with -5 indicating increased chance of failure and +5 indicating increased chance of success. Success was defined as a denture that is stable and comfortable and the patient is able to wear it all day
- c) *The process of providing RPDs.* Four case studies were provided that GDPs might come across in practice. They were asked to rate on a five point scale (ranging from 1 = no influence to 5 = very strong influence) the influence of 11 factors on their decision to prescribe a RPD. The 11 factors covered issues of dental status, function, patient preference, patient age, cost, published evidence and availability of alternative treatments
- d) *Attitudes to RPD provision.* GDPs were asked to indicate the extent to which they agreed or disagreed with a series of statements about RPDs, including issues of cost, NHS fee structure, GDP experience, training, job satisfaction, dental status, material used and patient preference
- e) *Details about the characteristics of the practitioner and their practice.* Demographic details, including gender, number of years since graduation as a dentist, postgraduate training and type of practice were also collected.

Initially, cognitive interviews were carried out with 11 GDPs at Newcastle University Dental School to test the survey questionnaire. A pilot postal study was then conducted with a representative sample of 60 dental practitioners (response rate 55%). The questionnaire was found to have acceptable validity properties, and required minor modifications prior to use in the main part of the study.

Table 1 Demographic characteristics of GDPs

Gender	
Male	68%
Female	32%
Years since graduation	
> 5 years	83%
Vocational trainer	18%
Type of practice	
NHS only	20%
Private only	3%
Mixed	77%
Laboratory on site	11%
Practice ownership	
Sole	31%
Co-owner	24%
Not included	45%

Table 2 Acrylic and chrome RPD prescription profile

Acrylic	
Low <10	15%
Medium >10 and <50	58%
High 50+	27%
Chrome	
Low 0-5	37%
Medium >5 and <20	43%
High 20+	20%

Table 3 Reported factors associated with success of a RPD

Factor influencing success (n = 376-384)	Mean score (sd)
RPD has high aesthetic value to the patient	4.07 (1.41)
Advice is given about the care of remaining teeth	3.22 (1.50)
Time is made available to make minor adjustments	3.19 (1.47)
Saddles of RPD are bounded	3.09 (1.56)
RPD has high functional value to the patient	3.05 (1.64)
Advice is given about how to adjust to wearing a RPD	3.01 (1.45)

Statistical methods

Data were analysed descriptively using SPSS for Windows version 10. Chi-square tests were used to test association between categorical variables and analysis of variance (ANOVA) was used for continuous variables. P values <0.05 were accepted as statistically significant.

RESULTS

Response to the study

Seven hundred and ninety-six questionnaires were sent to general dental practitioners. Three hundred and eighty-five questionnaires were returned (response rate 48%). Questionnaires were returned from 62 HAs, 54% of which were from deprived areas and 20% were from areas with low population density.

Table 4 Reported factors associated with failure of a RPD

Factor influencing failure	Mean score (sd)
Patient did not ask for a RPD	-3.19 (1.56)
Includes unbounded saddles	-2.20 (1.82)
RPD replaces teeth in lower jaw	-1.93 (1.99)

Table 5 Mean influence score

Factor	Mean influence (sd)
Patient's desire not to have a RPD	4.25 (0.11)
Dental status of adjacent teeth	4.00 (0.14)
Likely prognosis for remaining natural teeth	3.91 (0.05)
Tooth loss due to dental neglect	3.81 (0.05)
Potential for a RPD to improve function	3.59 (0.48)
Judgment about whether the patient can cope with the more expensive preparatory work for alternative treatment options	3.55 (0.09)
Financial aspects of the treatment	3.54 (0.04)
Time since loss of teeth	3.40 (0.16)
Confidence in providing other possible treatment options	3.27 (0.03)
Age of the patient	3.03 (0.08)
Published evidence about RPDs	2.71 (0.07)

Table 6 Reason for providing RPD

Reason for providing RPD	Rank
For the sake of appearance	1
To enhance social confidence	2
To provide occlusion and improve chewing ability	3
To improve biting food	4
To reduce wear and tear on teeth	5
To enhance speech	6

Demographic characteristics of general dental practitioners

These data are summarised in Table 1. The majority of respondents were male (68%), ranging in experience from newly qualified to 56 years in practice. In terms of type of practice represented, over three quarters of GDPs worked in a combined NHS and private practice, 20% in a NHS only practice and three percent in a private only practice.

