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# The Impact of Continuing Professional Development in Dentistry: a Literature Review

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# The Impact of Continuing Professional Development in Dentistry: a Literature Review

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# 1. Executive summary

## Introduction

The General Dental Council (GDC) is currently undertaking a review of mandatory Continuing Professional Development (CPD) requirements for all its registrants. As part of this exercise, it commissioned a literature review to investigate the impact of CPD activity on individual practice and competence assurance of the professions it regulates.

The overall aim of the literature review was to establish what evidence exists to demonstrate the range of likely positive and optimum impact of CPD upon the practice of dental professionals.

The literature review addressed seven questions posed by the GDC under the themes of: models of CPD, regulatory purposes of CPD, CPD participation and CPD and performance. The questions were:

### **Models of CPD**

1. What are the least and most effective modes of CPD for the healthcare professions, and in particular dentistry?
2. What are the least and most effective qualitative and quantitative measures of CPD activity for the healthcare professions, and in particular dentistry?

### **Regulatory purposes of CPD**

3. What are the regulatory benefits of CPD participation in dentistry?
4. What are the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation?

### **CPD participation**

5. How do healthcare professionals, and in particular dental professionals, currently engage with, perceive and benefit from CPD; and does CPD have particular consequences for different groups and forms of practice in dentistry?

### **CPD and performance**

6. Is CPD participation a valid indicator of professional competence or performance? Based on what criteria?
7. Is there a link between participation in CPD activity and performance enhancement in the healthcare professions including dentistry, and how is that formed?

## Research Methods

As there had been no previous comprehensive review of the literature, evidence for dental CPD was obtained by interrogating electronic databases for papers from peer reviewed journals, using a wide range of search terms. The search terms for the seven research questions were developed and agreed by the GDC, a comprehensive search of the literature on CPD for dental registrants and for other healthcare professions was performed, and the resulting evidence was synthesised. There had previously been several systematic reviews and reports on CPD for other healthcare professionals. These were identified and analysed for further information to answer the seven questions. A range of organisations and academics, with an administrative or research interest in CPD, were then contacted to identify any reports or other literature on CPD that were not listed on electronic databases.

These activities commenced on 15 August 2011, an interim report was submitted to the GDC on 22 September, a draft final report was submitted on 17 October 2011 and the final report on 24 October 2011. Weekly telephone or face-to-face progress and review meetings were held throughout the review between the GDC and the research team.

## Analysis of the Literature

94 relevant papers were identified for the purposes of this review. The initial database search located 3,779 papers on dental CPD. After applying exclusion criteria, 140 abstracts were reviewed and narrowed down to a final total of 94. Relevant information from these papers was captured on a standardised template. The papers were graded for the scientific quality of their methodologies using the criteria of the National Health Service Research and Development Centre for Evidence-Based Medicine, as set out in Table One, page 11 of the report. Only one paper was graded as 1 (highest Grade) and six as Grade 2. A number of the papers contained information relevant to more than one of the seven questions. None of the papers on dental CPD provided answers to the questions relating to CPD and its effect on performance and only two provided insights into the questions on the regulatory aspects of CPD. However, there were 55 papers that provided information on models of CPD and 54 on CPD participation. The information from the 94 relevant papers and from the analysis of systematic reviews and reports of CPD for other health care professions was then used to address the seven questions.

## Definition of CPD

The definition of CPD that has been adopted in this report is that used in the CPD guidance issued by the GDC, namely “study, training, courses, seminars, reading and other activities undertaken by a dentist or dental professional, which could reasonably be expected to advance their professional development, as a dentist or dental professional” (GDC 2011).

## Outcomes

The review of literature on CPD, for both dental and other healthcare professions, produced few robust evidence-based answers to the seven questions posed by the GDC. This was perhaps unsurprising as numerous authors have commented on the difficulties of conducting robust research into educational outcomes (Bloom, 2005, Marinopoulos et al. 2007, Schostak et al. 2010, Grant 2011). It was not the purpose of this review to analyse these difficulties. However, they should be borne in mind when considering the conclusions, set out below, which address each of the seven questions posed by the GDC.

