Are clinical decisions in endodontics influenced by the patient's fee-paying status?

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IN BRIEF

- Shows that an analogue study might be helpful in exploring clinical decision making in the dental surgery.
- Reports that for the cohort of participants in this study, there was no evidence to support the fee status of the patient impacting treatment prescription.

RESEARCH

Objective We explored whether the fee status of a UK patient influences clinical decision-making in endodontics. **Subjects and methods** In a randomised-controlled vignette study describing either an 'NHS-funded', 'Privately-funded' or undisclosed fee-status patient, we examined the importance vocational trainer dentists placed on a series of factors normally considered when deciding whether to offer patients endodontic treatment as opposed to extracting the tooth. N = 119 experienced (M years post qualification = 20.01) dentists participated. **Main outcome measures** Having read a vignette describing a hypothetical patient who could potentially be treated either endodontically or through an extraction, dentists rated a series of factors they would normally consider (for example, poor oral hygiene, the rest of their mouth is unfilled and caries-free), before recommending either endodontic treatment or an extraction. **Results** The patient's funding status had no influence on these dentists' clinical decision-making when considering endodontic treatment as an option ($p > 0.05$) with the exception of a single item relating to infrequent attendance where the NHS patient was more likely than the 'undisclosed-fee' patient, to be offered extractions ($F_{(2, 116)}$ 3.43, $p < 0.04$). **Conclusions** We have found no strong evidence to suggest that the fee-status of a patient influences clinical decision-making in endodontic treatment by experienced dentists.

INTRODUCTION

In 2006, the UK Government implemented a new National Health Service (NHS) general dental services contract (nGDS) in England and Wales. The new NHS contract was aimed at removing some financial decision-making pressure from dentists, freeing up time for more preventive work. On the other hand, private dentistry is delivered either by item of service, capitation (with the capitation levels fixed by the dentist), or a combination of both.

In 2010 the decision-making process in the NHS dental service for the three to four years after the implementation of this new contract was examined.[1] A small number of dentists were interviewed in a semi-structured manner. The study reported some major changes in referral pattern and decision-making, in particular a more short-term approach to dental treatment and more referrals for specialist care, than was seen before the implementation of the new contract. It was felt, by some, that a conflict might have been introduced by the new contract between providing the best treatment for the patient while maintaining the financial viability of the practice.

Endodontic treatment can be a very successful form of treatment when it is done to a high standard.[2] For example, a US study[3] found a 97% survival rate at 8 years when looking at endodontic treatment performed by either private practitioners or specialist endodontists in the USA. However, in the UK, patients predominantly receive NHS-funded, non-specialist dental treatment with 52.4% of the adult population in the UK having attended an NHS dentist in the 24 months before 31st December 2013.[4] As such, US findings might not be generalisable to the UK dental population.

Under the current NHS nGDS, endodontic treatment and extractions are both considered band 2 treatments, which constitutes the financial recompense to the dentist of three units of dental activity (UDAs). The value of each UDA varies nationally between dentists, from £16 to about £40, although the national average is about £25.50. Endodontic treatment is, however, a much more costly treatment for the GDP to deliver than extractions, due to it taking longer to perform and requiring the use of expensive, single-use instruments and materials. So there may exist obvious financial reasons for a dentist to elect an extraction rather than endodontic treatment, when considering treatment options for NHS-funded patients.

In countries where dental treatment is provided fully privately it has been demonstrated that cost is the driving factor for selection of treatment,[5] ahead of clinical factors, such as, oral health status and patient preference.[6] The type of private funding – such as fee per item or capitation – was also found to produce huge variations,[7] with fee per item showing a three-fold increase in restorative treatment provision. It is reasonable to propose, therefore, that the way a dentist is funded might have an effect on the treatment prescribed when considering purely privately-funded dentists. However, it is currently unclear whether this phenomenon is also an issue with dentists practising within a dual financial setting (that is, seeing both NHS and privately-funded patients). Knowledge in this area is important for considering any possible detrimental effect to patients following the introduction of new policy, such as, the 2006 contract.

The current study set out to explore this issue. In particular, it was hypothesised that

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in a randomised controlled study presenting dentists with an NHS-funded *vs*. privately-funded *vs*. undisclosed-fee status vignette of a hypothetical patient being considered for endodontic treatment, dentists' clinical decision making would be influenced by the fee-paying status of the patient, where more extractions would be seen in the NHS group.

METHODS

Ethical considerations

The study adhered to the Helsinki protocol and approval was given by King's College London Research Ethics Committee for Biomedical Sciences, Dentistry and Medicine (REF: BDM/13/14-60).