GDP practice and provision of removable partial dentures

According to GDPs' own estimates, the number of partial dentures provided in the last year ranged from two to 800 (mean 59.38). More upper than lower RPDs were provided and more acrylic than chrome RPDs were prescribed. The respondents' prescription profile is shown in Table 2. Those most likely to prescribe acrylic RPDs were also most likely to be from NHS

only practices ($p < 0.001$). High providers of chrome RPDs were more likely to be vocational trainers ($p < 0.01$) and/or were more likely to have postgraduate qualifications ($p < 0.05$). The findings also highlighted that low prescribers of acrylic and high prescribers of chrome dentures were more likely to endorse the view that dentures made from chrome rather than acrylic would be successful (ANOVA $p < 0.05$).

Only three percent of GDPs did not provide any cobalt chromium based RPDs in the previous year. For the remainder, 50% designed the framework themselves, 23% left the design to a technician and 27% designed it with the technician. There was no association between who designed the RPD and prescription rates.

Twenty-two percent of GDPs routinely arranged a review appointment for patients shortly after providing a RPD. The remaining GDPs advised patients to make a review appointment only if they experienced problems with their RPD. There was no association between follow-up appointment practice and type of practice. However, those most likely to provide acrylic RPDs were least likely to routinely arrange a review appointment for patients after providing their RPD ($p < 0.01$).

After a first time provision of a RPD, 89% of GDPs reported providing oral hygiene instructions without referral to a hygienist. This did not differ by type of practice or level of use.

Factors influencing the success or failure of an RPD

GDPs scored a number of factors from -5 to +5 with -5 indicating increased chance of failure and +5 indicating increased chance of success. Mean scores were calculated for each variable and ranked in order beginning with the strongest influence. Table 3 shows the factors reported as most associated with increased chance of success and Table 4 shows the factors reported as most associated with increased chance of failure.

These findings indicate that dentists strongly believe that appearance is the principal driving factor influencing patients to wear RPDs. While the majority of GDPs reported that after-care improves the chance of success of the RPD, as already highlighted, many GDPs indicated that they do not routinely arrange a review appointment with patients.

The most significant factor associated with failure to wear a RPD was if the decision to provide a RPD did not come from the patient. RPDs restoring unbounded saddles and missing teeth in the mandible were also considered important factors, albeit to a much lesser degree.

The process of providing RPDs

When given four case studies that GDPs might come across in practice and asked to rate a number of factors that influence their decision when providing a RPD, analysis of variance showed there was no difference in the way GDPs responded between case studies ($F_{3,30} = 0.4$; $p = 0.74$). However, there was a statistically significant difference in the way they responded between factors that influence their decision ($F_{10,30} = 26.2$; $p < 0.001$). The factors shown in Table 5 were regarded as important in the decision to provide a RPD regardless of case, and these are ranked in order of strength of influence.

GDPs were also asked to rank six reasons for providing RPDs in order of importance, and the ranking based on frequency of responses is shown in Table 6.

Statement	% GDPs agreed
My experience in practice has influenced the patients I select for RPDs	91%
The gross NHS fee (after deductions for laboratory costs) for RPDs is a disincentive to providing cobalt chrome RPDs	89%
I would like to be able to provide more cobalt chrome RPDs on the NHS	68%
Patients themselves regard the idea of a RPD as off-putting	59%

When given the opportunity to report any other reasons they felt were important in their decision to provide a RPD, 114 GDPs responded (30%). Over a third reported patient desire and motivation as an important factor, bearing out the main factor influencing prescription decisions.

