Practical considerations for conducting dental clinical trials in primary care

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IN BRIEF

- Examines some of the common difficulties encountered when conducting dental clinical trials in primary care settings.
- Provides practical information for clinicians and researchers undertaking dental clinical trials.
- Discusses the importance of successfully conducting dental clinical trials to enhance the evidence base and foster innovation.

PRACTICE

VERIFIABLE CPD PAPER

There is increasing importance placed on conducting clinical trials in dentistry to provide a robust evidence base for the treatment provided, and models of care delivered. However, providing the evidence upon which to base such decisions is not straightforward, as the conduct of these trials is complex. Currently, only limited information is available about the strategies to deliver successful clinical trials in primary care settings, and even less available on dental clinical trials. Considerable knowledge and experience is lost once a trial is completed as details about effective management of a trial are generally not reported or disseminated to trial managers and researchers. This leads to loss of vital knowledge that could assist with the effective delivery of new trials. The aim of this study is to examine the conduct and delivery of five dental clinical trials across both Australia and the UK and identify the various factors that impacted upon their implementation. Findings suggest that early stakeholder engagement, and well-designed and managed trials, lead to improved outcomes for researchers, clinic staff and patients, and increases the potential for future dissemination and translation of information into practice.

INTRODUCTION AND BACKGROUND

Oral health is fundamental for both overall health and quality of life. A healthy mouth enables people to eat, speak, and socialise without pain, discomfort or embarrassment.[1] A number of interacting influences determine an individual's oral health status, including genetics, nutrition, lifestyle, social connectedness, risk behaviours, personal health practices and coping strategies, hygiene, socio-economic status, education, cultural beliefs, attitudes, and health knowledge, as well as access to oral health services and interventions.[2] Although oral disease is largely preventable, caries and periodontal disease remain costly dental conditions. Research into new models of care can assist in improving oral health, preventing the development of disease, and reducing the need for costly and painful dental treatments.

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There is an increasing emphasis placed on the need for a strong evidence base for a change in dental clinical practice.[3,4] This evidence is usually in the form of systematic reviews and randomised controlled trials.[3,4] The community has an expectation that evidence-based practice will guide the delivery of healthcare, and dentistry is no exception; although dentistry is newer to clinical trials compared with other areas of health, such as medicine. Clinical trials involve following and assessing participants after they are assigned an intervention or treatment.[5] Systematic reviews, followed closely by randomised controlled trials, provide the highest level of scientific evidence needed to inform policy and change clinical practice. However, in the past, dental clinical trials have often been small scale and without the necessary statistical power to provide a robust evidence base to inform practice and policy.[4] This is not unexpected, as there are significant challenges encountered when designing and delivering studies that measure the effectiveness and/or cost-effectiveness of interventions in a public health setting.[6,7] Further, to be most useful, studies need to be both internally valid (such that results can be attributed to the experimental intervention) and externally valid (such that results can be generalised beyond the trial setting).[8]

It is estimated that 50 new clinical trials are published every month in the dentistry field.[9] Despite this, currently little information can be garnered from the published literature on the important considerations for designing and undertaking a clinical trial in primary care settings. Farrell *et al.*[10] highlighted the importance of documenting what worked when conducting trials and then implementing this when undertaking a trial. There are a growing number of practice-based research groups, mainly in the UK and USA, who have shown the importance of practice-based research in the dental field. These include the Product Research and Evaluation by Practitioners panel which was established in 1993 and has undertaken more than 70 projects within general dental practices.[11] Similarly in the USA, there are dental Practice Based Research Networks who facilitate the conduct of research within practices and engage, and partner with, clinicians in the research process.[12,13]

A new collaboration between researchers and trialists called Trial Forge is also currently occurring in the UK and aims to address methodological challenges in trials and increase gains in conducting clinical trials.[14] A very recent paper[3] discussed the approvals and processes required for setting up a randomised clinical trial in the UK, identifying that the process can be quite lengthy and considerable planning needs to be factored in. However, a search of the scientific literature revealed a very limited number of papers which provided information about the considerations and challenges

associated with coordinating, and managing a dental clinical trial.