### **Models of CPD**

#### ***Question 1.***

#### ***What are the least and most effective modes of CPD for the healthcare professions, and in particular dentistry?***

No studies of high quality (Grade 1 – systematic review(s) or Grade 2 – Randomised Controlled Trials (RCTs) )existed to demonstrate the effectiveness of CPD, in terms of quality of care delivered, performance, professional standards, competence, public satisfaction or safety, or their longer-term effects on knowledge retention and application. However, particular elements of individual CPD programmes including sustained, repeated, or longer term CPD activities, involving an interactive method of delivery utilising multimedia, or combining techniques, for example, interactive education were found to be effective. The importance of planning, self directed learning and reflective

practice for effective CPD was highlighted in the literature, as were the perceived benefits of personal learning plans and reflection to help clinicians to identify and take part in appropriate CPD.

### **Question 2.**

#### ***What are the least and most effective qualitative and quantitative measures of CPD activity for the healthcare professions, and in particular dentistry?***

The Pharmaceutical Society of Ireland (PSI) highlighted the benefits of blended learning using a mixture of online and face-to-face activities and an online portfolio to allow a flexible approach that focuses on outcomes relevant to an individual practitioner's practice (PSI 2010). The clearest advice with regard to qualitative and quantitative measures of CPD came from this report where authors suggested that all Irish Pharmacists should be required to record a balance of different CPD activities in a portfolio accompanied by a robust external competency assessment which should be developed by peers and recreate "patient facing scenarios" (PSI 2010). It has been suggested that hours accumulated from activities involving active and targeted participation, which have been shown to be more effective than passive learning, should attract more credits (Bloom 2005). However, both Schostak (2010) and Grant (2011) have described the weakness of using inputs, such as hours of CPD completed to measure CPD. Freidman and Woodhead (2008) have suggested that an output approach that attempts "to measure what CPD is intended to achieve directly" and enables individual professionals to monitor their own progress may be better. However, overall, both the dental and non-dental literature demonstrated the difficulties in developing effective and evidence-based recommendations for quantitative or qualitative measures of CPD. At present it is not possible to draw firm generalisable conclusions to answer question 2.

### **Regulatory purposes of CPD**

### **Question 3.**

#### ***What are the regulatory benefits of CPD participation in dentistry?***

The literature identified a range of potential regulatory benefits of participation in CPD. These encompass assuring activity levels and competency, satisfying public expectations, keeping abreast of advances in patient care and as a registration instrument. The literature did not reveal any studies that demonstrated benefits relating to regulatory purposes of CPD participation in terms of improved quality of care delivered, performance, professional standards, competence, public satisfaction or safety.

### **Question 4.**

#### ***What are the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation?***

The peer reviewed dental literature did not reveal any studies that demonstrated the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation. However, the GDC website (GDC 2011) reminds registrants that: "*Patients are right to expect that all members of the dental team are keeping their skills and knowledge up to date throughout their careers. We ensure that this is happening by making CPD a requirement for all dental professionals registered with us.*" Information from other healthcare sectors focussed on the role of CPD in maintaining and demonstrating professional standards and competency to the public. They include: helping to improve the safety and quality of care provided for patients and the public, maintaining skills and knowledge and reflecting on the standards of practice.

## CPD participation

### **Question 5.**

***How do healthcare professionals, and in particular dental professionals, currently engage with, perceive and benefit from CPD; and does CPD have particular consequences for different groups and forms of practice in dentistry?***

Factors motivating practitioners to undertake CPD and barriers to CPD appeared to be influenced by work-related factors such as environment, working patterns, and employment status, which are all specific to each healthcare professional group, as well as individual perceptions of CPD. Cost, ease of access, and perceived relevance are all related to the ability to engage with CPD.

