

## Why do general dental practitioners refer to a specific specialist endodontist in practice?

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### Abstract

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**Aims** To identify the factors that influence the decision of general dental practitioners (GDPs) in Northern Ireland to refer to a specific specialist endodontist.

**Methodology** A self-administered questionnaire was sent to 220 GDPs in Northern Ireland. The questionnaire comprised questions on demographic characteristics, pattern of practice, pattern of referral and factors influencing the decision to refer to a specific specialist endodontist in practice. The data were analysed using descriptive statistics and the chi-squared ( $\chi^2$ ) test at the 0.05 level of significance.

**Results** The response rate was 81%. All respondents stated that they carried out root canal treatment, and the majority (83%) stated that they also carried out root canal retreatment. A minority of respondents (11%) stated that they carried out surgical endodontics. These individuals were more likely to be men, hold a postgraduate qualification, or work in a rural

location. The majority of respondents (94%) referred patients with an endodontic problem. These individuals were more likely to be women, not hold a postgraduate qualification, or not carry out surgical endodontics. GDPs indicated a preference for referring to a specialist endodontist in practice over other treatment providers. Factors considered to be of importance in the decision to refer to a specialist endodontist in practice included the practice location of, reputation of, communication with and patient management by the specialist endodontist. The greatest proportion of respondents ranked short waiting time for a consultation as the top promoter when referring to a specific specialist endodontist in practice.

**Conclusion** The decision by GDPs to refer to a specific specialist endodontist in practice is multifactorial and influenced by several factors independent from the nature of endodontic disease. In Northern Ireland, the top promoter for referring to a specific specialist endodontist in practice was a relatively short waiting time for a consultation.

**Keywords:** referral, specialist endodontist.

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### Introduction

General dental practitioners (GDPs) are the main referral source for specialist endodontists in practice (Johns *et al.* 2006). The success of a specialist is

dependent on GDPs providing a continual flow of referrals (Nixon & Benson 2005). It is therefore important for specialists to recognize that referring health care professionals is a customer category (Armstrong *et al.* 1999) and to understand the factors that influence the decision of GDPs to refer to a specific specialist. The General Dental Council (GDC 2005), the European Society of Endodontology (ESE 2006); and the American Association of Endodontists (AAE 2009) provide guidance for GDPs when making a referral.

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GDPs should refer cases that are perceived to be beyond their abilities or if the patient asks to be referred.

Within the United Kingdom (UK), GDPs may refer patients with an endodontic problem to various specialist referral services in hospital or practice. This includes specialists in Endodontics, Restorative Dentistry or Oral Surgery. A number of studies have investigated the referral relationship in Restorative Dentistry (Nixon & Benson 2005), Periodontics (Linden 1998, Linden *et al.* 1999, Zemanovich *et al.* 2006, Sharpe *et al.* 2007) and Oral Surgery (Coulthard *et al.* 2000a,b). These studies indicate the key factors that influence the decision of a GDP to refer to a specific specialist dental service are waiting times; distance to service and cost of treatment. There is a paucity of literature on the factors influencing the decision by GDPs to refer to a specific specialist endodontist in practice.

In the UK, there are currently 213 registrants on the specialist list for Endodontics (GDC 2010). Of these, 173 are registered in England, and three are registered in Northern Ireland. All three practice in Belfast: one is a restorative specialist in hospital, one is a restorative specialist in practice; and one is a specialist endodontist in practice. Specialist endodontic services in Northern Ireland are scarce. There is little choice for GDPs in selecting and subsequently referring to a specific specialist endodontist. The aims of this study were (i) to investigate the provision of endodontic care by GDPs in Northern Ireland; (ii) to investigate the endodontic referral patterns of GDPs in Northern Ireland and (iii) to identify the factors that influence the decision of GDPs to refer to a specific specialist endodontist in practice.

## Materials and methods

This study was granted ethical approval by the King's College London Biomedical & Health Sciences, Medicine and Physical Sciences & Engineering Research Ethics Sub-Committee (reference number: BDM/08/09-38). The questionnaire was piloted on 10 GDPs in Northern Ireland and 10 postgraduate dental students. The target population of this investigation was all the GDPs in Northern Ireland. A sample of 220 GDPs was chosen to represent the target population of the then 877 dentists in Northern Ireland. The sample in this study was generated randomly from a list of dentists in Northern Ireland (Central Services Agency 2008).

