

# Barriers to improving endodontic care: the views of NHS practitioners

E. McColl,<sup>1</sup> M. Smith,<sup>2</sup> J. Whitworth,<sup>3</sup> G. Seccombe,<sup>4</sup> and J. Steele,<sup>5</sup>

**Aims** Concerns have been expressed about the technical quality of NHS endodontic treatment. Bringing performance into line with guidelines for good practice needs to be underpinned by an understanding of barriers to compliance. To this end, our research involved an exploratory investigation of the factors influencing the behaviour of general dental practitioners in their practice of endodontics.

**Materials and methods** Subjects 12 dental practitioners, representative of varying levels of professional experience and status, and of compliance with good practice guidelines. *Data collection* In-depth interviews, following a topic guide. *Analysis* Identification, abstraction and charting of major themes.

**Findings** Informants' responses suggested that general dental practitioners' endodontic practice is influenced by a complex web of factors. A key barrier to high quality treatment is the NHS remuneration scheme. Undergraduate and postgraduate education and training are also highly influential on practice. Dentists reported employing a range of strategies to manage the time-cost tensions imposed by the remuneration system. Perceived deficiencies in the content and delivery of postgraduate training were highlighted by our informants.

**Conclusions** There was a perception among our informants that the NHS fee structure needs to be revised. Their views suggest that a system which rewards quality rather than volume may be more appropriate, but, we believe, such a system would need to take into account efficiency as well as effectiveness. Modification of the current system of postgraduate training in endodontics is also indicated by the views expressed in the interviews. From the diversity of views and from a critical review of the literature, we conclude that flexibility is the key note in changing practice, with no single strategy likely to be universally appropriate.

Endodontics is an exacting discipline, and has been identified as one of the most technically demanding procedures in general dental practice.<sup>1</sup> Despite these challenges, and reflecting increasing patient expectations, the volume of endodontic work performed in England and Wales has increased substantially in recent decades. In 1978, 800,000 teeth were treated at a cost of £8 million.<sup>2</sup> By 1995/1996, in excess of 1.2 million teeth were root-filled at a cost to the National Health Service (NHS) of £42 million;<sup>3</sup> this does

**Table 1 European Society of Endodontology Guidelines<sup>5</sup>**

The European Society of Endodontology (1994) has developed quality guidelines for endodontic treatment. These were derived to provide a statement of good practice to inform both dentists and patients approaching endodontic procedures. They include detailed recommendations on :

- History, diagnosis and treatment planning
- Record keeping
- Infection control
- Maintenance of pulp vitality
- Root canal treatment
- Endodontic surgery
- Assessment of endodontic treatment
- Management of traumatic injuries.

not include the substantial payments made by patients themselves, whether treated on the NHS or privately. Root-treated teeth often provide the foundations for complex and expensive reconstruction.<sup>4</sup>

Consensus guidelines produced by the European Society of Endodontology<sup>5</sup> provide a statement of current 'good practice' in endodontic therapy (Table 1); these guidelines are based on the experience and opinions of practitioners fully appraised of current evidence on factors associated with predictable success in endodontic treatment. However, concern has been expressed in recent years that the technical quality of root treatment completed in NHS practice frequently falls short of current good practice,<sup>6-8</sup> with greatly increased likelihood that infection will persist, and treatment will fail. In particular, Dummer showed that only 10% of cases fulfilled technical criteria for success<sup>8</sup> as defined by the European Society of Endodontology.<sup>5</sup>

The response to Dummer's<sup>8</sup> paper was immediate and, not surprisingly, emotional.<sup>9-11</sup> In particular, general dental practitioners, operating at what they themselves perceived to be the 'coal face', highlighted the constraints imposed by the NHS remuneration system, which reimburses each unit of a dentist's time at the same rate, regardless of the technical difficulty of the procedure being undertaken. They also identified the limitations imposed by the knowledge and skills imparted during their undergraduate and continuing education.

