

# The INCENTIVE study: a mixed-methods evaluation of an innovation in commissioning and delivery of primary dental care compared with traditional dental contracting

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## Scientific summary

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# Scientific summary

## Background

Commissioning of primary care dentistry in the NHS has seen contract currency evolving from payment for units of dental activity (UDAs) towards incentive-driven or blended contracts that include incentives linked with key performance indicators such as access, quality and improved health outcome. There is limited evidence on the impact of these changes in dental oral health outcomes and patient, commissioner and workforce acceptability.

## Objectives

The aim of this study was to evaluate a blended/incentive-driven model of dental service provision. To:

1. explore stakeholder perspectives of the new service delivery model
2. assess the effectiveness of the new service delivery model in reducing the risk of and amount of dental disease and enhancing oral health-related quality of life (OHQoL) in patients
3. assess cost-effectiveness of the new service delivery model.

## The intervention

In the UK, current dental contracts are based on payment for UDAs. The new blended/incentive-driven contract and service delivery model evaluated here is based on contracts incentivising quality and oral health improvement (OHImp) in addition to UDAs. Sixty per cent of the contract value is apportioned to delivery of a set number of UDAs. The remaining 40% is dependent on the delivery of quality (systems, processes and infrastructure, 20%; and OHImp, 20%). The blended/incentive-driven contracts are aimed at ensuring evidence-based preventative interventions are delivered in line with identified needs for a defined population, increasing access to dentistry and ensuring that care is provided by the most appropriate team member to encourage skill mix. The new contract was designed to encourage a care pathway approach in which all patients have an oral health assessment (OHA) on joining the practice and at each subsequent recall. Four sets of information [age group, medical history, social history (e.g. self-care, habits/diet) and clinical assessment] are used to inform a traffic light system for patients with high (red), medium (amber) or low (green) risk of oral disease.

## Methods

Using a mixed-methods approach, the study included three dental practices working under the blended/incentive-driven (incentive) contract and three working under the UDAs (traditional) contract. Traditional practices, included in the study as comparators, were matched with incentive practices by deprivation index, age profile, size of practice and ethnicity profile. All practices were based in West Yorkshire.

### Qualitative study

Objective 1 uses focus groups and semistructured interviews, supplemented with observations of dental appointments of the delivery of dental care in the incentive practices and traditional practices. Purposive sampling via a sampling matrix supported recruitment of participants with different experiences of the model. The three stakeholder groups were lay people (patients and individuals without a dentist), dental teams and service commissioners. Interviews and focus groups followed a topic guide, partly informed by Andersen's behavioural model of access, but supplemented with themes that emerged from the observations and previous interviews. Interviews with dental team members took place at the dental surgery and those with patients took place in patients' homes. All were recorded and transcribed verbatim.

### Effectiveness study

A non-randomised study design compares the effectiveness (objective 2) of incentive practices with that of traditional practices. The primary outcome was the percentage of points bleeding on probing (BoP). Secondary outcomes were percentage of sound surfaces; percentage of extracted and filled teeth; and OHQoL [Oral Health Impact Profile (OHIP-14)] total score. Exploratory analysis was undertaken of the traffic light risk assessment system.

Sample size was powered using BoP. We estimated the standard deviation (SD) in percentage sites BoP across a UK cohort to be 27.5%, assuming a within-patient correlation in baseline to follow percentage sites BoP of 0.5 and a common variance in practices. We assumed a mean difference in percentage sites BoP baseline to follow-up in incentive practices of 10%, versus a mean difference in percentage sites BoP baseline to follow-up in traditional practices of 0% (i.e. a clinically meaningful difference in mean differences of 10%). We fixed a type I error rate of 0.05 and a power of 0.8. A design effect was included to account for clustering of patients within incentive and traditional practices, assuming an intracluster correlation of 0.2. A two-sided two independent samples *t*-test identified a total of 550 patients to be recruited (allowing for a 10% loss to follow-up).

Multiple linear regression was used to model the primary and secondary outcome measures. Given the reduced sample size because of loss to follow-up, to improve power, we use an analysis of covariance approach with follow-up measurement as the outcome and baseline measurement as a covariate. We first analysed the matched pairs separately before combining in a single analysis. Owing to reduced sample size and staff turnover, we were not able to include practitioner-level variables in our analyses.

