

## Factors influencing the provision of removable partial dentures by dentists in Ireland

### Précis

As the number of partially dentate patients increases, it is important to determine factors that influence acceptance of removable partial dentures (RPDs). This study illustrates current trends in the provision of RPDs in Ireland, and factors that influence clinical practice in the management of partially dentate patients.

### Abstract

Factors influencing clinical treatment of partially dentate patients are varied, and there is a need to identify factors influencing success in the provision of removable partial dentures. The aim of this study was to assess the attitudes of general dental practitioners (GDPs) in Ireland towards tooth replacement and use of RPDs, in partially dentate older adults. The sample frame was the Register of Dentists in Ireland; data were also collected from a sample of dentists practising under NHS regulations in Northern Ireland. Validated questionnaires were sent to all dentists on the Register of Dentists in the Republic of Ireland, and dentists working under NHS regulations registered with the Central Services Agency in Northern Ireland. Content of the questionnaire included details of the dentist themselves, their dental practice and the profile of partial denture provision. They were also asked to give their views on factors influencing the success or failure of an RPD, the process of providing RPDs and their attitudes to RPD provision. A total of 1,143 responses were received, a response rate of 45%. A mean number of 61 RPDs per annum were provided, with 75% of dentures provided being acrylic based. Respondents indicate their belief that cobalt-chromium based dentures had a longer prognosis than acrylic dentures, but less than half (46%) claim to design the frameworks themselves. Patients' attitudes are considered influential in the success of RPD provision, and their influence on appearance is considered the most important factor influencing success. The most important factors influencing failure are: the patient not requesting a denture; an RPD restoring unbounded saddles; and, lower RPDs. Although considered important, approximately 60% of the sample do not routinely organise follow-up appointments for patients provided with RPDs. The fee structures in the DTSS and DTBS are considered a barrier to quality in the provision of partial dentures.

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### Introduction

Removable partial dentures (RPDs) are a simple method for replacing teeth for patients missing some or all of their natural teeth. From a professional perspective, potential benefits of partial dentures include: a) adjacent and opposing natural teeth are prevented from drifting; b) the burden of occlusal loading on remaining natural teeth is reduced; and, c) oral comfort and function is enhanced. However, whether this is essential has been questioned by some researchers, who suggest that older adults have different functional needs to young

patients and therefore do not need a complete dentition. Furthermore, the World Health Organisation (WHO) suggested that a goal for oral health in the year 2000 should be that adults retain for life a healthy, functioning dentition of at least 20 teeth and not require an oral prosthesis to replace missing teeth.<sup>1</sup> Kayser and co-workers have proposed the shortened dental arch concept as a strategy for maintaining a functional rather than a complete dentition in older adults.<sup>2</sup> Using this approach, treatment goals are limited to maintaining key teeth for

function and appearance purposes. The rationale is that treatment can be simplified and directed at the patient's particular needs. In a six-year longitudinal study, Witter *et al* compared patients provided with RPDs and partially dentate patients managed using the shortened dental arch approach.<sup>3,4</sup> They found that this approach worked well in carefully selected patients and that removable partial dentures did not appear to significantly improve oral function or comfort. From an epidemiological point of view, many studies indicate that patients are willing to accept posterior spaces and don't seek treatment to replace missing molar teeth.<sup>5,6</sup> What remains unclear is whether this is because tooth spaces are acceptable, or perhaps more acceptable than the alternative of having a partial denture. In an analysis of data from a survey of oral health of older adults in the United Kingdom, Steele *et al*<sup>7</sup> assessed the importance of tooth loss on oral health-related quality of life. Having controlled for confounding factors such as gender, age and denture wearing, they concluded that having 20 or more teeth was an important predictor of satisfaction with oral health. This analysis is consistent with findings reported from the cohort study of Witter and colleagues.

Until now, there has been a lack of research that explores the reasons for provision of RPDs and patient acceptance of RPDs. A number of reports, including observational and cohort studies, indicate that patients provided with partial dentures discard them or wear them on an occasional basis.<sup>8-11</sup> 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. Further, cross-sectional studies and longitudinal clinical trials have reported an increased incidence of caries and periodontal breakdown when RPDs are worn.<sup>12,13</sup> Evidence from national surveys suggests a significant divergence between clinical intent and treatment outcome as measured by the prevalence of use of RPDs. This, together with their potential to generate an additional long-term treatment need, represents a considerable potential waste of resource. The reasons for this discrepancy are unclear but may reflect the attitudes and expectations 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.