The aim of this study is to examine the conduct and delivery of five dental clinical trials across both Australia and Scotland and identify the various factors that impacted upon implementation. Specifically we will explore the challenges that occur during the management of dental clinical trials in primary care settings and the methods used to address and overcome these challenges. We will focus on practical considerations so as to provide advice for the planning and conduct of future trials with the hope of increasing the potential for successful implementation.

METHODS

This paper covers the experiences of five dental clinical trials in primary care settings – three undertaken in Dundee, Scotland and two in Melbourne, Australia. All studies, being multi-site studies, involved the recruitment of dental practices, or clinics, first and then recruitment of participants from the community into the intervention or control arms of the studies.

Key researchers, trial staff, managers and stakeholders were identified for each trial and asked to provide information related to the main trial features. Specifically, data was collected in relation to: stakeholder engagement; community and dental clinic context; intervention activities; burden on participants and clinic personnel; data collection and outcome measures; and the difficulties encountered in the implementation of the trial.

RESULTS

Table 1 summarises the five dental clinical trials included in this paper and the difficulties encountered. All studies were multi-site and a number of common challenges were identified including difficulty recruiting practices and participants, training staff, multi-site coordination and lengthy periods required to gain approvals for the studies. Some studies also identified issues such as sterilisation of instruments, competing priorities for practices and time commitment required by participants. Table 2 identifies the key recommendations based on the experiences within the five primary care dental clinical trials examined. Full details of the included studies are available in Appendix 1.

DISCUSSION

This paper has identified a number of important factors that impact on the conduct of dental clinical trials. These relate to the need for early stakeholder engagement, and trials that are well planned, designed and managed. Consideration of these factors can lead to improved outcomes for researchers, clinic staff and patients, and increases the potential for future dissemination and translation of information into practice. Successfully conducting the trial (with extensive stakeholder involvement) will promote:

- Better research evidence, which can be translated into practice and policy
- Enhanced satisfaction of being involved in a well conducted trial both for research teams and the practice staff, and minimises stress for both groups
- More chance that the results will lead to future/ongoing research activities
- Increased opportunity costs (trials in difficulty require additional resources which could be used for additional research projects).

Specifically, we make the following recommendations for those developing and conducting dental clinical trials in primary care to be considered by researchers, and by practice staff involved in the trials.

For researchers to consider before undertaking a dental clinical trial

Early and continued engagement of dental practice staff (including clinicians)

As with all trials, it is important to engage dental clinics and clinicians early in the process of designing the study and developing the processes and methods. Practice and patient involvement at the design stage of a trial will help deliver a pragmatic design which is more likely to work in the primary care setting.[16] The involvement of more than one practice and their patients is important at the design stage to establish how to deliver a trial in the primary care setting.

Establishing a good rapport with dental practice teams can create and enable productive working relationships.[18] This can be achieved by the study coordinator visiting the participating practices and centres, meeting the teams, and following up with regular contact via email and phone calls. When setting up meetings, the likelihood of attendance can be increased by organising suitable times with the practice in advance.

During the recruitment phase of the trial, researchers need to identify which dental practices are most suitable and ready to undertake research and will therefore be able to deliver the trial. It is important that practice staff understand in advance, the logistics and time commitment required of them in order to participate in the trial. This will help them to provide feedback as to whether the trial is feasible in their clinic and also help to identify any additional support that may be required throughout the trial at an early stage.

Allowing sufficient time for establishing and maintaining governance processes (for example, ethics, advisory groups)

One aspect of undertaking a dental clinical trial that often leads to delays in the implementation of other aspects of the trial, is not allowing enough time for gaining the required ethics approvals and recruiting staff and practices into the study. Ethical review is required for all research involving humans. Ethics committees have a schedule of planned meetings throughout the year, and in addition to initial approval, any requested changes to the trial protocol can cause further delays. The processes required need to be investigated at the start of the trial, and adequate time then factored in for undertaking these approval processes.