### Cost-effectiveness study

Within objective 3, primary analyses take the perspective of the commissioners of the service (contractual payments). Secondary analysis takes the perspective of the service provider including the cost of dental practitioners' time and treatment materials. The price year is 2012. A discounting rate of 3.5% was used for costs and outcomes.

The analyses used the incremental cost per unit change in OHIP-14 score and the cost per quality-adjusted life-year (QALY) (derived from the European Quality of Life-5 Dimensions questionnaire, 3-level version, EQ-5D-3L). Incremental cost-effectiveness ratios (ICERs) are presented, together with cost-effectiveness plane scatterplots showing the uncertainty surrounding the estimates and cost-effectiveness acceptability curves, to illustrate the probability that each treatment would be cost-effective given a range of acceptable threshold values. Sensitivity analyses were further carried out to account for uncertainty in the cost values.

For the quantitative studies, missing data for the OHIP-14 were imputed using median imputation if only one or two OHIP-14 item scores were missing. Participants in whom more than two components of the OHIP-14 were missing or in whom EQ-5D-3L scores at baseline and follow-up were missing were excluded from the analysis.

## Inclusion criteria and timing of assessments

The inclusion criteria for the quantitative studies were age  $\geq 16$  years; willingness to be followed up for 24 months and to give informed consent; being new to the dental practice; and able to complete the patient questionnaires. All new patients attending the practice for the first time were invited to participate. Patients were asked to complete the OHIP-14 and EQ-5D-3L at their first visit and at the follow-up visit 24 months later. The dentist undertook the clinical assessment of teeth and gingivae using the International Caries Detection and Assessment System (ICDAS) instrument and BoP at both visits. Family/social history was taken at the first visit only. The OHA, using the traffic light system, was completed at baseline and 24 months by incentive practices. Appointment and treatment history were collected retrospectively using patients' dental records held at the practices.

Patients were contacted by the dental practice 6–8 weeks prior to their 24-month follow-up date to arrange an appointment by telephone, short message service (SMS) and letter in order to optimise follow-up. Patients were contacted a minimum of three times to arrange the appointment.

## Ethics approval

Ethics approval was received from Bromley Research Ethics Committee (reference number 12/LO/0205) on 5 April 2012. The study was sponsored by the University of Leeds, Leeds, UK.

## Results

### *Qualitative study*

Observations were made of 30 dental appointments. Eighteen lay people, 15 dental team staff and a member of the commissioning team took part in the interviews and focus groups. Data were collected between August 2012 and February 2014.

We found perceptions that the blended/incentive-driven contract increased access to dental care, with the contract determining dentists' and patients' perceptions of need, their behaviours, evaluated and subjective health outcomes and patient satisfaction. These outcomes were then seen to feed back to shape people's predispositions to visit the dentist.

The data hint at appreciable challenges related to a general refocusing of care and especially to perceptions about preventative dentistry and use of the risk assessments and care pathways. There are also obstacles to overcome to realise any benefits of the greater deployment of skill mix.

The ratings from the OHAs were seen to influence patients' perceptions of need, which led to changes in preventative behaviour. There was evidence that dentists' behaviours had responded to the contract in the desired direction with greater emphasis on prevention, use of the ratings in treatment planning, adherence to the pathways and the utilisation of skill mix. Participants identified increases in the capacity of practices to deliver more care as a result. These changes were seen to improve evaluated and perceived health and patient satisfaction.

### *Effectiveness study*

Within the quantitative studies, recruitment started on 1 June 2012; the first patient entered the study on 14 June 2012 and recruitment finished on 31 January 2013. A total of 550 participants were recruited to the study at baseline. However, only 291 participants attended a follow-up appointment at 24 months. Although there were no statistically significant differences in age, sex or ethnicity between those who were included in these analyses and those lost to follow-up, those who were lost to follow-up were generally

younger and more likely to be male. In addition, those lost to follow-up had worse oral health, although this was more variable (as there was a higher mean and SD).