Information regarding the outcome of treatment to provide RPDs to partially dentate adults in Ireland is currently lacking, and little is known about the effectiveness of tooth replacement strategies employed by dentists in the Republic of Ireland. Furthermore, the influence of the different healthcare funding mechanisms on treatment-seeking behaviour of middle-aged and elderly adults in Ireland is also unclear. Data from the 2001/'02 adult oral health survey in Ireland showed that 56% of adults over the age of 65 years need some kind of treatment to replace missing teeth.<sup>14</sup> Although this information is based on objective data collection criteria, it gives an indication of the potential scale of treatment need for adult patients in the Republic of Ireland. While many adults have missing teeth, not all will necessarily seek treatment to replace them or use removable prostheses provided for them. As with the UK, this may represent a considerable waste of resources if subjective treatment

need is not accurately identified. To date, this research question has not been addressed in the Republic of Ireland.

The aim of the present study was to assess attitudes of GDPs towards tooth replacement and use of RPDs in partially dentate older adults.

The objectives of the study were to:

- determine the factors that shape provision of RPDs in the Republic of Ireland; and,
- determine whether provision of treatment by dentists and demand for RPDs is influenced by the different healthcare systems in the Republic of Ireland, particularly the DTSS and DTBS schemes.

### Methods

Ethical approval for the study was granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals. The sampling frame was the Register of Dentists in Ireland. Each dentist on the register was sent a questionnaire seeking their views on RPDs. The questionnaire was a modified version of that previously validated for use in the UK by the author and co-workers.<sup>15</sup> The questionnaire was derived from interviews with dentists, and contained five themes, namely:

- current practice and provision of RPDs;
- factors influencing the success or failure of an RPD;
- the process of providing RPDs;
- attitudes to RPD provision; and,
- details about the characteristics of the practitioner and their practice.

### 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 (2007).

### Factors influencing the success or failure of an 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.

### 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 an RPD. The 11 factors covered issues of dental status, function, patient preference, patient age, cost, published evidence and availability of alternative treatments.

### 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, DTBS/DTSS fee structure, GDP experience, training, job satisfaction, dental status, material used and patient preference.

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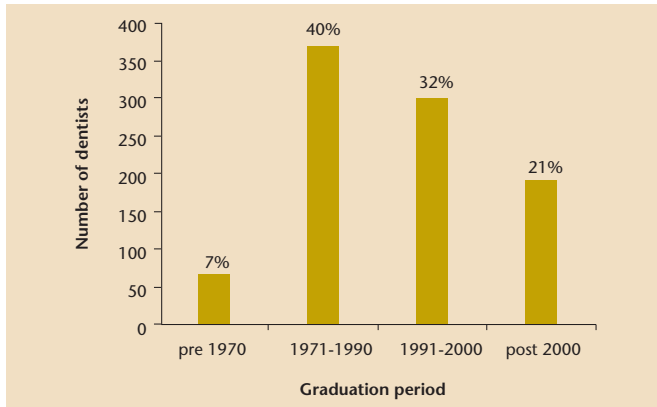


FIGURE 1: Distribution of respondents by time since graduation.

**Table 2: Proportion (%) of dentists providing <50 and >50 acrylic and cobalt-chromium-based RPDs, by country.**

	Acrylic dentures*		Cobalt-chromium dentures**	
	RoI	NI	RoI	NI
<50 per annum	14	3	68	58
>50 per annum	86	97	32	42
	*p=0.005, Chi-square		**p=0.14, Chi-square	

### 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.

Questionnaires were sent to the address given on the Register of Dentists, and a cover note was sent with the questionnaire outlining the purpose of the study and assuring confidentiality of responses. They were asked to complete the questionnaire as completely as possible, and to return it in the enclosed pre-paid envelope. A period of four weeks was allowed for a response, after which two follow-up mailings were made to get a response from all non-responders.

For the purpose of comparison, dentists working in the National Health Service (NHS) in Northern Ireland were also included. The sampling frame was the register of dentists held by the Central Services Agency (CSA) in Northern Ireland. This is a list of dentists contracted to provide dental care under NHS regulations in Northern Ireland. The UK version of the questionnaire was used for this group, and the same method for handling non-responders was employed.