The design and administration of the questionnaire was based on the Cochrane review of methods to

increase response rates to postal questionnaires (Edwards *et al.* 2007). The questionnaire was kept short, i.e. one-page, double-sided (Fig. 1). Question categories included demographics of the participant; demographics of the participant's practice; pattern of current referral of patients with an endodontic problem; likelihood of referral of patients with an endodontic problem to a new endodontic service and factors influencing referral to a specific specialist endodontist in practice. The questionnaire was designed using a word processor (Microsoft Office Word 2007) and printed digitally in colour throughout using a professional printing company (Scanplus Print Group, London, UK).


The questionnaire was accompanied by a signed covering letter on headed paper; a participant information sheet and a prepaid first-class addressed return envelope. To prevent the feeling of a mass mailing, the name of the participant was hand written on each covering letter, and the postal address of the participant was hand written on each envelope. These were sent to participants in March 2009 by first-class post. Three weeks after the first mailing, non-respondents were identified through a unique identifying number. Non-respondents were sent two reminders. Briefly, the covering and reminder letters explained the aim of the study and specified that all information obtained would be kept confidential and that respondents would be entered into a prize draw for a £50 voucher. The reminders included a copy of the questionnaire, a participant information sheet and a further prepaid first-class return envelope.

Data were entered onto a spreadsheet (Microsoft Office Excel 2007) and transferred to a data analysis and statistical software programme (Minitab version 15; Minitab, State College, PA, USA). Analysis included descriptive statistics and non-parametric tests of significance, i.e. Chi-squared ( $\chi^2$ ) analysis. Statistical significance was accepted where  $P < 0.05$ .

## Results

### Response rate

The response rate was 81%. Response units are shown in Table 1. Ten of the original samples were not eligible because they did not meet the inclusion criterion, i.e. a GDP whose practice of dentistry is limited to Northern Ireland. There were no significant differences in response rates between respondents and non-respondents with regard to demographic variables.



Survey: selecting a specialist endodontist in practice

*BDM Research Ethics Sub-Committee Ref: BDM/08/09-38*

**1. Are you a general dental practitioner whose practice of dentistry is limited to Northern Ireland?**

<sup>1</sup> Yes     <sup>2</sup> No

**2. What best describes your position?**

<sup>1</sup> Practice owner

<sup>2</sup> Associate

<sup>3</sup> Vocational dental practitioner

<sup>4</sup> Other: *please specify* \_\_\_\_\_

**3. What best describes your type of practice?**

<sup>1</sup> Private

<sup>2</sup> NHS

<sup>3</sup> Mixed private and NHS

**4. How many practices do you work in?**

**5. How many patients are registered in your main practice?**

<sup>1</sup> 0-1500

<sup>2</sup> 1500-3000

<sup>3</sup> 3000+

**6. How many dentists work in your main practice, including you?**

**7. What is your gender?**

<sup>1</sup> Female     <sup>2</sup> Male

**8. What is your age on 1 January 2009?**

years    *e.g. 40 years*

**9. When did you obtain your primary dental degree?**

   *e.g. 1970*

**10. Where did you obtain your primary dental degree?**

<sup>1</sup> Queen's University Belfast

<sup>2</sup> Republic of Ireland dental school

<sup>3</sup> Mainland UK dental school

<sup>4</sup> Other: *please specify* \_\_\_\_\_

**11. Do you have a postgraduate dental qualification?**

<sup>1</sup> Yes: *please specify* \_\_\_\_\_

<sup>2</sup> No

**12. What type(s) of endodontic treatment do you undertake? (tick  all applicable answers)**

<sup>1</sup> Root canal treatment

<sup>2</sup> Root canal re-treatment

<sup>3</sup> Surgical root canal treatment

<sup>4</sup> I do not undertake endodontic treatment

**13. How often do you refer patients on average with an endodontic problem?**

<sup>1</sup> Never

<sup>2</sup> Less than once a month

<sup>3</sup> 1-5 patients per month

<sup>4</sup> 6-10 patients per month

<sup>5</sup> More than 10 patients per month

**14. Who do you currently refer patients with an endodontic problem to? Circle one number per row**

	Always	Most cases	Sometimes	Rarely	Never
Specialist endodontist in practice	1	2	3	4	5
Restorative consultant in hospital	1	2	3	4	5
Non specialist colleague	1	2	3	4	5
Oral surgeon in practice	1	2	3	4	5
Oral surgeon in hospital	1	2	3	4	5

**15. How likely would you be to refer to the following endodontic services, if available? Circle one number per row**

	Very likely	Likely	Neutral	Unlikely	Very unlikely
Specialist endodontist in practice	1	2	3	4	5
Specialist endodontist in hospital	1	2	3	4	5

Figure 1 Survey: Selecting a specialist endodontist in practice.