Attitudes to removable partial dentures

Regarding factors which influence day-to-day attitudes to RPD provision, respondents were asked to indicate whether they agreed with a variety of statements. In terms of statements with which respondents *agreed*, the outcome of this section is shown in Table 7. Previous experience in providing RPDs is regarded as a factor influencing RPD provision in the vast majority of cases. The fee provided by the NHS for cobalt chromium based RPDs was also regarded as a disincentive by 89% of respondents.

The majority of GDPs agreed they would like to provide more chrome RPDs on the NHS (68%), of whom the majority were, at present, more likely to prescribe acrylic RPDs ($p < 0.01$).

Concerning statements with which respondents *disagreed*, the frequency of responses is shown in Table 8.

These data indicate that the fee structure for RPDs is a major consideration influencing prescription of RPDs on the NHS.

DISCUSSION

This study is the first of its kind in the UK to investigate factors influencing prescription of RPDs. The response rate of 48% is reasonable for a study of this kind, and the demographic characteristics of the respondents suggest that the results can be generalised. The respondents came from a wide geographical range of health authorities, and it is not likely that a significant response bias has occurred. We were unable to detect any systematic difference between responders and non-responders. A further important consideration in this regard was the process used to develop the study questionnaire. This instrument was grounded in the outcomes of qualitative interviews with GDPs, and its content validity is, therefore, appropriate for administration to GDPs.

The focus of this paper was to describe dentists' attitudes and practice in providing RPDs. Overall, it is clear that the provision of RPDs continues to be primarily patient led. The most important factors reported as influencing both the GDPs decision to provide a RPD and its subsequent success were patient desire to have a partial denture and aesthetic value associated with having a RPD. This supports previous findings^{10,11} and endorses the view that patients are unlikely to wear a RPD in the absence of self perceived need.^{4,11-12}

Statement	% GDPs disagreed
The current NHS fee structure for RPDs is a fair reflection of the work involved in providing an acrylic RPD	86%
It is perfectly feasible to achieve a high quality cobalt chrome RPD within the current NHS fee structure	83%
In general patients prefer a RPD to a bridge	78%
Most RPDs end up being left in the drawer	65%

Interestingly, in the present study, patient desire to have a RPD was reported by dentists as the most important factor in providing a RPD regardless of any other individual case factor.

However, the decision making process is also influenced by a number of factors including time, previous experience in providing RPDs, cost and the NHS fee structure. There appears to be a divergence among GDPs more likely to prescribe cobalt-chromium based dentures than acrylic. Dentists without post-graduate qualifications or involvement in vocational training, and who work in predominantly NHS practices, were more likely to prescribe acrylic dentures than cobalt-chromium based dentures. This may be a reflection of financial considerations or demands of patients in socio-economically deprived areas. Consistent with the literature, the majority of respondents in the present study supported the view that success would be positively influenced if the dentist designed the RPD.^{13,14} However, only half of all dentists reported designing their own RPD in practice, again possibly associated with the difficulty of resolving time and cost. This is less than previous studies have reported. Walter found that 73% of dentists reported designing their own partial denture.¹⁵ This is of concern, particularly when we consider that Walter also suggested that the number of dentists who claim to design dentures is invariably greater than data collected from British laboratories can confirm.

Clearly the present study highlights that for some dentists there is a divergence between knowledge and practice. This inconsistency is most apparent in decisions regarding material used, level of follow-up and responsibility for design, all of which GDPs directly associated with success of the RPD and involve greater practitioner time and cost, which are difficult to resolve or justify within NHS guidelines. As Wright reported over a decade ago, the current fees do not give the dental surgeon an incentive to provide dentures under the NHS.³ Interestingly, published evidence in the scientific literature was not widely regarded as influential in the decision making process for prescribing RPDs. In an era of emphasis on evidence-based decision making, the reasons for this warrant further investigation.

