

# Impact of changing provider remuneration on NHS general dental practitioner services in Northern Ireland: a mixed-methods study

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## Scientific summary

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# Scientific summary

## Background

Over the last 10–15 years, NHS dental services have faced significant criticism, largely about access to care, but also about the lack of responsiveness of the service to inequalities and changing population needs, concerns about the quality of care provided and the affordability of the service. Since the 2009 Steele review (Steele J. *NHS Dental Services in England*. London: Department of Health and Social Care; 2009), policy-makers across the UK have acknowledged the need to reform NHS dental contracts to address these concerns.

In 2013, our team published a systematic review of the effects of different methods of remuneration on the behaviour of general dental practitioners (Brocklehurst P, Price J, Glenny AM, Tickle M, Birch S, Mertz E, Grytten J. The effect of different methods of remuneration on the behaviour of primary care dentists. *Cochrane Database Syst Rev* 2013;**11**:CD009853) and concluded that financial incentives influence the clinical activity provided, but a clear understanding of the relationship between a change in remuneration and the impact it has on activity and population health is lacking. The existing evidence from the literature would suggest that general dental practitioners respond very quickly to changes in remuneration to ensure the viability of their practices, which operate for the most part as small businesses. The systematic review recommended that further empirical work was required to improve our understanding of the impact of changes in remuneration on general dental practitioners' behaviour and patient outcomes.

In 2013, a change in remuneration for NHS dentists was considered by policy-makers in Northern Ireland, favouring a system based on capitation rather than the existing fee-for-service system. The main reasons behind this initiative were to contain costs, promote prevention rather than the treatment of disease, maintain access and improve the quality of care provided. This policy development provided an opportunity to undertake a contemporary evaluation of the impact of a change in remuneration on general dental practitioners' behaviour and on patients using the service. The Department of Health, Social Services and Public Safety in Northern Ireland, in conjunction with the Northern Ireland Health and Social Care Board, made a commitment to pilot a change in the remuneration system and work collaboratively with the academic team to undertake a rigorous evaluation of the impact of the pilot.

## Objectives

The objectives of the research were to:

- measure changes over the different phases of the study in terms of –
  - productivity, as measured by the mean quantity of care delivered per provider
  - service mix, as measured by the proportions of key indicator treatments (these include examination plus scale and polish, radiographs, fillings, root canal treatment, crowns and bridgework)
  - general dental practitioners' time spent delivering patient care
  - cost of care, as measured by the volume of care weighted by the standard item treatment costs
  - co-payment revenue
- assess general dental practitioners' and patients' views about how, why and to what extent the changes in remuneration affect the delivery and quality of care
- measure changes in patient-reported oral health knowledge, attitudes and behaviour
- measure changes in patient-rated oral health outcomes and quality of care.

## Methods

The research programme used a mixed-methods design with three workstreams.

### Workstream 1

Workstream 1 used a difference-in-difference design to quantitatively measure the change in activity levels across 11 intervention and 18 matched control practices in the three phases of the study, each lasting 12 months:

- phase 1 – baseline period prior to the introduction of a capitation-based contract in the intervention practices
- phase 2 – capitation period for the intervention practices
- phase 3 – reversion period, when intervention practices returned to fee for service.

Intervention practices were selected in a two-stage process overseen by the Northern Ireland Health and Social Care Board. An invitation to participate in the pilot was sent to all dental practices in Northern Ireland. Practices that submitted an expression of interest had to fulfil a set of initial inclusion criteria, which would be expected of all participating practices providing NHS dental care. The second stage was undertaken by an internal Northern Ireland Health and Social Care Board panel using additional criteria to ensure that the final practices selected exhibited a range of characteristics that could influence activity (practice size, urban vs. non-urban and extent of NHS commitment). The total number of practices selected was also influenced by affordability; the Northern Ireland Health and Social Care Board had a fixed budget for the pilot and had to ensure that it could accommodate the possible fall in patient charge revenue.

The control group of practices was selected using a two-stage process with oversampling. Initially, stratified random sampling was used to identify potential control practices using the following strata: practice list size, proportion of children registered, proportion of adult patients exempt from patient charges and geographic location. This initial process identified 45 potential control practices, 15 of which could not be used because of data inconsistencies, leaving 30 potential control practices. The final stage of selecting control practices involved matching the 11 intervention practices to control practices using a propensity score approach, which identified 18 matched control practices.