For research that will involve the UK NHS, approval is required from the regional NHS organisation involved.[3] In Scotland this involves the research team providing adequate documentation to demonstrate that the ethical and regulatory requirements have been met. This approval process is coordinated across the country, to ease the process for research involving multiple health boards. Every time a new site is added to a trial, local approval needs to be applied for, even if there are already active sites in that region. Recently, in England the Primary Care Trusts which had previously managed this approval process for dental research were dissolved. Unfortunately, delegation of this task had not been placed within the new structures. Until this situation was resolved no new dental research sites could be approved within NHS England. This role has now been taken on by the local clinical research networks in England.

In Australia, there is no one dedicated ethics system for coordinating approval for multi-site projects and it is possible that ethics approval may need to be sought from each site's ethics committee if different health services are involved.

Allowing sufficient time for recruitment of dental practices and participants into the study

Successful recruitment of participants is a critical element of any trial.[10] When planning the trial, a power calculation will determine the required sample size. Estimation is then required to determine what rate of recruitment is expected at a research site, how many sites will be recruiting participants, and for how long recruitment will continue. While there may be some information on which to base this estimation, either from similar previous studies or a pilot trial, there

Table 1 Summary of the five studies and difficulties encountered

Study and aim	Site details	Difficulties encountered
Assessing cost-effectiveness of minimal intervention dentistry (ACE MID) (Australia) To determine if the MID approach in a group of community public dental patients (adolescents aged 11–14 years), who are at high risk of developing dental caries, is 'cost-effective' compared to 'current practice' in achieving positive oral health outcomes for this population group	12 community dental practices	Recruiting dental practices Lower than expected recruitment of adolescents Competing priorities for clinics (service delivery vs research) Staff recruitment Staff training and outcome calibration Long process to gain all approvals required Multi-site coordination (12 sites across metropolitan Melbourne) Time commitment from participants (timing of appointments and duration) Not piloting screening tools
Hall Technique (Australia) To determine the acceptability, success and cost-effectiveness of the Hall Technique - using stainless steel crowns (SSCs) to seal dental caries in primary molars in 3–7 year old children	3 community dental agencies	Recruiting dental practices Long process to gain all approvals required Competing priorities for practices (service delivery vs research) Multi-site coordination (three agencies with eight dental practices in total) Time commitment from participants Sterilisation process for SSCs
Filling children's teeth – indicated or not trial[15] (FiCTION) (United Kingdom) To compare the difference in incidence in pain/sepsis between the three treatment approaches to primary caries. The secondary aim was to examine quality of life, health economics, and patient/provider preferences for the threeinterventions in the study.	70 general dental practices throughout UK (Scotland, North East England, Yorkshire, Wales, London)	Long process to gain all approvals required Lower than expected recruitment rate of children Dental practices withdrawing from study
Investigation of NICE technologies for enabling risk-variable-adjusted-length dental recalls trial (INTERVAL) (United Kingdom) To investigate and compare the effects of three different interventions (six monthly recall; 24 month recall or risk-b ased recall) for optimal, cost-effective maintenance of oral health in adults.	50 general dental practices across UK	Recruiting dental practices Lower (and slower) than expected recruitment of adults Competing priorities for practices (service delivery vs research) Staff recruitment of outcome assessors for the study Staff training and calibration for outcome assessors Long process to gain all approvals required Multi-site coordination (50 sites across UK) Time commitment from participants Sterilisation of instruments Retention/engagement of dental practices and participants
Improving the quality of dentistry[17] (IQuaD) (United Kingdom) To compare the effectiveness and cost-effectiveness of theoretically-based personalised oral hygiene advice or periodontal instrumentation at different time intervals or their combination, for improving periodontal health in dentate adults.	63 dental practices (44 in Scotland and 19 in north east England)	Recruiting dental practices and participants Staff recruitment Staff training and outcome calibration Long process to gain all approvals required Multi-site coordination (63 sites across Scotland and NE England) Time commitment from participants Sterilisation of instruments

is a degree of uncertainty around these estimates. More sites or more time will generally incur additional cost to the trial, so a balance is required in any study proposal.