**16. Please rate the importance of the following factors in terms of their influence to promote your decision to select and subsequently refer to a specialist endodontist in practice:**

Circle one number per row. 1 = Very important, 2 = Important, 3 = Neutral, 4 = Unimportant, 5 = Very unimportant

Location factors		Very important				Very unimportant
1.	Specialist endodontist is located in close proximity (<25 miles) to your dental practice	1	2	3	4	5
2.	Specialist endodontist is located in close proximity (<25 miles) to the patient's home	1	2	3	4	5
3.	Specialist endodontist is located in close proximity to public transport	1	2	3	4	5
4.	Specialist endodontist is located in an urban area	1	2	3	4	5
5.	Specialist endodontist is located in a rural area	1	2	3	4	5
Practice factors		Very important				Very unimportant
6.	Specialist endodontist works in a practice with other dental specialists	1	2	3	4	5
7.	Specialist endodontist works in a practice with general dental practitioners	1	2	3	4	5
8.	Specialist endodontist works alone in practice	1	2	3	4	5
Reputation/character of specialist endodontist		Very important				Very unimportant
9.	Specialist endodontist has a likeable personality	1	2	3	4	5
10.	Other dentist(s) in your practice already refer(s) to the specialist endodontist	1	2	3	4	5
11.	Specialist endodontist offers Continuing Professional Development courses/lectures	1	2	3	4	5
Communication		Very important				Very unimportant
12.	Referral procedure to specialist endodontist is straightforward, e.g. email or pro forma	1	2	3	4	5
13.	Specialist endodontist provides good written communication back to you	1	2	3	4	5
Patient access & management		Very important				Very unimportant
14.	Specialist endodontist provides daily urgent/emergency appointments	1	2	3	4	5
15.	Specialist endodontist is open in the evening and weekends	1	2	3	4	5
16.	Waiting time for a specialist consultation is relatively short	1	2	3	4	5
17.	Cost of specialist treatment is inexpensive compared to other specialist endodontists	1	2	3	4	5
18.	Specialist endodontist uses an operating microscope	1	2	3	4	5
19.	Knowledge that specialist endodontist completes treatment in a single or few visits	1	2	3	4	5
20.	Specialist endodontist places a core/post following endodontic treatment	1	2	3	4	5
21.	Specialist endodontist places a temporary restoration following endodontic treatment	1	2	3	4	5
22.	Knowledge that the patient will be referred back to you following endodontic treatment	1	2	3	4	5

**17. From the above 22 factors, please rank the top three factors that would promote your decision to select a specialist endodontist in practice:**

= 1st promoter     = 2nd promoter     = 3rd promoter    e.g.  = 1st promoter

**18. Other comments:** *please continue on separate sheet if necessary*

Figure 1 (Continued).



**Table 1** Summary of response units

Unit	N
Returned questionnaires	183
Usable questionnaires (completed and partially completed)	171
Usable from 1st mail out	129
Usable from 1st reminder	33
Usable from 2nd reminder	9
Unknown eligibility: royal mail: 'addressee gone away'	2
Not eligible	10

### Description of the respondents

The ratio of female to male respondents was 79 : 90 (47% : 53%). The year of graduation ranged from 1966 to 2008. The mean time since graduation was 16 years (SD = 9.8). The distribution of time since graduation was positively skewed, with the greatest number of respondents (33%) being graduated for <10 years and the least number of respondents (1%) being graduated for 40 or more years. The vast majority of respondents (99%) obtained their primary dental degree in the UK or the Republic of Ireland. Most of the respondents (65%) had obtained their primary dental degree at Queen's University Belfast. A minority of respondents (19%) reported that they had a postgraduate dental qualification. All of these were a Diploma of membership of the dental faculties at the various Royal Colleges.