Three broad sets of outcome measures were used to assess the impact of the change in remuneration on:

1. access – different types of registration as a proportion of the total number of patients on the practice list was used to measure the impact on access
2. service mix –
  - complex treatments requiring extensive clinical time or work completed by a dental laboratory
  - treatment of disease [e.g. direct restorations (fillings) and extractions]
  - preventative care (e.g. examinations and fissure sealants)
  - composite measures of activity (number of treatment items and number of items per treatment plan)
3. financial outcomes (total health service income and patient charge revenue).

All intervention and control practices were required to submit HS45 payment claim forms to the Business Services Organisation, which enabled identification of all NHS treatments provided during each phase of the study. Analyses were performed at the practice level. We also used the same difference-in-difference approach to compare the behaviours of equity-owning practice principals and non-equity-owning associate dentists.

Triangulation of the difference-in-difference results was performed using an interrupted time series approach on selected outcomes. A linear model was fitted for each outcome over time, for each of the three phases of the study. Discontinuities ('jumps') were allowed at each transition point to represent any sudden change in outcome. Intervention effects were measured by the difference in jump between the control and intervention groups at the transitions between each phase of the study.

### **Workstream 2**

Workstream 2 used qualitative methods to assess general dental practitioners' and patients' views about the changes in remuneration and its impact on care delivery. Purposive sampling was used to recruit general dental practitioners and patients from intervention practices. General dental practitioners were identified by the Northern Ireland Health and Social Care Board and practice principals and associate dentists from each participating practice were recruited. General dental practitioners from intervention practices identified patients for interview. Interviews were conducted face to face with 11 practice principals and by telephone with seven associate dentists and 14 patients. All interviews were recorded and transcribed verbatim, with collection and analysis running concurrently. A thematic analysis of individual transcripts was undertaken. Transcripts were systematically coded and catalogued and the results were recorded using NVivo (QSR International, Warrington, UK) software.

### **Workstream 3**

In workstream 3, we used a questionnaire to capture any patient-reported changes in the care provided. The questionnaires were developed with our patient and public involvement group. Questionnaires were distributed to patients registered with practices, in both intervention and control practices, at each study phase.

Five matched control practices from all NHS dental practices in Northern Ireland were selected for each intervention practice. Practices were matched on practice size, proportion of patients exempt from fees, proportion of adult patients and rural/urban status. A quota sampling approach used three domains to stratify the sample: exemption from NHS charges, gender and age. A total of 9000 questionnaires (3000 in each phase of the study, 4500 to patients in intervention practices and 4500 to those in control practices) were sent out in waves of 250. In the first wave, questionnaires were sent to equal numbers of patients from each stratum. Subsequent waves were targeted, with greater proportions distributed to strata with low response rates. Difference-in-difference models were estimated using patient responses to each question in the questionnaire.

## **Results**

### **Workstream 1**

No statistically significant difference was found between intervention and control practices during the baseline period when comparing mean number of examinations, multiple deprivation scores, gender of patients, patients exempt from fee paying and age. The difference-in-difference analyses identified significant and rapid changes in behaviour in the intervention group of practices at each transition period, fee for service to capitation and capitation back to fee for service, compared with the control practices.

### **Access**

In the lead-up to the change from fee for service to the capitation-based payment period, the observed changes appear to suggest that intervention practices met their specified target to avoid contractual penalties. During the capitation period, there was a small increase in registrations (1.5 registrations per month per 1000 registered patients at baseline), when compared with the control practices, but there was a significant relative increase in registrations in the intervention practices. This increase was primarily because of a relative reduction (27.1 registrations per month per 1000 registered patients at baseline) in lapsed registrations in the intervention group.

## Service mix

The change from fee for service to capitation saw activity depressed 'across the board', with all individual treatments and composite measures of activity (except treatments with a gross cost of  $\geq$  £280) showing statistically significant reductions compared with the control practices. There was no evidence of 'cherry picking' treatments that were more profitable to provide. The difference in the difference (between intervention and control practices) in the mean number of items of treatment per 1000 registrations increased significantly ( $p < 0.05$ ), by 174.8 items, between baseline and the capitation period, compared with control practices. This difference was caused by a reduction in activity in intervention practices. There was a rapid return to baseline levels of activity on reversion from capitation to fee for service for all variables, with no corresponding increase in activity among control practices.