Data entry screens were designed in Microsoft Excel. All data were double entered by trained personnel (Data Entry Bureau). The data were transferred to SAS for entry validation and discrepancies were resolved with reference to the returned questionnaires. All data were subject to consistency checks and cleaned as appropriate.

Data were analysed descriptively, and frequency distributions are reported. Chi-squared tests were used when comparing categorical data.

### Results

There were 817 responses from dentists resident in the Republic of

**Table 1: Percentage of very low, low, medium and high providers of RPDs per annum, by country.**

	Republic of Ireland	Northern Ireland
<b>Number of RPDs provided per annum</b>		
<10	13%	6%
10-49	31%	37%
50-99	18%	21%
>100	18%	24%
No answer	20%	12%
Differences not statistically significant (p=0.185, Chi-square test)		

**Table 3: Factors that dentists believe influence the success of RPDs.**

Factor influences success	Mean (SD) score
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 an RPD	3.01 (1.45)

Ireland, with 326 respondents from Northern Ireland, giving a total of 1,143 responses. The overall response rate was 45%. The gender breakdown was 61% male to 39% female.

The distribution of respondents by time since graduation is shown in **Figure 1**. This shows that respondents had a broad range of clinical experience. The number of RPDs provided by respondents ranged from 2-651, with a mean number of 61 RPDs provided per annum. Some 75% of RPDs provided were acrylic based. A comparison of prescribing profiles is shown in **Table 1**. This table shows the breakdown by very low (<10), low (<50), medium (50-100) and high (>100) providers of partial dentures provided annually by category, i.e., fewer than 10 per annum, greater than 100 per annum, etc. There were no significant differences between the number of RPDs provided annually in the Republic of Ireland and Northern Ireland.

In terms of proportions of acrylic/cobalt-chromium based dentures provided, **Table 2** shows the breakdown into percentage of dentists providing <50 and >50 acrylic and cobalt-chromium based RPDs per year, by country. These data indicate that the proportion of dentists providing >50 acrylic-based RPDs is larger in Northern Ireland.

Dentists believe that the average lifespan of an acrylic-based RPD is 5.7 years, whereas a cobalt-chromium based denture has an average lifespan of 10.6 years. In terms of designing cobalt-chromium based frameworks, 46% claim to design the frameworks themselves while 22% delegate this task to a dental technician.

Concerning follow-up/review of patients, only 40% of respondents routinely arrange post-treatment review appointments. The remaining GDPs advised patients to make a review appointment only if they experienced problems with their RPD. Approximately 10% of respondents refer their RPD patients to a dental hygienist for oral

**Table 4: Factors that dentists believe influence the failure of RPDs.**

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

**Table 5: Factors influencing the decision to provide RPDs, ranked in order of importance.**

Factor	Mean (SD) influence
The patient's desire not to have an RPD	4.25 (0.11)
The dental status of adjacent teeth	4.00 (0.14)
The likely prognosis for remaining natural teeth	3.91 (0.05)
Tooth loss due to dental neglect	3.81 (0.05)
The potential for an RPD to improve function	3.59 (0.48)
My judgment about whether the patient can cope with the more expensive preparatory work for alternative treatment options	3.55 (0.09)
The financial aspects of the treatment	3.54 (0.04)
The time since loss of teeth	3.40 (0.16)
Your confidence in providing other possible treatment options	3.27 (0.03)
The age of the patient	3.03 (0.08)
The published evidence about RPDs	2.71 (0.07)

hygiene instruction and maintenance, whereas the remaining 90% of respondents provide oral hygiene instruction themselves.

When considering factors influencing the success of RPDs, patients' perceptions on the importance of a denture in restoring appearance was considered the most important factor. Restoration of function, though important, was considered less influential. These data are shown in **Table 3**, and are based on the measurement scale:

**Increased chance of failure**   **No influence**   **Increased chance of success**  
 -5   -4   -3   -2   -1   0   1   2   3   4   5

In terms of factors influencing failure of RPDs, **Table 4** indicates the factors that dentists believe most likely to result in patients not wearing an RPD. The data show that patients' wishes are the most important factor influencing this.

A summary table indicating the factors that influence dentists to provide RPDs is shown in **Table 5**. These data indicate that patients' wishes are the most important factor influencing the decision whether or not to provide an RPD. Factors related to dental status are considered important, as are financial aspects. Intriguingly in an era of evidence-based dental care, published evidence about RPDs is very moderately influential in decisions about RPD provision.