Participants

Dentists were included in the study if they were post-foundation year and were working in the UK. One hundred and nineteen (N = 119) experienced (M years since qualification 20.01, SD = 10.34), middle-aged (M age 43.26, SD = 10 years), general dental practitioners (GDPs) who practised both in NHS and private dental settings (percentage time spent on NHS work M = 62.73%, SD = 30.86) took part in the study. Most respondents (N = 86) were male.

Materials

i) Vignette

The following clinical vignette was developed by an experienced GDP (IW) and refined through pilot testing and feedback from N = 2 independent GDPs.

'A patient receiving dental treatment presents with a periapical infection on a lower right first molar. The tooth has been heavily filled with a deep DO amalgam. The patient complains of pain on biting, and it is affecting their sleep. They ask you what is the best treatment for this tooth. How would the factors described on the following page affect your decision to opt for treating this tooth endodontically rather than extracting it?'

The vignette used was identical across all three conditions. The only difference between conditions was in the start to the heading of the vignette, where respondents were told that the narrative related to either a 'private patient' (condition 1), 'a patient' (condition 2) or 'an NHS patient' (condition 3).

ii) Decision-making questionnaire

This questionnaire invited participants to rate a series of seven patient variation factors that represented a wide range of future treatment need. These were as follows: 1) patient has poor oral hygiene, 2) the rest of the mouth is unfilled and caries-free, 3) the patient is a smoker, 4) the patient is an irregular attender, 5) the patient is not concerned with cost, they just want 'what is best', 6) the patient has several missing teeth, and 7) deep decay is present and visible on radiographs elsewhere in the mouth.

Respondents were asked to consider each of the above seven factors and decide whether they would treat endodontically or through an extraction, and then to select the ONE answer that best described how much the factor would affect their decision to choose to treat the tooth. They were thus asked to score these seven factors on a 7-point Likert scale that ranged from 'Extraction is definitely a good option for this patient' (mid points of 'Extraction is *probably* a good option for this patient' and 'Extraction is *possibly* a good option for this patient') to 'Endodontic treatment is definitely a good option for this patient' with midpoints framed as 'possibly' and 'probably'. The response scale included a neutral option ('Neither extraction nor endodontic treatment are good options for this patient'). An example of a questionnaire item (question number 7) appears in Figure 1.

iii) Demographic and additional information questionnaire

This asked participants to report demographic details about themselves and their practice such as percentage of NHS work, their gender, age, year of qualification, ethnic group, nationality, any further training and if so, what this training was. They were also invited to suggest any additional factors that might impact their decision to treat endodontically or extract, which were not considered in the vignette.

Procedure

Participants were recruited through opportunistic sampling at a vocational training meeting in July 2014 and through snowballing of postgraduate students at KCL. Participants were given the option to complete the study either through pen and paper copies of the measures handed out to them at the meeting or through a Survey Monkey link emailed to them directly. In both cases a participant information sheet was provided at this point. Completion of the questionnaire was taken as consent of participation. Participants were randomised into the three conditions in two ways; those sent the questionnaire via Survey Monkey were randomly allocated via the software's random assignment feature, while those who completed the measure on pen and paper were randomised via physical means. The vignettes were placed in blank envelopes, shuffled and randomly allocated to participants.

Once all data had been collected in, data screening and analysis took place using SPSS v.20.

Analytical strategy

For analysis purposes, a standard numerical value of 100 was assigned for the middle value of the 7-point Likert scale ('Neither extraction nor endodontic treatment are good options for this patient'). This increased in increments of 10 for each subsequent response indicating endodontic treatment and decreased 10 points for each subsequent response indicating extraction (see Table 1). Thus, for each of the seven factors, definite endodontic treatment scored 130 and definite extraction scored 70.

Data were summarised using standard measures of central tendency and variability. A total mean decision score was calculated for the 7-item scale to show whether the overall decision would be to endodontically treat or extract. The reliability of the scale was assessed using Cronbach's alpha

7. On taking bitewings you notice other areas in the mouth with decay that appears very close to the pulp chamber.
I would consider that

- Extraction is definitely a good option for this patient
- Extraction is probably a good option for this patient
- Extraction is possibly a good option for this patient
- Neither extraction nor endodontic treatment are good options for this patient
- Endodontic treatment is possibly a good option for this patient
- Endodontic treatment is propbably a good option for this patient
- Endodontic treatment is definitely a good option for this patient

Fig. 1 Example questionnaire item

Table 1 Numerical values allocated to the Likert score ratings (mid point of 100)

Score	70	80	90	100	110	120	130
Likert scale descriptor	Extraction is definitely a good option for this patient	Extraction is probably a good option for this patient	Extraction is possibly a good option for this patient	**Neither extraction nor endodontic treatment are good options for this patient**	Endodontic treatment is possibly a good option for this patient	Endodontic treatment is probably a good option for this patient	Endodontic treatment is definitely a good option for this patient

reliability analysis. Differences between groups were assessed using an independent groups ANOVA followed by post hoc testing where appropriate. Power analysis was undertaken using G*Power.