### Description of the respondents' practices

The vast majority of respondents' practices (90%) were located in urban areas. Nearly half of the respondents' practices (47%) were located 25 miles or more from the specialist endodontic services in Northern Ireland. Most respondents (69%) reported their practice as 'Mixed private and National Health Service (NHS)'. Only 10% of respondents reported their practice as 'Private'. The greatest percentage of respondents (30%) reported three dentists worked in their main practice.

### Description of the respondents' pattern of work

Respondents were mainly either practice owners (46%) or associates (48%). Seven respondents (4%) were vocational dental practitioners; two respondents (1%) were general professional trainees; and one (1%) respondent was an assistant. The majority of male respondents (69%) were practice owners, and this was

significantly higher than that of female respondents (20%) ( $\chi^2 = 40.043$ , d.f. = 1,  $P < 0.001$ ). The proportion of respondents who had been graduated for 10 or more years and were practice owners (66%) was significantly higher than respondents who had been graduated for <10 years (5%) ( $\chi^2 = 56.090$ , d.f. = 1,  $P < 0.001$ ).

All respondents carried out root canal treatment. Most of the respondents (83%) also carried out root canal retreatment. A significantly higher proportion of respondents who had a postgraduate qualification carried out root canal retreatment (97%) compared to respondents who did not have a postgraduate qualification (79%) ( $\chi^2 = 5.531$ , d.f. = 1,  $P = 0.019$ ). Eighteen respondents (11%) stated that they carried out surgical endodontic treatment, of which only one was woman. The proportion of male respondents who carried out surgical endodontic treatment (19%) was significantly higher than that of the female respondents (1%) ( $\chi^2 = 13.730$ , d.f. = 1,  $P < 0.001$ ). There was a significantly higher proportion of respondents who had a postgraduate qualification and carried out surgical endodontic treatment (28%) compared to respondents who did not have a postgraduate qualification (7%) ( $\chi^2 = 12.526$ , d.f. = 1,  $P < 0.001$ ). The proportion of respondents who worked in a rural practice and carried out surgical endodontic treatment (28%) was significantly higher than that of respondents who worked in an urban practice (9%) ( $\chi^2 = 6.210$ , d.f. = 1,  $P = 0.013$ ).

### Description of the respondents' referrals

The vast majority of respondents (94%) reported that they referred patients with an endodontic problem. It is not known if these referrals included all patients with an endodontic problem or referrals on occasion. Of these, the majority (87%) referred patients less than once a month (Table 2). None of the respondents referred six or more patients per month. The vast majority of female respondents (99%) referred patients,

**Table 2** Distribution of respondents' referral demographic variables

Number of patients referred per month (Useable responses = 169; Blank responses = 2)	N	%
Never refer	10	6
<1 per month	139	82
1-5 per month	20	12
≥6 per month	0	0

and this was significantly higher than that of male respondents (90%) ( $\chi^2 = 5.765$ , d.f. = 1,  $P = 0.016$ ). The proportion of respondents who did not have a postgraduate qualification and referred patients (97%) was significantly higher than respondents who had a postgraduate qualification (81%) ( $\chi^2 = 11.565$ , d.f. = 1,  $P = 0.001$ ). A significantly higher proportion of respondents who did not carry out surgical endodontic treatment (99%) referred patients compared with respondents who carried out surgical endodontic treatment (56%) ( $\chi^2 = 53.715$ , d.f. = 1,  $P < 0.001$ ).

With regard to current referrals, the greatest percentage of respondents (55%) reported that they refer patients with an endodontic problem 'always' or 'mostly' to a specialist endodontist (Table 3). In contrast, a minority of respondents reported that they refer 'always' or 'mostly' to each of the other endodontic referral services. With regard to potential referrals, most respondents (80%) reported that they would be 'very likely' or 'likely' to refer to a new specialist endodontist in practice, if available (Table 4). A smaller majority of respondents (69%) reported that they would be 'very likely' or 'likely' to refer to a new specialist endodontist in hospital, if available.

### Factors influencing the decision to refer to a specific specialist endodontist in practice

The respondents were asked to indicate the importance of 22 statements in terms of their influence to promote the decision to refer to a specific specialist endodontist in practice. The majority of the respondents indicated that half of the 22 statements were either 'important' or 'very important'. The influence of various demographic characteristics of the respondents on the 22 statements was analysed.