The aims of our study as a whole<sup>12</sup> were to establish the prevalence of good practice (defined in accordance with current published guidelines)<sup>5</sup> in NHS endodontics in England, to identify the factors influencing general dentists in their practice of endodontics, and to define minimum criteria for a successful outcome of endodontic treatment. A mixture of quantitative and qualitative approaches was used to address these aims. Details of current practice and of criteria for success will be reported elsewhere in due course. In this paper, we focus on the findings from the qualitative

<sup>1</sup>Senior Research Associate, <sup>2</sup>Research Associate, Centre for Health Services Research, University of Newcastle upon Tyne, 21 Claremont Place Newcastle upon Tyne NE2 4AA; <sup>3</sup>Lecturer, <sup>4</sup>Clinical Research Associate, <sup>5</sup>Lecturer, Department of Restorative Dentistry, The Dental School, Framlington Place, University of Newcastle upon Tyne NE2 4BW

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phase of our research, which allowed us to explore and identify perceived barriers to good practice and to pinpoint the coping strategies employed by general dental practitioners. Only by understanding the factors influencing behaviour, is it possible to inform and devise appropriate strategies for effecting positive behaviour change and encouraging good practice.

## Methods

### Background

In autumn 1996, we conducted a postal survey to establish the range of materials and techniques used for endodontic treatment in general dental practice. The sample for this survey was two age cohorts of dentists, representing all of the 1970–73 and 1990–93 graduates from two English dental schools. This questionnaire concluded with an open-ended question, inviting respondents to make any additional comments they desired on the provision of endodontic treatment in the NHS. Eighty-five per cent of questionnaires were returned; the responses revealed a broad range of treatment approaches, many deviating markedly from published guidelines.<sup>5</sup> The invitation to provide additional comments produced a copious and highly candid response. On the basis of the responses to the initial questionnaire, a second survey was planned to examine the main barriers to and facilitators of good practice in endodontic treatment. To develop the questions for this second survey, in particular to ensure a high degree of relevance and face validity to the respondents, we conducted a series of in-depth qualitative interviews with a sample of general dental practitioners.

### Methods used in the qualitative phase

In exploring complex attitudes and opinions, a qualitative approach to data collection, as is afforded by individual in-depth interviews, is the most appropriate.<sup>13,14</sup>

Sampling for qualitative studies generally demands a systematic, non-probabilistic approach. The aim is not statistical representativeness, but rather ‘to identify specific groups of people who ... possess characteristics ... relevant to the phenomenon being studied’.<sup>14</sup> Subjects are not selected at random but instead are chosen because they are expected to facilitate investigation of ‘an aspect of behaviour relevant to the research’. Accordingly, for our in-depth interviews, we selected a purposive sample of respondents to the first postal survey (described above) since this group could reasonably be expected to express considered views on the topic of barriers and facilitators to the practice of high quality endodontic care. Analogous to stratification in a probability sample, the sample for qualitative research may be deliberately constructed to ensure inclusion of informants displaying different characteristics (for example, age and gender), believed to be related to the behaviour or opinion under investigation.

There is no consensus about sample size for qualitative research. Experience shows that 6–8 data sources often suffice for a homogeneous sample, while 12–20 may be needed when looking for disconfirming evidence.<sup>15</sup> We anticipated that our sample would be relatively homogeneous; because of this, and because of resource constraints, we chose a sample size of 12.

This sample was constructed to include informants who:

- Were general dental practitioners, practising in the Northern and Yorkshire region of the UK, who regularly undertook endodontic treatment on NHS patients.
- Displayed a broad range of approaches to endodontic treatment, from apparently close compliance, through an intermediate position to marked deviation from published guidelines for good practice.<sup>5</sup> Compliance was defined in terms of four aspects of these guidelines (Table 2); practitioners routinely complying with all four recommendations were classed as ‘close compliance’; those routinely complying with none of the four recommenda-

**Table 2 Criteria for compliance (based on European Society of Endodontology (ESE) guidelines)<sup>5</sup>**

1. Frequency of rubber dam use for endodontic procedures.  
(ESE guidelines recommend the use of rubber dam for all endodontic procedures)
2. Use of radiographs to guide operative treatment and monitor responses to treatment.  
(ESE guidelines recommend the use of radiographs to guide operative treatment, and to monitor tissue responses to treatment)
3. Materials used to root-fill canals.  
(ESE guidelines recommend the use of a semi-solid material (gutta percha) in combination with sealer, not solid materials or sealers containing strong organic compounds such as aldehydes)
4. Criteria used to classify a root-treatment as successful.  
(ESE guidelines recommend that treatments should be monitored clinically and radiographically after treatment, and that success should be determined on the basis of tissue response, and not just the abolition of reported symptoms)