## CPD and performance

### **Question 6.**

***Is CPD participation a valid indicator of professional competence or performance? Based on what criteria?***

The dental and non-dental literature did not provide any information to demonstrate if CPD participation is a valid indicator of professional competence or performance. This is principally due to the research challenges of assessing outcomes of CPD in terms of effectiveness and impact.

### **Question 7.**

***Is there a link between participation in CPD activity and performance enhancement in the healthcare professions including dentistry, and how is that formed?***

The dental literature did not address either of the two parts of this question. However, the medical literature suggested an association between undertaking CPD activities and enhancing performance. The benefits of targeting and management of CPD were highlighted, especially through the use of personal development plans and annual appraisals.

## 2. Introduction

The General Dental Council (GDC) is the regulator of dental professionals in the United Kingdom. All dentists and Dental Care Professionals (DCPs): dental nurses, dental technicians, clinical dental technicians, dental hygienists, dental therapists and orthodontic therapists, must be registered with the GDC to practise in the UK.

The GDC has recently embarked upon a review of mandatory Continuing Professional Development (CPD) requirements in order to:

- Evaluate the strengths and weaknesses of the current CPD model
- Understand alternative approaches to CPD
- Analyse the benefits of alternative approaches
- Model operational processes in support of preferred approach
- Make a recommendation to Council for a preferred 'revalidation-ready' model of CPD
- Prepare a public consultation based on the Council's preferred model

The GDC commissioned this literature review to investigate the impact of CPD activity on individual practice and competence assurance of all the professions it regulates.

The purpose of the literature review is to contribute to an evidence base to support the GDC in its undertaking of a review of the statutory requirements of CPD for dentists and dental care professionals. The findings of this study will be used by the GDC as part of evidence gathering for its review of CPD and may also help to inform the development of revalidation.

The contract for the review was with the Faculty of General Dental Practice (UK). The team that conducted the literature review was Professor Kenneth Eaton (academic leader), Dr Janine Brooks, Reena Patel and Farzeela Merali, with oversight from the FGDP (UK) by Dr Paul Batchelor and Amrita Narain.

Prior to the literature review, it was believed that very little high quality evidence on CPD in dentistry had been published.

The literature review set out to identify studies that addressed the seven research questions posed by the GDC and to assess the quality of these studies. It sought to review the literature comprehensively, and to identify studies from which conclusions could be drawn. It was a comprehensive review of the dental literature on CPD supplemented by a review of the literature on CPD for other healthcare professions. Because there were very few systematic reviews or Randomised Controlled Trials (RCTs) on dental CPD, the search strategy was designed to identify all relevant studies, the majority of which would not be included in a systematic review. Therefore, this review should be considered as using the methodology of a systematic review of literature rather than a systematic review as such.

The definition of CPD that has been adopted in this report is that used in the CPD guidance issued by the GDC, namely "study, training, courses, seminars, reading and other activities undertaken by a dentist or dental professional, which could reasonably be expected to advance their professional development, as a dentist or dental professional" (GDC 2011).

Nevertheless, there are other definitions and interpretations of CPD. In particular, the terms Continuing Professional Development, Continuing Medical Education (CME) and Continuing Education (CE) can be, and are frequently, used interchangeably. Furthermore, some countries, including the USA, still refer to CME rather than to CDP.



In this review the terms CPD, CME and CE are used as they appear in the reviewed literature. For example, when analysing American papers the term CME, rather than CPD, is used.

## **Aims**

The overall aim of the literature review was to establish whether or not there is evidence that can be used to effectively demonstrate the range of likely positive and optimum impact of CPD upon the practice of dental professionals.

Within this overall aim the literature review addresses the seven questions posed by the GDC under the four themes of: models of CPD; regulatory purposes of CPD; CPD participation and CPD and performance. The questions were:

### **Models of CPD**

1. What are the least and most effective modes of CPD for the healthcare professions, and in particular dentistry?
2. What are the least and most effective qualitative and quantitative measures of CPD activity for the healthcare professions, and in particular dentistry?