Differences in activity were seen between practice principals and associate dentists. Associate dentists were more sensitive to the intervention, registering significant changes for all activity outcomes with larger effect sizes than those of practice principals. In response to the change from fee for service to capitation, practice principals did not show a significant change in activity for indirect restorations, fissure sealants and treatment plans provided per month. There was a persistent change in behaviour among practice principals for some items of treatment. There was a statistically significant increase in the number of extractions delivered in the fee-for-service reversion period when compared with fee for service at baseline. The number of radiographs and root canal treatments after a fall under capitation did not return to baseline levels when reverting to fee for service.

## Finance

The fall in activity during the capitation period significantly reduced overall notional practice income by £5920 per month in intervention practices compared with control practices, with notional income measured by what income a practice's activity would have accrued from the NHS if those practices had been paid under fee for service. There was no change in the proportion of practice income derived from patient charges between phases of the study compared with control practices. However, the fall in activity in the intervention practices compared with control practices resulted in a significant ( $p < 0.05$ ) difference between intervention and control practices in patient fee contributions, of £2403 per month. Patient charge revenue rapidly reverted to baseline levels in the fee-for-service reversion period with no corresponding increase in control practices.

Triangulation of the difference-in-difference results using interrupted time series analyses showed the same direction of effect (and statistical significance) across the selected outcomes (bar one).

## Workstream 2

Compared with the difference-in-difference analysis, the interviews with general dental practitioners revealed a more nuanced picture. Different behaviours were evident across the intervention practices, and these appeared to be influenced by the variance in organisational structures and views across the intervention practices. Variation appeared to result from individualised approaches to managing the tension between professional ethics and the need to run a profitable business. Local context also contributed to variation: the behaviour of general dental practitioners was influenced by relationships with peers, their community and their individual patients and accountability that comes with serving small communities. The capitation model was preferred by practice principals as it was seen to provide more time for managing the activities of the practice and provided greater opportunities for private treatment and increasing total practice income. NHS capitation payments introduced a sense of value to the provision of NHS care among practice principals, the capitation payment being seen by some practice principals as a 'retainer fee' for keeping their doors open to NHS patients. Associate dentists were less keen on the capitation model and perceived themselves to be at financial risk, as their contracts would be with their practice principals rather than directly with the Northern Ireland Health and Social Care Board. Although general dental practitioners can be acutely sensitive to incentives within dental contracts, the subtle contextual variations and their associated causal mechanisms would suggest that not all general dental practitioners behave in the same way when their remuneration is altered.

The interviews with patients were less revealing: patients expressed high levels of satisfaction with and trust in their general dental practitioners, and none of the patients interviewed noticed a change in the service as a result of the change to the payment system.

### **Workstream 3**

There were no significant differences in patient-reported oral health knowledge, attitudes and behaviour in the questionnaire designed by patients (compared with the control practices). Only three items on the questionnaire relating to quality of care showed a statistically significant difference between the intervention and control practices. Patients in intervention practices felt that they had to wait longer for an NHS check-up, were less likely to have a radiograph taken and were more likely to have been treated by a dental hygienist.

## **Conclusions**

Compared with general dental practitioners in control practices who continued to be paid by fee for service throughout the period of study, there was a rapid and clinically significant fall in the quantity of care delivered following the transition from fee for service to a capitation-based remuneration. An equally rapid reversion of activity to baseline levels was seen in the return from capitation to fee for service. However, the behaviour of associate dentists was more sensitive to the change in NHS remuneration than the behaviour of practice principals.

Interviews with general dental practitioners revealed a more nuanced picture, with the variation across the practices resulting from different approaches to managing the tension between professional ethics and the need to run a profitable business. Local context also contributed to variation, and the behaviour of general dental practitioners was influenced by relationships with peers and their individual patients and accountability that comes with serving small communities. Patients reported little change as a result of the change in payment mechanism.

## **Trial registration**

The trial is registered as ISRCTN29840057.

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