The majority of respondents (60%) considered the statement 'other dentist(s) in your practice already refer(s) to the specialist endodontist' as 'very important' or 'important'. Statistical analysis of this majority showed the following:

- The proportion of female respondents (68%) was significantly higher than the proportion of male respondents (51%) ( $\chi^2 = 4.833$ , d.f. = 1,  $P = 0.028$ ).
- The proportion of respondents who were practice owners (45%) was significantly lower than the proportions of respondents who were not practice owners (72%) ( $\chi^2 = 12.595$ , d.f. = 1,  $P < 0.001$ ).
- The proportion of respondents who work at a practice with more than three dentists (76%) was significantly higher than the proportion of respondents who work at a practice with three or less dentists (50%) ( $\chi^2 = 10.813$ , d.f. = 1,  $P = 0.001$ ).
- The proportion of respondents decreased significantly with years since graduation ( $\chi^2 = 22.413$ , d.f. = 3,  $P < 0.001$ ). The majority of respondents who had graduated <10 years ago ranked this statement as 'very important' or 'important' (79%) compared with a minority of respondents who had graduated more than 30 years ago (22%).

A greater proportion of respondents who worked in an NHS practice (69%) considered the statement 'cost of specialist treatment is inexpensive compared to other specialist endodontists' as an important factor compared to respondents who worked in a private practice (41%). However, this was not found to be statistically significant.

The respondents were then asked to choose, from the 22 statements, the top three factors that would promote their decision to refer to a specific specialist endodontist in practice. The distribution of the statements considered to be top promoters is summarized in

**Table 3** Current referral of patients to various endodontic services

Current referral to	Useable responses (N)	Always (%)	Mostly (%)	Sometime (%)	Rarely (%)	Never (%)
Specialist endodontist in practice	168	20	35	20	13	12
Restorative consultant in hospital	157	1	13	31	26	29
Non-specialist colleague	135	1	2	7	5	85
Oral surgeon in practice	142	1	5	23	18	52
Oral surgeon in hospital	141	1	3	12	19	65

**Table 4** Potential referral to endodontic services, if made available

Potential referral to	Useable responses (N)	Very likely (%)	Likely (%)	Neutral (%)	Unlikely (%)	Very unlikely (%)
Specialist endodontist in practice	168	46	35	12	5	2
Specialist endodontist in hospital	164	35	34	13	12	6

Table 5. The most frequently chosen statement was 'waiting time for specialist consultation is relatively short' (55%).

Qualitative written comments were provided by 38 respondents. Several respondents stated that there was a general lack of specialist endodontists in Northern Ireland. Others raised the issue of accessibility for patients, with one respondent stating, 'We do not have a local (within 50 miles) endodontist', and another respondent stating there are 'no specialist endodontists within 70 miles'. A number of respondents stated that

they worked in a mainly NHS practice, and the cost of specialist treatment was a barrier to their patients. Some respondents felt that the ability, clinical result and success rate of the specialist endodontist were the most important factors in deciding which specialist endodontist to refer to.

## Discussion

The response rate of this study was 81% and was considered satisfactory for a postal questionnaire (Dillman

**Table 5** Distribution of statements considered to be top promoters and 'very important' or 'important' for selecting a specialist endodontist in practice