### **Regulatory purposes of CPD**

3. What are the regulatory benefits of CPD participation in dentistry?
4. What are the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation?

### **CPD participation**

5. How do healthcare professionals, and in particular dental professionals, currently engage with, perceive and benefit from CPD; and does CPD have particular consequences for different groups and forms of practice in dentistry?

### **CPD and performance**

6. Is CPD participation a valid indicator of professional competence or performance? Based on what criteria?
7. Is there a link between participation in CPD activity and performance enhancement in the healthcare professions including dentistry, and how is that formed?

### 3. Research methods

The methods involved identifying the key search terms for the seven research questions, performing a comprehensive literature search within dentistry and other healthcare professions, contacting Subject Matter Experts (SMEs) to identify unpublished grey literature, summarising the literature, synthesising the evidence, and submitting an interim and a final report for review by the GDC.

These activities commenced on 15 August 2011, an interim report was submitted to the GDC on 22 September a draft final report was submitted on 17 October 2011 and the final report was submitted on 24 October 2011. Weekly telephone or face-to-face progress and review meetings were held throughout the review between the GDC and the research team.

#### 3.1 Dental literature

##### Search Strategy

The search strategy was designed to be comprehensive and to allow for the selection of the most relevant primary studies and review papers. The search plan utilised electronic searching. The following databases: MEDLINE®, EMBASE® and the Cochrane Database of Systematic Reviews were searched to identify literature on the research questions. A more detailed explanation of the search strategy is provided in Appendix A. A systematic approach for searching the dental literature was used, with specific exclusion criteria designed to minimise the risk of bias in selecting papers for inclusion in the review. The exclusion criteria were:

1. Contained no human data
2. Was a meeting abstract, opinion piece, editorial, commentary, or letter
3. Did not include dentists/ dental care professionals
4. Did not include dental training or education
5. Did not evaluate an educational activity
6. Published prior to 1981
7. Did not apply to GDC key research questions
8. Did not include at least 15 fully trained dentists/ dental care professionals
9. Involved quality improvement without an educational activity
10. Not written in English

A standardised form (data template) was used for data extraction from the full versions of the papers. A full explanation of the data extraction process is detailed in Appendix B.

##### Quality Assessment: Rating the Body of Evidence

The quality of the resulting evidence was graded to address the research questions. The methodological characteristics of a study's qualities were assessed by identifying if the papers involved:

- Randomised or convenience samples
- Interview-based questionnaires

- Self-completed questionnaires
- Focus groups
- Qualitative interviews
- Other techniques

The strength of the study design used in each paper was assessed using the grades of evidence listed in Table 1. The five levels of evidence are those adopted by the National Health Service Research and Development Centre for Evidence-Based Medicine (Evidence Based On-Call database 2002).

**Table 1: Grades of evidence**

The grades of evidence	Strength of evidence
<b>Grade I</b>	Strong evidence from at least one systematic review of multiple, well-designed, randomised control trial/s.
<b>Grade II</b>	Strong evidence from at least one properly designed, randomised control trial of appropriate size.
<b>Grade III</b>	Evidence from well-designed trials without randomisation, single group studied pre and post intervention, cohort, time series of matched, case-control studies.
<b>Grade IV</b>	Evidence from well-designed, non-experimental studies from more than one centre or research group.
<b>Grade V</b>	Opinions of respected authorities, based on clinical evidence, descriptive studies or reports of expert committees.

### 3.2 Literature from other healthcare professions

Literature on CPD from non-dental publications was reviewed. This included systematic reviews published in peer reviewed journals identified using a Medline search that adopted the terms: “medicine”, “nurses”, “continuing professional development”. From citations in these systematic reviews, other papers were identified.