RESULTS

Of the 138 eligible vocational trainer dentists, all 138 were approached, 120 agreed to take part, 11 refused, 7 were excluded due to not being UK based. One of the 120 provided incomplete data. Hence, data from N = 119 participants were entered into the analysis (Fig. 2).

Scale reliability

A Cronbach's alpha test on the seven patient factors yielded a Cronbach's α of 0.847 showing the scale was reliable. As such all original seven patient variation factors were included in the analysis.

Randomisation effects

The success of the randomisation procedure was confirmed; there were no differences in the sample age, experience or percentage of NHS work between any of the three conditions ($F_{(2, 112)}$ range 0.40–0.82, p >0.05).

Power

A post hoc power analysis showed that the study had 97% power to detect a large (d = 0.4) effect.

Main analysis

Means (M), standard deviations (SD) and confidence intervals (CI) for each one of the seven patient variation factors were calculated. Mean scores over the 100 mid-point of the scale indicate a decision to treat endodontically, while mean scores below 100 suggest a preference for an extraction. These data appear in Table 2 below.

The data in Table 2 suggest that the factor relating to poor oral health (factor 1) and 'decay on bitewings elsewhere in the mouth' (factor 7) elicited ratings in the middle of the scale across all three conditions with no significant differences between the three arms for either factor 1 ($F_{(2, 116)} = 0.02$, p >0.05) or for factor 7 ($F_{(2, 116)} = 2.45$, p >0.05). The 'unfilled, caries-free' factor (factor 2) yielded ratings strongly favouring endodontic treatment (all three means above the 100 mark) but again, there were no differences between fee-status conditions ($F_{(2, 116)} = 0.59$, p >0.05). Patient factor 3 (patient is a smoker), 5 (patient wants what is best regardless of cost) and 6 (the patient has missing teeth) all yielded responses marginally favouring endodontic treatment, with ratings above the middle of the scale; when these means were tested for differences no significant differences emerged ($F_{(2, 116)}$ range 0.32–2.80, p >0.05). One item (Item 4, 'the patient is an irregular attender') elicited quite a lot of variation in ratings as seen in Table 2; here there was a significant difference between conditions ($F_{(2, 116)}$ 3.43, p<.04). A Bonferroni post-hoc test suggested that the 'undisclosed' and 'NHS-funded' scores for this item were significantly different from each other with NHS irregular non-attenders more likely to be offered an extraction than the undisclosed patient. Interestingly, in item 4, there were no differences between the 'NHS-funded' and 'private patient' ratings (mean difference 5.83, p>0.05) or the 'private' and 'undisclosed' patient ratings (mean difference 2.65, p>0.05.)

DISCUSSION

The aims of this study were to investigate any differences that may lie in the prescription of endodontic treatment between NHS and privately-funded patients in the UK using a randomised analogue study. The study very clearly found no reliable evidence that experienced dentists are influenced by the financial status of a patient when considering treatment options in endodontics.

The current finding is in stark contrast to previous research[8] that demonstrated significant changes in treatment pattern post introduction of the new contract in 2006, particularly a shift from endodontics to extractions. An explanation for this finding might lie in the fact that in the last 10 years the dental