Blood on probing was measured at baseline in 529 of the 550 participants recruited, but at both time periods in only 270 participants. Following quality assurance, 188 participants were included in the BoP analysis (incentive,  $n = 90$ ; traditional practice,  $n = 98$ ). For BoP pooled across practices, the 95% confidence interval (CI) for the effect size was 3.23% to 17.25%, indicating a positive effect for incentive but with considerable uncertainty in magnitude. Traditional practices had a higher proportion of sound surfaces (defined as caries free and initial ICDAS codes 1 and 2;  $n = 187$ ) at follow-up (4.68%), although in two of the pairings there was no non-significant difference in the proportion of sound surfaces. Overall, traditional practices had a higher follow-up OHIP-14 score ( $n = 176$ ) by 3.5 points indicating worse OHQoL. Again, for two of the three pairings there was no significant difference. For the OHA (incentive practices only), for those who attended both baseline and follow-up ( $n = 111$ ), there was an improvement with 68% red at baseline and 44% red at follow-up.

### Cost-effectiveness

A total of 210 patients were included in the cost-effectiveness analyses. Patients in incentive practices had more appointments, on average, than those in traditional practices (8.89 vs. 6.63, respectively). Patients who were lost to follow-up (and for whom we had appointment data) attended, on average, slightly fewer appointments. Among the loss to follow-up group, the average number of dental appointments per person was 7.97 (SD 5.34;  $n = 152$ ) in the incentive practices and 4.99 (SD 3.53;  $n = 131$ ) in the traditional practices.

The incentive arm attracted a higher cost for the service commissioner (mean per-person cost of £459.77 vs. £281.57). Incentive contracts were financially attractive for the dental provider at the practice level (costs less contractual payments equated to a mean per-person cost of -£209.26 vs. -£116.21, i.e. on average the payment the dental surgery receives is greater than the cost to them of providing the treatment). The mean OHIP-14 score was 7.11 and 8.00 points in the incentive and traditional groups, respectively. The ICER using the OHIP-14 from the commissioner's perspective was £199.22 (indicating a cost of £199.22 for an increase of 1 point in the OHIP-14 score); from the service provider's perspective, incentive dominates traditional (less costly, better mean outcomes). The ICERs using the QALYs from the commissioner's perspective show incentive to be dominated (more costly, lower mean QALY), and from the service provider's perspective the ICER was £122,089.48 (indicating a cost of £122,089.48 for an increase of 1 QALY).

### Patient and public involvement

Patient contributors were integral members of the research team from conception of the research through input into the research and design questions, the ethics application including patient information sheets and as members of our advisory group. They ensured our research was of relevance to patients and the NHS and would contribute to shape and improve reform of the dental contract to maximise a service designed to address patient needs in terms of improved oral health outcome through a paradigm shift from restorative to preventative oral health care and access to NHS services.

### Conclusions

The blended/incentive-driven contracts were perceived to increase access to dental care, with the contract determining dentists' and patients' perceptions of need, their behaviours, evaluated and subjective health outcomes and patient satisfaction. Although the results of the quantitative analysis were mixed and should be treated with caution given the high loss to follow-up, the study findings have implications for both practice and future work in assessing these types of contract.

A large proportion of people in the study who had access to a dentist did not follow up on oral care. These individuals are more likely to be younger males and have poorer oral health. The evidence suggests further work is required to understand how best to promote and encourage appropriate dental service attendance especially among those with high level of need, to avoid increasing health inequalities, and to consider from a policy perspective the care pathway approach recommended in the Steele report (Department of Health. *NHS Dental Services In England: An Independent Review Led by Professor Jimmy Steele*. London: Department of Health; 2009), which legitimises irregular dental attendance for those who choose it.

For dental practitioners, there are challenges within the blended/incentive-driven contracts related to a general refocusing of care around preventative dentistry, risk assessment and a care pathway approach rather than the focus on treatment inherent in the UDA-based contract. There are also obstacles to overcome to realise the benefits of the greater deployment of skill mix. Intuitively, the delegation of treatment to staff specialised in only a specific range of treatments could reduce costs and increase access to care but there may be financial barriers that prevent the profitability and effective use of skill mix. Further work is required to validate the red–amber–green assessment as a risk assessment, communication aid and contract-monitoring tool, and as a tool for evaluation; and to further assess the financial impact of the contract and particularly the increase of skill mix on the individual practitioner in order to support the model.

Data quality and dentist data recording, particularly dentition charting, was challenging. This supports the view that there should be a strong driver in the contract for data to be collected accurately and appropriate training and support provided to practices. Further work is required to explore the utility of BoP as a surrogate for other oral health outcomes and both the utility and the validity of recording dental caries and treatment experience with an indicator such as ICDAS as a contract outcome.

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