Documents from grey literature suggested by the GDC and from Subject Matter Experts were also analysed. Dental SMEs and from wider healthcare included those from academic organisations, regulatory bodies, postgraduate educational institutions, professional organisations, arms’ length bodies, and national and European senior advisors. Consultation with them enabled the identification of grey literature for dentistry and other areas of healthcare. Information relevant to the seven questions posed by the GDC was extracted and its location in the papers/reports was logged.

## 4. Overview of the analysis of the literature for dental and other healthcare professionals

### 4.1 Dental literature

There were 94 relevant papers identified from within the dental literature for the purposes of this review. A summary of the search results for the literature review is presented in Appendix C. From the search, 3779 titles were found that seemed eligible for further review. However, as many were found several times using different strings, there were fewer than 3779 papers. After reviewing the resulting list of titles, a list of 140 abstracts, which appeared to address the seven questions, was developed. The exclusion criteria were then applied to the abstract list, and the full papers were retrieved. The same exclusion criteria were also applied when reviewing the full papers. A total of 94 papers on dental CPD are included in this review. Of these, 93 were identified by the search and one, that by Wright and Franklin (2007), after consultation with the SMEs. Appendix D summarises the SMEs contacted and the information they provided.

52 of the studies were performed in the UK, and 42 were undertaken elsewhere, including in Australia, Canada, and the United States of America.

The most commonly used research method to explore issues around performance was the self-completion questionnaire, used in 63 studies. Six studies used qualitative interviews, interview-based questionnaires or focus group techniques. Other less common methods included: literature reviews, multiple choice questions, recordings of treatment and diagnostic information, participation rates, computer aided learning packages, and an overview of published systematic reviews.

The degree of scientific rigour varied considerably. Only one paper was assessed as Grade 1 and although published in a dental journal it reported four systematic reviews of Medical CPD. Six papers were assessed as Grade 2 and 20 as Grade 3. Of the remaining studies, 25 were assessed as Grade 4 and 42 were Grade 5.

A general observation applicable to all research themes and seven questions, is that there was a lack of solid scientific evidence from which robust conclusions can be based. This was evident from the very low numbers of papers graded 1 or 2.

Finally, the papers were analysed to assess which research themes they addressed. Some papers covered more than one research area. A summary of the 94 papers by the four research areas is set out below (Table 2). Some papers are relevant to more than one research theme, hence the total in Table 2 is greater than 94.

Further details of the studies analysed by country, methodology, quality grade and research area are provided in Appendix C.

**Table 2: Summary of the 94 papers on Dental CPD by the four research areas**

Research Area	Total No. papers found	Total No. Papers 1-3
Models of CPD	55	26
Regulatory purposes of CPD	2	0
CPD participation	54	9
CPD and performance	0	0

## 4.2 Literature for other healthcare professional groups

Of the 12 non-dental papers on CPD that were reviewed, one was a review of systematic reviews (Bloom 2005), two were systematic reviews (Marinopoulos et al. 2007, Forsetlund et al. 2009), six were literature reviews or reviews within reports (Grisci and Jacano 2006, Friedman and Woodhead 2008, Donyai et al. 2010, Pharmaceutical Society of Ireland (PSI) 2010, Schostak et al. 2010, Grant 2011) and three were reports or policy statements. They provided further insights over and above those found in the dental literature on CPD. However, all the systematic reviews and literature reviews, both dental and non-dental, highlight the lack of a robust scientific evidence base to inform policy for many of the seven questions on CPD posed by the GDC.

## 5. Key findings from the literature review

This section presents the key findings from the literature review across the four research areas, in answer to the following seven questions.