Cost and the NHS fee structure were also key themes to emerge as important factors in the decision making process when providing a RPD. Cost and the NHS fee structure were not seen to be a fair reflection of the work involved. Respondents reported the current NHS guide as '*...highly unrealistic unless the practice is prepared to go bankrupt*', '*laughable*', '*a joke*' and '*...similar to donating to charity*'. When asked about specific materials, respondents who were currently most likely to provide an acrylic RPD were more likely to say they would

prefer to provide more cobalt chrome on the NHS. Indeed, 91% of GDPs believed that using cobalt chrome would to some degree improve the chance of success of a RPD. However, the majority of GDPs agreed, regardless of prescribing practice, that the gross NHS fee for a RPD is not feasible and in fact is a disincentive to providing cobalt chrome RPDs. A number of dentists suggested that within the NHS fee guidelines, it is impossible to balance quality, time needed and profit when providing a cobalt chrome RPD. Similarly, while the majority of GDPs reported that aftercare improves the chance of success of the RPD, many GDPs in practice did not follow their own beliefs and failed to routinely arrange a review appointment with patients or refer patients to a hygienist.

CONCLUSION

There is general agreement that patient driven factors are critical to the outcome of RPD provision. However, there are apparent barriers to best practice in RPD design and provision which may be a reflection of dentists' perceptions of the NHS fee structure for RPDs.

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1. Kelly M, Steele J, Nuttall N *et al.* *Adult dental health survey. Oral health in the United Kingdom 1998.* London: HMSO, 2000.
2. Dental Practice Board. *2004-2005 digest of statistics.* Eastbourne: Dental Practice Board, 2005.
3. Wright S M. Prosthetic practice in the National Health Service: 2. Partial dentures. *Dent Update* 1992; **19**: 424-428.
4. Jepson N J A, Thomason J M, Steele J G. The influence of denture design on patient acceptance of partial dentures. *Br Dent J* 1995; **178**: 296-300.
5. Drake C W, Beck J D. The oral status of elderly removable partial denture wearers. *J Oral Rehabil* 1993; **20**: 53-60.
6. Mojon P, Rentsch A, Budtz-Jorgensen E. Association between prosthodontic status, caries, and periodontal disease in a geriatric population. *Int J Prosthodont* 1995; **8**: 564-571.
7. Steele J G, Walls A W, Murray J J. Partial dentures as an independent indicator of root caries risk in a group of older adults. *Gerodontology* 1997; **14**: 67-74.
8. Jepson N J A, Moynihan P J, Kelly P J, Watson G W, Thomason J M. Caries incidence following restoration of shortened lower dental arches in a randomized controlled trial. *Br Dent J* 2001; **191**: 140-144.
9. Graham R, Mihaylov S, Jepson N, Allen P F, Bond S. Determining 'need' for a removable partial denture: a qualitative study of factors that influence dentist provision and patient use. *Br Dent J* 2006; **200**: 115-118.
10. Kronstrom M, Palmqvist S, Soderfeldt B. Prosthodontic decision making among general dentists in Sweden. II: The choice between fixed and removable partial dentures. *Int J Prosthodont* 1999; **12**: 527-533.
11. Steele J G, Walls A W G, Ayatollahi S M, Murray J J. Major clinical findings from a dental survey of elderly people in three different English communities. *Br Dent J* 1996; **180**: 17-23.
12. Davenport J C, Basker R M, Heath J R, Ralph J P, Glantz P O. Need and demand for treatment. *Br Dent J* 2000; **189**: 364-368.
13. McCord J F, Grey N J A, Winstanley R B, Johnson A. A clinical overview of removable prostheses: 1. Factors to consider in planning a removable partial denture. *Dent Update* 2002; **29**: 376-381.
14. Lechner S K, Thomas G A. Removable partial denture design: importance of clinical variables. *Eur J Prosthodont Restor Dent* 1994; **2**: 127-129.
15. Walter J D. A study of partial denture designs produced by an alumni group of dentists in health service practice. *Eur J Prosthodont Restor Dent* 1995; **3**: 135-139.