**Table 3 Characteristics of informants for in-depth interviews**

Identifier	Age cohort	Gender	Practice status	Compliance
A	1970–1973	Male	Principal	Low
B	1990–1993	Female	Principal	High
C	1970–1973	Male	Principal	Intermediate
D	1970–1973	Female	Principal	High
E	1990–1993	Female	Associate	Intermediate
F	1990–1993	Male	Associate	High
G	1990–1993	Male	Associate	Intermediate
H	1970–1973	Male	Principal	Low
I	1990–1993	Male	Associate	High
J	1970–1973	Male	Principal	Low
K	1970–1973	Male	Principal	Intermediate
L	1970–1973	Male	Principal	Low

tions were classed as ‘low compliance’; those at neither extreme were classed as ‘intermediate compliance’.

- Reflected representatives of the younger and older age cohorts (that is, 1970–73 and 1990–93 graduates) and included both male and female dentists.
- Were of varying levels of practice seniority (that is, included both principals and associates).

Table 3 presents characteristics of the sample and the identifiers used in the remainder of this paper (in the interests of confidentiality, informants are identified by an alphabetic identifier only).

The invitation to participate in an in-depth interview did not mention explicitly that the main purpose of the interview was to develop the content for a subsequent structured questionnaire; rather it was portrayed as an investigation of the factors influencing the individual’s endodontic practice. All those invited to participate in the interviews agreed to do so. Interviews were carried out in a setting chosen by the informant, generally his or her dental practice premises, and at a time mutually convenient to the informant and interviewer. All interviews were carried out by the same interviewer (GS). The interviewer was himself a general dental practitioner, a fact that was revealed to the informants; it was felt that this would engender a greater openness among the informants, who might have perceived the other members of the research team (two academic restorative dentists and two social scientists) as less understanding of the problems facing dentists at the ‘coal-face’. Each interview lasted around 1 hour and, with the permission of the informants, was tape-recorded.

The interview covered six general topics (Table 4) generated from responses to the open-ended questions in the first postal survey. Although our main interest was in the factors influencing practice,

we also needed to 'set the scene' by asking about experience, current behaviour and criteria for successful treatment.

The interviews were transcribed. As is customary in qualitative data analysis, to ensure reliability, interview transcripts were independently coded and analysed by two of us (MS and EM) using 'Framework', a recognised qualitative data analysis technique involving identifying, abstracting, charting and matching themes which are recurrent across the data set.<sup>16</sup> The key steps in this technique are summarised in Table 5.

## Results

### Key influences on endodontic practice

A number of key themes emerged from the in-depth interviews. These naturally reflected the topics raised by the interviewer. But they also revealed the depth and complexity of the web of influences on general dental practitioners' endodontic practice. These included:

- Constraints on choice of techniques and materials
- Expected clinical outcome
- Perceptions of patients' expectations
- Anxieties arising from lack of expertise, inexperience or inappropriate equipment and materials
- Ways of managing time-cost pressures and payment structures, especially within the NHS fee structure
- Attitudes toward postgraduate education.

Below, we report in detail on the last two of these themes. These were the most frequently reported by our informants. They also have relevance both to practitioners' concerns about the level of NHS remuneration<sup>9-11</sup> and to the current debate about undergraduate and continuing education within a British<sup>1,17</sup> and an international context.<sup>18</sup> The quotations have been chosen as illustrative of the themes; in presenting the views and quotations, we use the identifiers shown in Table 3.

### Remuneration issues

There was general agreement that the NHS remuneration scales for endodontic treatment, particularly for molars, do not reflect the time required to carry out satisfactory work (D, E). This view was echoed by informants who had high, intermediate and low compliance with good practice but the pressure was less for associates than for principals because 'as an associate, you do not have the same sort of overheads as the principal' (E).

*'The remuneration for NHS endodontic treatment seems to have fallen out of line compared with other treatments.'* (D)

*'There is a dilemma between the time required for molar endodontic treatment and the fee.'* (E)

As a result of the fee structure, inequities exist in the standards of care offered to private, NHS fee-paying and exempt patients.