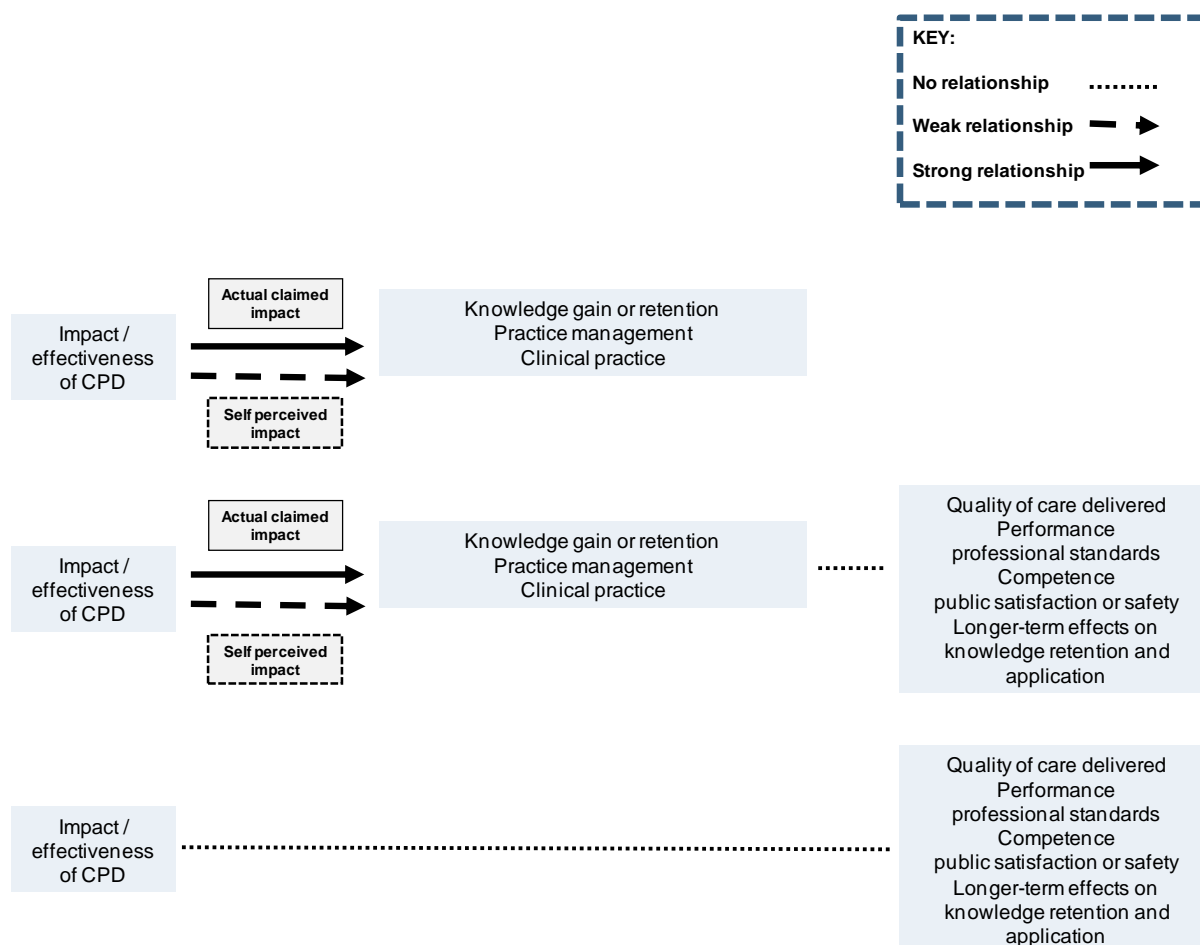
### 5.1 Models of CPD

#### **What are the least and most effective modes of CPD for the healthcare professions, and in particular dentistry?**

In considering the least and most effective modes of CPD in dentistry, no literature of high quality was identified to address certain aspects of CPD programmes, such as the effectiveness of CPD, in terms of quality of care delivered, performance, professional standards, competence, public satisfaction or safety, or their longer-term effects on knowledge retention and application. The search revealed only one Grade 1 paper (Sohn et al. 2004) that, although published in a dental journal, investigated the medical literature. It presented findings from published systematic reviews on the efficacy of educational interventions in the form of continuing medical education and dissemination of educational materials, academic outreach, reminders and local opinion leaders, on the adoption of new knowledge and practices by primary care providers. It concluded that there is a limited knowledge base on the efficacy of the selected CPD interventions (lectures, workshops, educational meetings, and group training) on oral health screening by primary care clinicians. However, effective interventions such as small group discussion, interactive workshops, educational outreach visits and reminders are available to increase knowledge and change behaviours of medical providers.