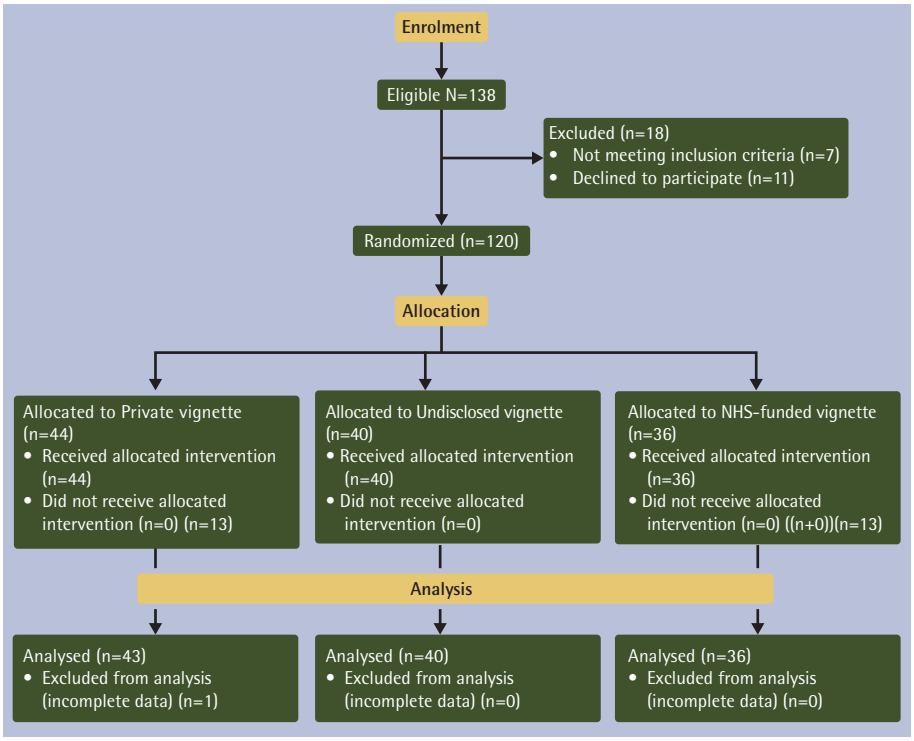

Fig. 2 CONSORT chart

Table 2 Vignette responses for the 7-patient variation factors showing mean (SD) and CIs

Patient variation factor	Private (N = 43) Mean (SD)/CI	Undisclosed (N = 40) Mean (SD)/CI	NHS-funded (N = 36) Mean (SD)/CI
1 – poor OH	99.77 (14.22)/ 95.39–104.14	100.25 (14.93) 95.47–105.03	99.72 (12.53) 95.48–103.96
2 – unfilled, caries free	122.09 (11.03) 118.70–125.49	123.48 (10.23) 120.20–126.75	120.83 (10.52) 117.27–124.39
3 - smoker	113.72 (14.31) 109.32–118.13	113.50 (11.67) 109.77–117.23	111.67 (10.00) 108.28–115.05
4 – irregular attender	98.60 (15.05) 93.97–103.24	101.25 (15.05) 96.44–106.06	92.78 (12.56) 88.53–97.02
5 – not concerned with cost, wants best treatment	115.12 (13.16) 111.07–119.17	119.25 (10.95) 115.75–122.75	112.78 (12.10) 108.68–116.87
6 - missing teeth already	109.76 (13.34) 105.60–113.92	109.25 (12.28) 105.32–113.18	104.44 (13.19) 99.98–108.91
7 – decay on BWs elsewhere in mouth	103.26 (14.10) 98.92–107.59	100.50 (14.84) 95.75–105.25	96.11 (13.10) 91.38–100.85

landscape has changed, with many corporate bodies investing heavily in NHS dental practices; for example, 11.3% of NHS practices in 2011[9] were owned by corporate bodies with this percentage figure increasing rapidly. These acquisitions of NHS practices, which come with a guaranteed income via fixed contracts, has seen the value of NHS practices relative to private ones increase, as the corporate bodies see an NHS practice as less of a financial risk than a private practice. This inflation of the value of NHS practices may explain the seeming 'good will' towards NHS dentistry, which appears evident from the results of this study and may, in part, explain the current findings being different to those reported earlier. An alternate explanation of the heterogeneous findings between our study and previous work, may be one of declining resistance to change. It may have been that dentists were at some level opposed to the 2006 contract, but that this opposition has diminished with time. The reasons for the change in observations would need further investigation, but may be considerations for any new general policy changes in patient care.

Overall, the predominant treatment of choice in this study was endodontic treatment, with a few patient variation factors producing 'undecided' results in the middle of the scale. These findings show a general trend for tooth preservation and the use of a more conservative approach and as such support recent previous research,[10] in cases of apical periodontitis. These findings are contradictory to data published by the Department of Health. According to their data, in the year 2012–2013, 16.6% of courses of treatment for adult patients contained extractions compared to 4.3% containing endodontic treatment.[11] Of course, some of the teeth that were extracted may not have been alternatively treated by endodontic treatment, as the extraction may have been due to periodontal problems, or perhaps an unrestorable tooth.

The single significant difference between conditions was seen in the irregular attendance factor where NHS patients would be more likely to be prescribed an extraction compared to patients whose fee status was undisclosed. Notably, there were no differences between those two groups and the 'private' patient. This finding is interesting but as it is the single significant finding its replication with a different, larger sample is recommended to eliminate the possibility that this is simply a type 1 statistical error as a result of multiple testing.