*'Exempt patients get more ideal treatment than paying patients because of the removal of the financial constraints. Also an exempt patient will ask you to try to achieve a particular treatment objective — there is no financial risk involved for them.'* (E)

*'With paying NHS patients, you sometimes have to modify treatment to fit what they are prepared to pay.'* (F)

*'If it is a private patient, then I am concerned with the prognosis more. I'm looking towards achieving a higher standard.'* (L)

Some informants tried to mitigate these differences and accepted that by putting the patient's needs first they would probably lose money on a particular root treatment, but that they could make up the shortfall elsewhere, including from private treatment.

*'There are certain cases on the NHS where you know you cannot finish it there and then ... you obviously take a loss ... They are subsidised by private patients.'* (B)

Others staggered treatment, thus enabling patients to save up their contribution to the costs (E, G).

**Table 4 Topic guide for in-depth interviews**

- Experience of endodontics
- Current practice and favoured procedures
- Criteria for appropriate outcomes
- Patient involvement and expectations of treatment
- NHS fee structures and equity issues
- Opportunities for and value of postgraduate training.

**Table 5 Key steps in the Framework technique for qualitative analysis<sup>16</sup>**

- 1 *Familiarisation* — gaining an overview of the material gathered (for example, through reading transcripts)
- 2 *Identifying a thematic framework* — drawing upon a priori themes from topic guide, emergent themes from interviews, analytical themes from repeated issues
- 3 *Indexing* — applying the thematic framework systematically to the body of data by coding each fragment/section of interview transcript
- 4 *Charting* — building up a picture of the data as a whole; rearranging the data according to themes
- 5 *Mapping and interpretation* — aggregating patterns of data; weighing up importance and dynamics of issues; searching for an overall structure in the data; synthesising the findings.

*'What we do is, do the root treatment on a badly broken down tooth on the NHS, then do a pinned amalgam on the NHS — thus rendering the patient dentally fit — then do a private crown 1 month later. If the patient wants a bonded crown, they don't also want to have to pay for the root filling privately.'* (G)

Among those practitioners who felt that the current NHS remuneration system is inadequate, two broad strategic approaches were adopted to deal with the time-cost tensions imposed by the fee structure. The first was an avoidance strategy. This included extracting teeth rather than carrying out endodontic procedures, especially on back molars (E, G, A), and referral to other specialists, especially if the treatment was anticipated to be complex (A, J).

*'I am trying not to root fill sevens, and eights do not enter the picture. I am looking at more definite contraindications to root filling and possibly aim for the alternative of extraction.'* (G)

*'With a complex or problematic case ... I would refer the patient.'* (A)

The second approach involved compromising standards of care by using sub-optimal (by comparison with the standards of the European Society of Endodontology)<sup>5</sup> but time-saving techniques. It also involved manipulating the number of and length of consultations (C, H, L, F, B, D).

*'In honesty I know there are a lot of benefits to be derived from the use of rubber dam, but I haven't used it routinely because of the time factor.'* (H)

*'If I can get it done in one visit I will do so... but 40 to 45 minutes for a molar doesn't really do it justice; 45 minutes to clean, shape and fill three canals, that's going some!'* (F)

### Education and training issues

Limitations in knowledge and skills was another major theme to emerge from the data and represented an important barrier to good practice. Comments on the role of basic and continuing education, and the quality of that education, were elicited from informants representing all points in the spectrum of compliance with good practice.

Several informants recognised that their undergraduate endodontic training did not cover all aspects of endodontics in the depth which was needed in routine practice.

*'I did not do any molar endodontic training as an undergraduate, and it took me quite a long time to get used to finding canals...'* (I)

Vocational training for new graduates was introduced in 1977 to bridge the gap between theory and practice;<sup>1</sup> it became mandatory in 1993. Many of the younger informants had benefited from that

experience (G), and their older colleagues generally felt that standards of competence in trainees was higher than when they themselves had started in practice (D). However, endodontics remained an area of their work which provoked anxiety, and exposure to new materials and techniques did not necessarily mitigate the difficulties which they experienced (H). While informants acknowledged the need to refresh and update skills in order to keep abreast of the considerable changes in endodontics (A, D), most placed heavy reliance on their basic undergraduate training, some admitting to 'not moving on' (E) while others mentioned making 'only a few modifications' to their practice since graduating (B, C). It is clear that some dentists, both older and more recent graduates, find difficulty addressing the deficits in their knowledge and skills. Both age cohorts rely heavily on their initial training and resist adopting changes which would improve their practice (A, F, H).