Recruitment for dental trials takes considerable time and effort.[4] In a busy dental practice with competing demands, the priority to maintain recruitment of participants to a research study can be easily displaced. Further, our experience within primary care dental studies is that recruitment is often slower than anticipated. Potential reasons for this include: a the lack of familiarity with recruiting to research among clinic staff; the challenge of finding patients who meet the inclusion criteria; establishing the additional administrative processes required; recruitment to a research study may not be a priority and is displaced by other demands on the clinic or clinic staff. One strategy for overcoming the slow recruitment is to identify potential additional sites early in the trial, and to activate them rapidly should recruitment fail to meet expectations.

Table 2 Recommendations for improving the implementation of dental clinical trials in primary care

Early and continued engagement of dental practice staff (including clinicians).
Allowing sufficient time for establishing and maintaining governance processes (eg ethics, advisory groups).
Allowing sufficient time for recruitment of dental practices and participants into the study.
Pilot testing data collection tools and methodology prior to the trial.
Allocating sufficient resources for obtaining and processing dental instruments.
A focus is placed on recruitment, retention and training of study staff.
Developing processes for managing multi-site projects early in the study, and then supporting the maintenance of the processes throughout the trial period.
Designing a trial that is not overly burdensome for participants and recruitment.
Early and continued involvement of clinic staff in the research study.
Developing, or enhancing the research capacity within the dental practice.
Identifying a trial champion at each dental practice for the length of the trial period.

Pilot testing data collection tools and methodology before the trial

In order for trials to run smoothly, it is crucial for any tools for recruitment and data collection to be trialled before use. This process will identify any technical issues or areas of ambiguity with the tools, and confirms that the tool is user-friendly for the clinicians. It is also highly recommended that before a large clinical trial is attempted, that a small pilot study is undertaken using the planned

methodology to determine the acceptability of the study to both participants and practices. This also should identify any barriers to implementation early, allowing time to develop strategies for overcoming these before investing larger amounts of money and time into a bigger study. It is preferable to also trial data collection forms and databases at this stage in order to avoid amendments to the trial protocol at a later stage. However, constraints on time and budget may prevent this type of testing at the pilot stage.

Allocating sufficient resources for obtaining and processing dental instruments

Clinical equipment and instruments that are not routinely found in general dental practice are often required for trial interventions or outcome measurement. While sourcing this equipment for trial purposes it is important to also develop appropriate processes to address the issues of infection control and sterilisation of instruments during the trial. If the trial practice staff also serves as the clinical outcome assessors then the practices should be encouraged to follow their local procedures and ensure that the sterilisation of instruments follows health board or national guidelines. A number of the dental trials examined in this paper employed outcome assessor teams to collect clinical measurements. These teams were able to sterilise the instruments and thereby reduce the time required of practice staff. Researchers should be aware that there may be additional costs involved in sterilising equipment.

A focus is placed on recruitment, retention and training of study staff

When undertaking a dental trial it is important to allocate enough time and resources to recruit trial staff to the research project. This includes the development of position descriptions, approval from human resources to advertise, advertising costs and time, and resources required for interviews. Time required for these steps may be as long as six months from the beginning of recruitment to the staff member joining the project, and as such needs to be factored into the trial timeline. Due to the length of follow up of some long-term trials, the process may need to be repeated throughout the trial with staff turnover. Due to funding allocated the number of patients seen gradually over a long study period per clinical examiner, or flow of data for entry and analysis, study staff are often recruited in a casual or part-time capacity. This is problematic as casual employees, if not receiving regular work from the study, may seek part- or full-time employment elsewhere which then necessitates recruitment of new staff to the study. In addition, managing a number of part-time staff can add to the workload of the study coordinator.

Developing processes for managing multi-site projects early in the study, and then supporting the maintenance of the processes throughout the trial period

Coordinating randomised control trials with multiple collaborating sites and recruitment centres can be an extremely challenging logistical exercise. Investigators, researchers and trial dental staff are generally extremely busy individuals with their own time constraints and pressures due to their workload. In our experience, identifying the best point of contact in each collaborating centre and practice at the earliest possible time, can avoid trial correspondence being missed and time wasted during recruitment and follow up. Also, dental practice staff must fully own the project and be fully committed and supportive of its goals and long term benefits. This cannot be achieved by just one visit or one presentation by the lead investigator or the study coordinator. There needs to be an extensive lead up before the research commencing, as discussed earlier in relation to stakeholder engagement.