Rank	Statement	Considered to be top promoters		Considered to be 'very important' or 'important'	
		N	%	N	%
1	Waiting time for specialist consultation is relatively short	91	55	170	87
2	Specialist endodontist is located in close proximity (<25 miles) to your dental practice	66	40	170	74
3	Specialist endodontist has a likeable personality	51	31	170	77
=4	Cost of specialist treatment is inexpensive compared to other specialist endodontists	47	29	170	54
=4	Specialist endodontist provides good written communication back to you	47	29	165	95
6	Referral procedure to specialist endodontist is straightforward e.g. email or pro forma	42	26	167	90
7	Specialist endodontist provides daily urgent or emergency appointments	32	19	170	72
8	Knowledge that the patient will be referred back to you following endodontic treatment	31	19	170	85
9	Specialist endodontist is located in close proximity (<25 miles) to the patient's home	27	16	169	67
10	Knowledge that the specialist endodontist completes treatment in a single or few visits	17	10	170	48
11	Other dentist(s) in your practice already refer(s) to the specialist endodontist	16	10	168	60
12	Specialist endodontist uses an operating microscope	9	6	170	45
13	Specialist endodontist offers CPD courses or lectures	7	4	170	37
=14	Specialist endodontist is located in close proximity to public transport	2	1	169	30
=14	Specialist endodontist places a core/post following endodontic treatment	2	1	170	17
=14	Specialist endodontist places a temporary restoration following endodontic treatment	2	1	170	53
=17	Specialist endodontist is located in an urban area	1	1	168	19
=17	Specialist endodontist works in a practice with other dental specialists	1	1	170	18
=17	Specialist endodontist is open in the evening and weekends	1	1	170	28
-	Specialist endodontist is located in a rural area	0	0	168	3
-	Specialist endodontist works in a practice with GDPs	0	0	170	4
-	Specialist endodontist works alone in practice	0	0	170	9

GDPs, general dental practitioners.

2007). This may be because of the questionnaire topic being relevant, as well as the methods used to design and administer the questionnaire (Edwards *et al.* 2007). Given the high response rate, it was not expected that there would be any degree of non-response bias. This was confirmed by comparing the response rates between the demographic characteristics of the sample. However, there is still the possibility of non-response bias because of behavioural differences between responders and non-responders (McCarthy & McDonald 1997, Parashos *et al.* 2005). Another method to assess non-response bias is to determine late response bias (McCarthy *et al.* 1997, Parashos *et al.* 2005). It was not possible to assess late response bias because the 'no' responses for simple 'yes' or 'no' questions were poorly represented for statistical analysis.

The random sample of 220 GDPs may be considered small; however, small random samples with high response rates are more valuable than those with low response rates (Evans 1991). Previous survey studies in Northern Ireland have obtained inadequate response rates when surveying all GDPs instead of using a sample. The study by Hunt *et al.* (2001) obtained a highly desirable response rate of 93% using a sample size representing 25% of the GDPs in Northern Ireland. The same proportion was used to calculate the sample size in this study so that financial resources could be optimized to achieve a high response rate. It is acknowledged that this is the limitation of the study. Ideally, the sample size should have been 482 based on the published formula for calculating sample size based on probability sampling (Dillman 2007). The simple random sampling method could also be considered a limitation. There were a disproportionate number of urban and rural respondents, and this could have biased the results. Stratified random sampling would have ensured representation of the urban and rural subgroups. Some respondents did not complete the questionnaire fully, and this resulted in a reduced response rate for some questions. The partially completed questionnaires were not considered ineligible as they included useable data. It is acceptable to include partially completed questionnaires when calculating a response rate (American Association for Public Opinion Research 2009).

As far as the authors are aware, this study is the first to provide published information on the provision of endodontic treatment by GDPs in Northern Ireland. All of the respondents reported that they carried out root canal treatment with the majority (83%) also reporting

they carried out root canal retreatment. A minority of respondents (11%) reported that they carried out surgical endodontics. This is in contrast to GDPs in Scotland, where, a decade ago, it was reported that the majority (53%) undertook surgical endodontics (Saunders *et al.* 1999). Since the 1990s, there has been a strong emphasis on the value of microsurgical techniques in endodontics (Pecora & Andreana 1993, Kim 1997, Rubinstein & Kim 2002). Dento-legal implications may now deter GDPs from carrying out surgical endodontics.

The respondents who carried out surgical endodontic procedures were significantly more likely to be men, hold a postgraduate qualification or work in a rural location. It is not immediately clear from the dental literature why men were more likely to carry out surgical endodontic procedures. GDPs who hold a postgraduate qualification may possess additional knowledge and skills as well as the ability to carry out surgical endodontic procedures. Exposure to postgraduate education may affect the range of treatments that GDPs offer (Linden 1998). GDPs who work in rural areas may feel obliged to provide surgical endodontics, when they perceive it is indicated, considering that all specialist endodontic referral services in Northern Ireland are located in one city, Belfast.