*'I use my experience. I feel that I have a reasonably good success rate using the techniques I do, basic though they may be. ... The methods and materials are similar to those used in my undergraduate training. ... I use a technique that is not going to cause any problems if it works. Things that don't work, I don't do.'* (A)

*'I am a bit naughty in that I don't use rubber dam as much as I should. When I first started here, I used rubber dam all the time. Then I started to get decoronated teeth and it all gets too difficult. Apart from that my treatment is based on my undergraduate teaching.'* (F)

*'We have a Giromatic handpiece here but I still ream manually. I think 'how can it be done ... how can you get a reliable seal'. ... I get the impression that it is possible to seal root canals quicker than when we were students.'* (H)

Postgraduate endodontic training, particularly hands-on training, was welcomed by some (D, K). Yet, even among these dentists, there were examples of practitioners who failed to maintain the skills and techniques which they had learnt (K). Some had changed their behaviour on the basis of what they had learned; others found the theory difficult to put into practice.

*'I use only files now, (after attending postgraduate courses and lectures) where previously I used reamers. In the past I used all sorts of cocktails of sealers, but now I use calcium hydroxide based sealer.'* (D)

*'I do not use rubber dam, but I know that I should. I went on a postgraduate course on rubber dam fairly recently, but it is so easy to lapse into the established ways.'* (K)

Some informants were resistant to updating their knowledge and skills through attendance at courses. Apathy and inertia were acknowledged by practitioners who 'don't get round to booking' (E); this sometimes was because course information arrived too late to enable them to make arrangements to attend (K). Available time, loss of income, the financial and opportunity cost of attending courses (that is, what had to be given up in order to attend, such as time and therefore income foregone in the practice, and time which could otherwise have been devoted to leisure pursuits), together with convenience factors, such as proximity to course centres, were taken into account when taking up postgraduate courses. In spurning courses, some concluded that, in the view of one informant, 'you can't make a living and do it properly' (J).

A few older practitioners questioned the value of learning about 'fashions which come and go' (A) and doubted that courses were relevant for practitioners working primarily in the NHS where quite basic treatment was carried out (J). Position in the career cycle appeared to be influential in decisions to take up postgraduate courses. Those toward the end of their career had little incentive to continue training, particularly in areas such as endodontics which was perceived as 'not a soft subject' (H, C).

*'I am too close to the end of my practising career to avail myself of postgraduate courses...'* (C)

However, practitioners at the beginning of their career also felt disinclined to pursue training in this specialist area. One recently qualified associate starting his own practice felt there were currently

no courses on offer that interested him and that 'my year as a vocational trainee was enough for me' (I).

There was evidence that some practices encouraged maintenance of high standards of work and in-house development of skills, through peer review and audit and, in the larger practices, regular meetings of practice colleagues (H, C). Elsewhere guidance, if available, was spasmodic and unstructured (F, G). The lack of a systematic approach to in-house learning meant that dentists are 'left to (their) own devices' and 'you just get on and do it' (E). In some cases, this was equated with having clinical freedom (F), and was applauded (L, H).

*'There is no uniformity of technique. Everyone does their own thing. Because of my advancing years I feel it is less appropriate to involve myself in what they do. This is a point of principle.'* (H)

## Discussion

The qualitative data presented above contextualise some of the perceived barriers to improving the quality of endodontic treatment provided in general dental practice. As is the norm in qualitative research, we did not seek to measure the strength of the attitudes expressed nor to estimate the number of practitioners expressing any particular view. The aim was to generate theory rather than to test hypotheses. Nonetheless, we are confident that the views quoted are resonant of the opinions of a wide spectrum of dentists. Our informants were selected to reflect the range of experience and compliance with good practice followed by dentists who responded to a postal survey of two generations of practitioners trained in two dental schools. The experiences and attitudes that they voiced echoed the concerns previously expressed in the literature<sup>1,9-11,16,17</sup> and by many of those answering the open-ended question in our first postal survey. The views expressed by the informants to this qualitative phase of the research were used to develop a series of statements for inclusion in the second postal survey. The views expressed in that second survey<sup>12</sup> provide further support for the findings reported here: for example, some 60% of respondents to the follow-up survey agreed or strongly agreed that 'pressure of time leads me to compromise on my NHS endodontic treatment'.