Some studies have identified that incentives (for example, issuing members of the dental team with continuing professional development credits) as recognition will enable the creation of a culture where participation in research is valued by peers; accepting the need to build and develop capacity for research in primary care. Newsletters are a useful tool to aid coordination on a trial-wide level by highlighting important trial milestones, deadlines, and best practice to all trial teams. It is also a way of acknowledging practices that achieve high levels of recruitment or to highlight initial data coming out of the study that hopefully will maintain a level of enthusiasm by practice staff for the study. For example, newsletters may update clinics and practices about reminder cards available to assist with recruitment or to provide data on proportion of the eligible population of a clinic that was screened. Ultimately face-to-face meetings between the research team and practice/clinic staff are extremely important and regular visits to each practice in a study will help to maintain the clinic's enthusiasm for, and engagement in the research.

One strategy for maintaining enthusiasm for the trial is through recruitment initiatives, whereby clinics that perform well in recruitment are rewarded for successful recruitment. For example, within the FiCTION trial, branded trial merchandise was used to encourage recruitment. At the beginning of a particular month, practices were set a limited recruitment target and successful practices would be sent a 'coffee break' pack consisting of a set of mugs, tea, coffee, and biscuits. They would then be asked to send in a photo of the practice team enjoying their FiCTION coffee break. The aim of this exercise was to develop a feeling of community and fun around participation in the trial, and also ensure trial recruitment remained prominent within practices.

Designing a trial that is not overly burdensome for participants and recruitment

A number of the studies in this paper indicated that time commitment by participants was an issue that may have led to lower than expected recruitment and retention rates. Studies need to ensure that the burden for participants is not too significant as to deter involvement in the trial. Ideally flexibility with appointments should be provided to participants; for example, not restricting dental appointments for school-aged participants to only during school hours. The time required by participants to attend appointments and the frequency of these appointments should not be too onerous or different to what they would receive if they attended a clinic outside of the trial. The time required should be clearly explained to the participant (and their parent/guardian if the participant is a child or adolescent) during the recruitment and consenting process.

Aspects for clinics and clinicians to consider before participating in a trial

Early and continued involvement of clinic staff in the research study

As mentioned previously, the involvement of dental clinics in which the study will take place is crucial very early in the designing of the study. Clinical staff may want to volunteer to actively participate in the design and provide feedback into the feasibility and practicality of the interventions being developed to ensure effective delivery in that particular environment. Involvement at this early stage will help clinical staff to understand the trial processes and help provide solutions to potential problems before they occur. Those clinical staff that were not involved at the early stages of the trial may wish to contact clinicians that were involved, to seek advice on trial processes and practical tips. Individual practices need to consider whether a particular trial is suitable for them, on a case-by-case basis, before signing up. For example, the FiCTION study found that practices signed up wanting to assist in answering a clinical question but

subsequently realised that they did not have suitable patients (for example, they were a private practice with very few child patients).

Practices may be asked to undertake a limited amount of preparatory work, before full participation in the trial, in order to identify potential difficulties that could occur in the practice as early as possible. When considering being involved in a research trial, practice staff need to fully understand what will be required of them during the study and what resources will be provided to them. During this period, issues can be identified such as low presentation rates of the population being targeted (for example, children at high risk of developing caries, low disease rates in particular clinics) or lack of enthusiasm for the trial by staff within the practice. Often a pilot can identify issues such as recruitment difficulties, an intervention design that is unpopular or overly burdensome, protocols/documentation that are difficult to follow, or dental practices that are not able for whatever reason to be able to fully participate in the study. Although this additional period requires time, it provides a way of identifying problems early and recognising reasons why the trial may not work at a particular site before significant investment has been made.