As will be demonstrated in the analysis that follows, of the 54 papers that dealt with models of CPD, the majority reported self assessed effectiveness of various modes of CPD e.g. short term knowledge gain, or impact upon practice management or clinical practice. With specific reference to the GDC's research questions that seek to assess the impact of CPD upon performance, from a regulatory perspective, only two studies demonstrated medium term improvement in practice. In one, Brown et al. (2004), periodontal record keeping improved after a one year CPD programme. In the other, Chapko et al. (1984), there was more delegation of duties to DCPs and increased productivity two years after an educational intervention. However, there were no data from other dental studies demonstrating benefits in terms of quality of care delivered, performance, professional standards, public satisfaction or safety, or longer term effects on knowledge retention and application. This finding is demonstrated visually in Figure 2.

**Figure 2: Summary of dental research examining impact of CPD**



Effectiveness of CPD has been described in the literature in a variety of ways, indeed Grant (2011) listed *38 methods of following up CPD and showing its effectiveness*. Methods included: appraisal, audit, educational records log books and self-assessment. However, the majority of the studies in the dental literature identified in this literature review used self-assessed data to measure these variables. It should be borne in mind that self-assessment as a measure can be subject to individual bias, reflecting perceptual changes as opposed to observed actual changes.

The findings from the dental literature, set out below, have been broken down according to the following three sub-headings: studies claiming effective modes of CPD for dentists, where a robust outcome measure has been utilised e.g. pre/post tests or recording of treatment and diagnostic information (Tables 3 and 6); studies using self assessed information from dentists, where self reported data has been utilised e.g. perceived improvement in knowledge, or change in clinical practice (Tables 4 and 7); and studies of modes of CPD which demonstrated that a particular mode of CPD was not effective (Table 5).

Because there appeared to be different circumstances, e.g. employment status or working environments for dentists, dental hygienists, dental nurses and dental technicians, the information in all tables are presented according to these professional groups. Those for dentists reflect themes from studies rated as Grade 1-3. There were far fewer studies on CPD for the other dental professions and of those for dental nurses and dental technicians none graded higher than 4.

**Table 3: Studies claiming effective modes of CPD for Dentists**

Professional group	Study type	Title
Dentists	Claimed effective modes of CPD	<b>The effectiveness of a quality improvement intervention with a broad-based approach (involving completion of a self-assessment manual, receipt of relevant references and individual scores) (Best and Messer 2003) Grade 2</b>
		<b>The impact of radiation protection courses in terms of comprehension, knowledge levels, and knowledge application. (Absi et al. 2009, Absi et al 2006) Grade 3</b>
		<b>Evaluating the medium-term knowledge retention of dental personnel following attendance at a postgraduate course in radiation protection, both immediately after training and at 6 month follow up. (Absi et al. 2011) Grade 3</b>
		<b>The impact of a year-long CPD intervention on diagnostic and preventative activities related to the provision of periodontal care (Brown et al. 2004) Grade 3</b>
		<b>The impact of management training on dentists' delegation to auxiliaries (Chapko et al. 1984) Grade 3</b>
		<b>An analysis of the outcomes of an online CPD programme in terms of users' knowledge of material (Francis et al. 2000) Grade 3</b>
		<b>The impact of an e-learning cross-infection control CD-ROM on GDPs' level of knowledge of cross-infection control (Gray et al. 2007) Grade 3</b>
		<b>The effect of continuing education on the topic of fissure sealants on dental professionals' knowledge, attitude and use of sealant restorations. (Farsi 1999) Grade 3</b>

The papers in Table 3 describe the impact of a range of CPD programmes, including the utilisation of a self-assessment manual, courses in radiation protection, longer term continuing education programmes, online applications and CD ROM programmes. Topics included a range of clinical and administrative themes ranging from periodontology, health and safety, practice management, cross infection control and the use of fissure sealants.