The results of this study reveal the referral patterns and preferences of GDPs in Northern Ireland. With regard to current referral patterns, the majority of respondents (94%) stated they refer patients with an endodontic problem; however, the majority refer patients less than once a month. The reason for this trend was not investigated in this study. Other studies have reported different patterns and frequencies of referral in Scotland and the Netherlands (Saunders *et al.* 1999, Ree *et al.* 2003). This may be because of the specialist list for Endodontics in the UK being introduced in 1998, and there being a greater choice of endodontists in the Netherlands.

Respondents who referred patients with an endodontic problem were significantly more likely to be women; hold a postgraduate degree and carry out surgical endodontic procedures. Other studies have reported that women are significantly more likely to refer patients to a periodontist (Zemanovich *et al.* 2006) or to refer patients for simple dentoalveolar surgery (Cottrell *et al.* 2007). However, Linden (1998) and Linden *et al.* (1999) did not find significant differences between female and male GDPs. The reason for this gender difference is not immediately apparent. The medical literature suggests that female physicians are



more participatory in the decision-making process with their patients (Cooper-Patrick *et al.* 1999), and female physicians engage in more communication that can be considered patient centred (Roter *et al.* 2002). GDPs who have undergone further postgraduate training may have the ability to deal with more difficult cases, which GDPs without a postgraduate qualification would otherwise refer. One could speculate that GDPs who perform surgical endodontic procedures possess the confidence to manage root filled teeth with post-treatment disease.

The results of this study suggest that GDPs in Northern Ireland prefer to refer patients with an endodontic problem to a specialist endodontist in practice over other treatment providers. This is comparable to the findings of Nixon & Benson (2005) who reported that GDPs preferred to refer to a mono-specialist. It has been suggested that the main reason for preference over a consultant in Restorative Dentistry is the high regard for focused skills of a mono-specialist (Nixon & Benson 2005). It could also be argued that some patients referred to hospital in the UK do not strictly receive a full specialist service. Hospital patients may be seen for a consultation by and be under the care of a consultant or specialist; however, they are often allocated to a non-specialist, i.e. postgraduate student or staff in training for treatment. Preference over an oral surgeon may be because of GDPs' understanding that root treated teeth with diseased outcomes should be retreated prior to considering surgery (European Society of Endodontology 2006) and that surgical techniques used by specialist endodontists differ from those used by oral surgeons (Rahbaran *et al.* 2001).

Respondents were asked to give the top three factors that would promote their decision to refer to a specific specialist endodontist in practice. The only factor to be ranked by the majority of the respondents (55%) as a top promoter was the length of waiting time for a consultation being relatively short. The majority of respondents (87%) had also given high importance to the statement 'waiting time for a specialist consultation is relatively short'. This confirms the findings of other studies, which reported that short waiting times were important in choosing a specialist oral surgeon (Coulthard *et al.* 2000a,b) or a specialist in Restorative Dentistry (Nixon & Benson 2005). There is a two-to-three month waiting time for a consultation appointment and an additional one-month waiting time for treatment with the sole specialist endodontist in practice in Northern Ireland. In contrast, it has been

reported that the majority of patients (81%) referred to Restorative Dentistry at the dental hospital in Belfast are seen for a consultation within six weeks, and all patients are seen within nine weeks (DHSSPS 2009). Despite this difference in waiting times in Northern Ireland, the majority of respondents (55%) currently refer 'always' or 'mostly' to a specialist endodontist in practice. Several respondents added written comments with regard to the influence of waiting times with one respondent stating 'hospital waiting times (are) unacceptable'. It may be that the waiting time between a consultation and treatment in hospital is much longer than in specialist practice. As recommended by Coulthard *et al.* (2000a), GDPs should be provided with current information on waiting times so that an informed decision can be made when selecting a specialist endodontic referral service. Ideally, this should include waiting times for both consultation appointments and treatment being started.

Close proximity (<25 miles) of the specialist endodontist to their dental practice was considered by 40% of the respondents as a top promoter to selecting an endodontist in practice. This confirms the findings of other studies that have shown distance is an important factor in the decision process of selecting a specialist periodontist (Linden 1998, Linden *et al.* 1999, Sharpe *et al.* 2007); a specialist oral surgeon (Coulthard *et al.* 2000b) and a specialist in Restorative Dentistry (Nixon & Benson 2005). Statistical analysis did not show any significant differences in the referral patterns of GDPs located in close proximity to Belfast or urban areas compared to GDPs located 25 miles or more from Belfast or rural areas. This may be because of GDPs not having any choice to refer to other locations outside Belfast.