The factors influencing treatment decisions included expectations of treatment outcomes (including both efficacy and complications), the time-cost-benefit equation, knowledge and past experience of techniques, available equipment, and patient expectations. To some extent, this reflects findings from general medical practice. Expectations about treatment outcomes, professional norms and previous experience with the treatment have been shown to be the most relevant factors in explaining drug choice by general medical practitioners;<sup>19</sup> however, among the doctors in this Dutch study, expectations with respect to cost, and patient expectation/demand did not play a major part in determining drug choice. This contrast in influences perhaps reflects the different remuneration systems and may also be a consequence of the growing emphasis on 'consumerism' in healthcare over the past ten years.

Most of our informants explicitly or implicitly recognised that trade-offs between the cost of treatment, the financial recompense and the likely benefit to the patient influenced their treatment behaviour. In the range of strategies adopted to accommodate the time-cost tension, dental practitioners appear to be behaving in a rational manner. Few dentists are prepared to tolerate a situation where the 'cost' of optimal treatment is perceived to exceed the benefits (both in terms of the financial benefit to the dentist and the treatment outcome for the patient). Instead, they seek to bring net costs and benefits into line by compromising the standard of care provided (and accepting the potential effect of poorer patient outcomes) or by subsidising NHS treatment through private work. Clearly, there is a perception amongst our informants that a review of the fee structure is required, echoing concerns raised by Feirn, Fletcher Jones and Norton.<sup>9-11</sup> If the aim is to reward quality (for

example, as defined by published guidelines)<sup>5</sup> rather than volume, any such review needs to be linked to agreed outcomes which include quality standards. In setting target standards for the process and outcome of care, further research may be required to determine whether the additional benefits conferred by approaches such as those recommended by the European Society of Endodontology<sup>5</sup> outweigh or at least equal their additional cost.

Continuing professional education is often viewed as a means to the end of improving the quality of patient care.<sup>20</sup> But we found an ethos, among some dental practitioners, which discouraged updating and improving knowledge and skills through accessing post-graduate training. In common with general medical practitioners,<sup>21</sup> dentists highlighted the direct financial costs and the opportunity costs of attending lectures; some also felt that some of the course content did not reflect the realities of practice at the 'coal-face'. Our findings do not tell us whether these perceptions are fully justified, although shortcomings of undergraduate and vocational training in endodontics have been previously identified.<sup>1,17,18</sup> Nonetheless, both perceived and actual barriers must be addressed in planning and delivering postgraduate education and training in endodontic techniques. It may not be enough to simply describe or demonstrate techniques through lectures and workshops;<sup>22</sup> the opportunity for 'hands-on' practice of new methods may be needed. Nowlem<sup>23</sup> and Schon<sup>24</sup> have suggested that peers and colleagues should act as educators, because of their in-depth knowledge of the practice setting; 'academic' endodontists may be perceived as lacking in understanding of the realities of general dental practice, a view reflected in the comments of some of our informants and in responses<sup>9-11</sup> to Dummer's<sup>8</sup> critique of current practice. Programmes of continuing education need to be flexible, to take into account differences in learners' needs, learning styles and working environment.<sup>25</sup> No single method of delivering education is universally appropriate: 'using a combination of different educational methods will improve the chances of successful implementation of change.'<sup>26</sup>

### Conclusions

We conclude that a flexible and varied approach is required if the quality of endodontic care within the NHS is to be improved and good practice utilised. There was a perception among our informants that the NHS fee structure needed to be revised. On the basis of the evidence presented here, a system which gives adequate reward for quality rather than volume may be more appropriate than a simple fee increase; however, in our view, any such system would need to take account of efficiency as well as effectiveness. Drawing on the opinions expressed by our informants, modification of the current system of postgraduate training in endodontics is also indicated.

Finally we recommend further research, employing both qualitative and quantitative techniques, to examine whether the barriers and facilitating factors to high quality endodontic care, identified in this exploratory study, apply in other areas of general dental practice. Our own current research agenda includes an examination of the factors influencing the provision of resin-bonded bridges.

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