Developing, or enhancing the research capacity within the dental practice

A clinician may not necessarily be familiar with research methodology and what is involved in a clinical trial. The research team should discuss the trial protocols and methods in advance with practice staff to allow for fully informed decision-making, before committing to participation. If practice staff are unfamiliar with conducting research studies, then training in basic research principles should be arranged through the research team, to ensure staff are familiar with these aspects. Practices and staff should understand exactly what is required of them as part of the study design and throughout the duration of the study. The study/research coordinator should interact with the clinic team early in the process to identify clinicians' needs for research training. Research training should include key aspects such as ethics, informed consent, principles of data collection, following research protocols, use of screening and eligibility tools, and calibration of clinical examiners. We recommend that efforts are made to train and support the full practice team, which may require research staff to provide training in the practice itself, as it can be difficult for key team members to be released from the practice to attend training run externally. In addition, with staff turnover, there may be a need to run training at intervals throughout the length of the trial.

Identifying a trial champion at each dental practice for the length of the trial period

Identification, by the practice, of a person at each site who is strongly enthusiastic about the trial is important and can greatly assist with the progress and momentum of the study. A number of studies in this paper identified sites that recruited well. These sites often had a lead person who maintained enthusiasm for the study and motivated other clinicians to screen and recruit participants. This person provides a point of contact for the trial coordinator or investigators to provide information and updates about the trial, and can also enable the practice team to maintain their motivation for the trial.

CONCLUSIONS

It is acknowledged that undertaking and managing clinical trials is costly and not a straight forward exercise.[7,11] However oral disease is extremely costly to treat and providing an evidence base for improved intervention and treatment is important. In Australia, oral diseases accounted for $7.7 billion of total health expenditure in 2009–10, second only to cardiovascular diseases.[19] Similarly, in the European Union current spending on all aspects of care and treatment is close to €79 billion, and if the trends continue, this figure could be as high as €93 billion in 2020.[20] In the UK alone, health expenditure for dental problems was estimated to be £3.31 billion in 2010–11.[21]

Clinical trials are important for dentistry and can add to the evidence-base and influence future clinical practice and community-based oral healthcare.[11] Clinicians and the public expect that the care that will be provided is based on robust evidence, and clinical trials are therefore required to provide this evidence. We have identified key factors to consider when designing and implementing a dental clinical trial in primary care settings. It is extremely important that issues around delivery of trials are openly discussed in order to maximise learning, and to help others to avoid the same issues. Further, it increases the potential for successfully undertaking the dental clinical trial as planned.

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Appendix 1 Description of studies included in this paper