When asked to indicate which statements they agreed and disagreed with, the highest prevalence of agreement related to the influence of previous experience and fees for treatment (**Table 6**).

Statements with which dentists generally disagreed are shown in **Table 7**. These data indicate that dentists consider the fee structure for RPDs to be a barrier to quality provision of care.

**Table 6: Statements with which dentists agreed.**

Statement	% GDPs agreed
My experience in practice has influenced the patients I select for RPDs	92%
The gross DTSS/DTBS fee (after deductions for laboratory costs) for RPDs is a disincentive to providing cobalt-chrome RPDs	82%
I would like to be able to provide more cobalt-chrome RPDs on the DTSS/DTBS	77%
I would never have an RPD myself	62%

**Table 7: Statements with which dentists disagreed.**

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

## Discussion

This study is the first of its kind in the Republic of Ireland to investigate factors influencing prescription of RPDs. The response rate of 45%, while lower than ideal, is reasonable for a study of this kind, and the demographic characteristics of the respondents suggest that the results can be generalised. This is a trade-off in using the entire Register of Dentists as a sampling frame in the Republic of Ireland. This database includes dentists living overseas or on temporary registration arrangements, expected that a significant number of individuals on the Register might not respond. However, the respondents came from a wide geographical range, and represented broadly a wide category of periods since time of graduation. Secondary analysis indicated that the characteristics of non-responders were not that different to responders, and it is not therefore likely that a significant response bias has occurred.

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 GDP's decision to provide an RPD and its subsequent success were patient desire to have a partial denture and aesthetic value associated with having an RPD. This supports previous findings and endorses the view that patients are unlikely to wear an RPD in the absence of self-perceived need. Active participation of patients in the treatment decision-making process is seen as influential in treatment outcome, specifically in

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relation to patient satisfaction.<sup>16-18</sup> Interestingly, in the present study patient desire to have an RPD was reported by dentists as the most important factor in providing an 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 fee structure available for providing RPDs. This may be a reflection of financial considerations or demands of patients in socio-economically deprived areas. Kronstrom *et al*<sup>19,20</sup> have reported that decision-making is influenced by gender of the dentist, and by whether they work in the private sector or in the public service. They indicate that fixed prosthodontics are far less used in a public healthcare setting in Sweden, which is probably a reflection of the influence of financial resources available to pay for oral healthcare.

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. 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. This is of concern, especially if it is felt that success is likely to be influenced by who designs the denture. A further issue is the high prevalence of acrylic-based dentures provided, despite the fact that 77% of respondents would like to provide more cobalt-chromium-based dentures. This may be a reflection of the fee scales provided for RPDs. Another influence could be the relative lack of technical support for making cast cobalt-chromium frameworks in the Republic of Ireland, as reported previously by Lynch and Allen.<sup>21</sup>

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. 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 DTBS/DTSS fee structure (NHS fees in Northern Ireland) were also key themes to emerge as important factors in the decision-making process when providing an RPD. These fee structures were not seen to be a fair reflection of the work involved. In the UK study reported by Allen *et al*<sup>20</sup> 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 an RPD. However, the majority of GDPs agreed, regardless of prescribing practice, that the gross NHS fee for an 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. In the present study, respondents from the Republic of Ireland offered a slightly different emphasis on this. While generally agreeing that the fees provided by the DTSS/DTBS schemes were not adequate, there was also a sense that RPDs are seen as a cheap alternative to the preferred option of fixed prosthodontics (i.e., fixed bridgework or implants). This is shown in free comments made by respondents such as " ... limited finances rule out other treatments ... ". Potentially, there may be an equity issue for Medical Card holders, as they are only offered acrylic-based dentures, " ... in the case of medical card holders there is no other treatment option ... ".

Overall, the findings reported in this study are quite similar to the UK study reported by Allen *et al*.<sup>15</sup> There is a greater prevalence of acrylic denture provision in the UK, but there were no other major differences noted between dentists in the Republic of Ireland and the UK. RPDs are seen to have a role in the management of partially dentate patients in both countries. However, some clear patterns emerge. Patient attitude to aesthetics appears to be a major influence in the success of RPDs, particularly in the upper jaw. Fee structures are an apparent disincentive to RPD provision in both countries. Finally, best practice in relation to routine patient follow-up and designing RPDs appears to be somewhat less than ideal.

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