While these findings are encouraging and suggestive that this cohort of participants takes a cost-irrelevant approach in practising dentistry, they may not be generalisable widely to general dental practice. The current sample comprised mainly vocational trainers, who have to go through a process of selection before appointment, and people studying postgraduate courses at a large London dental school; a significant 85.8% of the participants had undertaken further training post graduation. Further training and vocational training interest may have rendered the current sample atypical of the general dental practitioner population.

Methodological shortcomings in the use of vignettes need to also be considered; vignette studies have a long history of being used reliably as a hybrid between tightly controlled experimental studies and less rigidly controlled surveys to explore, among others, healthcare professionals' beliefs and decision-making.[12] However, it could be that an analogue study, such as this, is not a reliable indicator of dentists' true intentions. There are many clinical factors at play during the decision-making process and clinical information (such as root morphology, canal shape, periodontal condition, whether it was restorable post endodontic treatment) and patient wishes were obviously not a feature of the current vignette. In addition, our sample of well-trained, perhaps very conscientious and well informed of medico-legal issues 'good' dentists, may well not be representative of the majority of dentists in practice at the moment.

Nevertheless, taken at face value, this study has shown that highly trained dentists responding to a vignette study seem to be taking an ethical approach to prescribing complex treatments to NHS patients; not choosing those that are solely financially beneficial. This finding does not concur with previous research in general dental practice but would suggest that experienced dentists in the UK may be practising in entirely ethical ways, not driven purely by financial gain.

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COMMENTARY

In this study the authors set out to see whether the fee-paying status of a patient had any affect on the clinical decision by a group of general practitioners.

Following changes in the NHS contract (2006) many general dental practice dentists have faced considerable pressure with the management and delivery of endodontic treatment. Previous studies have demonstrated a significant swing favouring extraction over endodontics perhaps resulting from time and financial constraints as well as little or no available means of referring under the auspices of the NHS.

The null hypothesis was tested using a cohort of experienced general practitioners who were VT (vocational training, now know as foundation training) trainers practising in both NHS and private dental settings, 85% of whom had further postgraduate training. They appeared to be a very compliant group with 119 general practitioners recruited from 138, with 11 refusals, seven who were excluded and only one who returned incomplete data.

The authors discuss the fact that corporate bodies are acquiring NHS practices nationally and it is possible that the type of dentist often recruited by these practices is not reflected in the cohort used in this study. There is therefore potential for bias, preventing true extrapolation with similar studies or NHS dentistry as a whole.

The authors used a vignette technique where a hypothetical clinical question was posed and tested against different variant factors; a private, undisclosed or NHS patient. The respondents were then asked which of seven fixed variables would affect their decision to treat the tooth.

There are obvious drawbacks in the vignette approach and the authors do elude to the fact that it may not be a reliable indicator of true intention. It also does not take into account the multitude of other technical, perceptual and judgmental factors that have to be addressed in a clinical setting.

Within the various permutations the only significant factor was that an NHS irregular attender was more likely to be offered extraction.

Within the limitations of this research the refreshing conclusion was that amongst this group of dedicated and experienced general dental practitioners the prescription of endodontic treatment or extraction was not based on financial outcome.

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AUTHOR QUESTIONS AND ANSWERS

Why did you undertake this research?

The feeling amongst the profession was that there is some 'gaming' with regards to treatment planning for NHS patients, to minimise the financial impact to the dentist treating them. Extractions are quick and easy to do, with minimal cost but endodontic treatment carries much greater cost, in terms of both time taken to do the procedure and the materials used. There is very little published research on this matter so it was seen as an interesting area to study, to investigate if there was any substance to the feeling that dentists were picking and choosing their treatment plans for financial gain. There is a lot of pressure from the Department of Health on dentists to achieve targets, with it being made year on year harder to achieve the UDA totals. Amidst this climate it was interesting to see how treatment plans are determined for endodontic treatment.

What would you like to do next in this area to follow on from this work?

It was clear from the comments made on the vignette that participating dentists would like more clinical information to help them make their decisions. It would be interesting to re-run the study, but with much clearer clinical descriptions. Rather than having a single scenario to which various patient variation factors were applied, it seems that it would work better if each patient variation factor contained its own scenario. It may also be beneficial to include clinical pictures and radiographs. In this way, we would get a more accurate idea of the various dentists' true intentions. The cohort of the participants were mainly vocational trainers so it may be that they are not representative of the general dental population, due to them having to go through a vigorous selection procedure to be appointed as a vocational trainer. A replication might wish to include a wider range of dentists to participate in the study.