Study name	Stakeholder engagement during project development	Site and sample details	Intervention(s)	Outcome measures
Assessing cost-effectiveness of minimal intervention dentistry (ACE MID) (Australia)	- A pilot study was undertaken to test the MID model and study design at a public dental practice with patients with high rates of dental decay - An Expression of Interest session was held for clinics interested in being involved in the ACE MID study. This session discussed the study design, resources required and resources provided	- Twelve community dental practices - Recruitment target: 504 adolescents aged 11-14-years (revised to 320 adolescents due to recruitment difficulties); actual recruitment: 280	Group 1: Minimal intervention dentistry (MID) which includes development of an individual oral health care plan, application of fluoride varnish, oral health instructions, provision of oral health education resources, and oral health care products (e.g. toothpaste, tooth brushes; floss, Tooth Mousse™ [calcium/ phosphate] - where appropriate etc). Group 2: Control – No intervention, standard care only which includes a recall examination every 12 months. Intervention activities delivered at baseline then at 3, 6, 12, 18 and 24 months. Average appointment time needed for MID preventive intervention was 60 minutes.	- Plaque index, ICDAS II (caries), bleeding index, oral health knowledge and behaviours. - Questionnaire data on all study participants' oral health behaviours and knowledge was collected at clinical examinations. - Clinical examinations consisting of bleeding, plaque indices, caries assessment (ICDAS II) and radiographs of all participants undertaken at baseline, 12 and 24 months. - Questionnaire data on intervention participants' oral health behaviour and diet was collected at 3, 6 and 18 months.
Hall technique (Australia)	- Small pilot study conducted in two community dental agencies in 2012 - one outer and one inner urban agency - Many issues dealt with in the pilot that were essential to the development of the current (phase two) study	- Three community dental agencies - Recruitment target: 220 children aged 3-7-years (actual recruitment: 251)	Group 1: Hall Technique which includes placing a stainless steel crown (SSC) on one carious primary molar per participant. Control - conventional restorative treatment of caries in matched primary molars of same children. Total time for appointment was 30 minutes. A 15 minute appointment was required in 80% of cases for insertion of separators prior to Hall Technique crown placement.	- Baseline data collected was clinical (including ICDAS II) and radiograph examination. - The primary outcome was the period of time that the Hall technique crowned tooth and matched primary molar (same mouth) are free from further treatment, assessed at 6, 12 and 24 months. - Acceptability and satisfaction assessed via questionnaires among patients and their primary carers at baseline, 6, 12 and 24 months. - Health economic data collection will provide cost-outcome description and cost-effectiveness analysis.
Filling children's teeth – indicated or not trial (FiCTION)[15] (United Kingdom)	- Pilot[16] conducted in three areas in the UK (11 practices, 20 dentists) - Feedback gained from pilot that provided information utilised in development of main trial	- Seventy general dental practices throughout UK (Scotland, North East England, Yorkshire, Wales, London)- originally planned for 50 sites - Original recruitment target: 1,461 children aged 3-7 years, with at least one carious molar and no pain/sepsis (30 children per practice) over a 12 month period (actual recruitment: 1,071)	Group 1: Conventional (including prevention) – complete removal of caries and restoration Group 2: Biological (including prevention) – partial/no caries removal and sealing caries (Hall crowns and/or adhesive restorations) Group 3: Preventive only – preventive (e.g. dietary counselling, toothbrush advice and fluoride application) to prevent progression of caries (this is incorporated in above interventions) Time required for an appointment ranged from 15 - 30 minutes.	- Baseline data including: quality of life, clinical and radiographic examination, ICDAS II charting. - Three-year follow up, with regular recording of clinical findings and treatment provided, health economic data, quality of life data, patient/provider preferences.
Investigation of NICE technologies for enabling risk-variable-adjusted-length dental recalls trial (INTERVAL) (United Kingdom)	- Pilot conducted in three areas of the UK (nine practices) - Feedback gained from pilot provided information on how best to manage aspects of the main trial	- Original sample was 40 general dental practices across UK (revised number is 50 practices) - Recruitment target: 2,288 adults (actual recruitment: 2,375)	- Four-year follow-up study Group 1: Six-month recall (every six months) Group 2: 24-month recall Group 3: Risk-based recall (varying interval between 6-24 months set by dentist after assessing patient's oral health)	Primary outcomes: Clinical: - Periodontal disease – gingival inflammation/ bleeding on probing at gingival margin at follow up Patient-centred: - Health-related quality of life : Oral Health Impact Profile (OHIP) – 14 Secondary outcomes: Clinical: - Caries – assessed at both the enamel and dentine thresholds – index ICDAS II; - Periodontal – probing depths and calculus Patient-centred: - Dental anxiety - Oral health related knowledge, attitudes and behaviours - Satisfaction with care - Use of, and reason for use of, dental services (including symptoms and pain)
Improving the quality of dentistry (IQuaD)[17] (United Kingdom)		- Sixty-three dental practices (44 in Scotland and 19 in northeast England) - Recruitment target: target 60 practices and 1,860 adult dentate patients (actual recruited: 63 practices and 1,877 adult dentate patients)	- Three-year follow up Group 1: Routine oral hygiene advice 1a: No periodontal instrumentation 1b: Periodontal instrumentation every six months 1c: Periodontal instrumentation every 12 months Group 2: Personalised oral hygiene advice 2a: No periodontal instrumentation 2b: Periodontal instrumentation every six months 2c: Periodontal instrumentation every 12 months Initial consent and screening appointment was 20 minutes and patient was then examined by their own dentist immediately afterwards. Appointments required 6-12 monthly depending on intervention group (every patient was to be examined at least annually no matter which allocation	- Primary clinical outcome: Gingival inflammation/ bleeding on probing at the gingival margin at three-year follow-up - Secondary clinical outcomes – probing depths and calculus - Patient centred primary outcome: Oral hygiene self-efficacy at three-year follow-up: Oral Health Impact Profile-14 (OHIP-14) - Economic primary outcome: Net benefits (mean willingness to pay minus mean costs)