Personality of the specialist was considered by a large majority of the respondents to be important in influencing their referral decision. Several studies have concluded that the personality and reputation of the specialist are important in the referral relationship (Goldenberg 1992, Coulthard *et al.* 2000a, Zemanovich *et al.* 2006, Sharpe *et al.* 2007). GDPs may personally know the specialist through social events or attending CPD courses; or they will know of the specialist's reputation through feedback from colleagues or patients.

Several respondents commented that the cost of specialist treatment was a barrier to referral. The results revealed that a greater proportion of GDPs who work in NHS practices (69%) were more likely to consider inexpensive cost of specialist treatment as an

important factor compared to GDPs who work in private practices (41%). Although statistical analysis did not show this to be significant, Nixon & Benson (2005) reported that GDPs who work in NHS practices were significantly more likely to consider the cost of specialist treatment as a barrier to referral. It is appreciated that GDPs may have perceived barriers to offering a private referral (Nixon & Benson 2005, Sharpe *et al.* 2007); however, it is recommended that the offer of a referral should still be made. The patient's perceived barriers to referral may be very different to those of the GDP.

Communication and ease of referral were considered by the vast majority of respondents to be important in influencing their referral decision. Several studies have emphasized the importance of including good quality information in referral letters to specialists (Djemal *et al.* 2004, White *et al.* 2004). This study highlights the importance of specialists providing good written communication back to GDPs. This supports the results of Zemanovich *et al.* (2006) who reported that good communication from a specialist periodontist was important to GDPs. This study is also in agreement with the conclusions of studies that advocate the referral pro forma (Djemal *et al.* 2004) or email (Torres-Pereira *et al.* 2008) as useful referral tools.

The majority of respondents (60%) gave high importance to the statement 'other dentist(s) in your practice already refer(s) to the specialist endodontist'. Analysis found that respondents who were women, not practice owners, qualified <10 years, or working in a practice with more than three dentists were significantly more likely to give high importance to this statement. This suggests that the dynamics within a practice strongly affect the choice of which specialist endodontist to refer to. The positive experience of one GDP's referral relationship with the specialist endodontist may influence the decision of another GDP within the practice. It could also be speculated that practice owners, who were significantly more likely to be men and qualified for 10 or more years, decide for the practice as a whole which specialist endodontist should be referred to. Specialist endodontists should not only treat GDPs as a referral source but the practices that they work in.

Respondents provided written comments on the questionnaires. A main theme in these comments was that the 'ability', 'clinical result' and 'success rate' of the specialist endodontist were the most important factors in choosing a specialist endodontist in practice. The clinical result or quality of treatment was not

investigated as factors in this study as it could be argued that the ability of a specialist is usually taken for granted by the referring GDP, and obtaining a good clinical result is not always the only final consequence (Goldenberg 1997).

General dental practitioners have been described as gatekeepers to the dental referral services (Morris & Burke 2001, Cottrell *et al.* 2007). Ideally, specialists should have an understanding of the factors that influence the decision of GDPs to refer to a specific specialist endodontist in practice. This would obviously benefit the commercial aspect of a referral practice and more importantly improve patients' access to specialist endodontic care. The results of this study suggest that in Northern Ireland, specialist endodontists in practice can optimize the referral relationship in several ways, in particular by keeping waiting times relatively short. Reducing waiting times is difficult without introducing stricter criteria for accepting referrals or encouraging more specialist endodontists to practice in Northern Ireland. Ideally, the specialist practice should be located in an urban area as this study, and previous studies have shown this is where the majority of GDPs are located (Teusner & Spencer 2003, Johns *et al.* 2006, Brennan & Spencer 2007, Wall & Brown 2007). Hospital-based specialists are limited to providing care in dental hospitals or associated satellite clinics, if available. A specialist endodontist in practice has a wider choice of locations including existing practices or setting up new practices.

## Conclusion

The majority of GDPs in Northern Ireland provide non-surgical endodontic treatment and also refer patients with an endodontic problem. The decision by GDPs to refer to a specific specialist endodontist in practice is multifactorial and influenced by several non-disease-related factors. In Northern Ireland, the top promoter for referring to a specific specialist endodontist in practice was a relatively short waiting time for a consultation.

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