In a randomised controlled trial, Best and Messer (2003) examined the effectiveness of two interventions that included completion of a self-assessment manual with relevant references provided, with or without an associated continuing education course. The self-assessment manual contained 21 sections addressing clinical issues, administrative and process issues for dental practice and served as a measuring instrument to allow comparisons of baseline and post-intervention data. The results demonstrated that an intervention involving self-assessment, followed by the receipt of scores and references for the manual, resulted in *modest* (not statistically significant) improvements in total scores for dentists after one year. This intervention resulted in significantly better scores in the study group, than the two control groups.



The studies assessing the impact of courses in radiation protection all used validated pre- and post-course multiple choice questions to test knowledge and comprehension levels (Absi et al. 2011, Absi et al. 2009, Absi et al. 2006). They applied convenience samples of practitioners who had attended courses in radiation protection. All studies demonstrated that at baseline, levels of radiation protection knowledge were very low, but attending an approved course improved this considerably in the immediate to short term. However, Absi et al. (2009) highlighted that competency and performance were not measured, as this would require more rigorous forms of assessment, such as practice visits and peer review that would have been costly. Absi et al. (2006) also found that more recently qualified practitioners performed slightly better than their more experienced peers. The authors suggested that this was because they were more familiar with multiple choice questionnaires and had recent learning experience. Finally, in the most recent study, Absi et al. (2011) demonstrated a substantial amount of knowledge loss 6 to 12 months after an attendance course. The authors suggested that to achieve long-term knowledge retention, early or repeated reinforcement may be necessary.

Brown et al. (2004) assessed the impact of a longer-term (one year) continuing education intervention in periodontics on a group of randomly selected private practitioners in Adelaide, Australia. The intervention involved a one day seminar, bi-monthly newsletters, individualised three monthly feed-back and technical assistance. The results demonstrated that an extended CPD intervention had a statistically significant effect on the provision of periodontal services. This was detected through an increase in the number of periodontal diagnostic, preventative and treatment recordings in the patient records of participating practices. However, the authors acknowledged that this change had been achieved through frequent contact and support, at significant cost and investment of resources and the research did not address the most important question, namely whether there were health benefits for patients.

In a study of 122 Washington State general dental practices, Chapko et al. (1984) investigated the impact of receiving continuing education in the efficient utilisation of dental auxiliaries (dental nurses). Evaluation of the course's effects demonstrated that such a course in practice management can have a positive effect on delegation of tasks to auxiliaries, practice output and dentist income. The training had statistically significant effects on task delegation after one year, with enhancements in productivity evident only after two years. The authors noted that effects of the continuing education are sequential with changes in delegation to auxiliaries (dental nurses) occurring first, and increases in volume of services and income occurring later.

Francis et al. (2000) utilised a pre and post-course multiple choice test to assess knowledge levels of two online modules on dental radiology and occupational safety and health administration standards. Results demonstrated a significant increase in mean pre- to post-test scores. However, generalisations cannot be made to the entire dental profession as the study utilised a small convenience sample of participants, and furthermore, no attempt was made to standardise the learning styles or groups that evaluated the modules.

The final two studies utilised pre and post-course tests to demonstrate increases in knowledge levels of cross-infection control (Gray et al. 2007) and fissure sealants (Farsi 1999). In a national study, Gray et al. (2007) carried out a post-impact evaluation of a cross-infection control CD-ROM. The majority of respondents to the survey evaluation felt that the CD-ROM was well designed, fit for purpose, and extended their subject knowledge in the area of cross-infection control. However, they also felt that an online resource should also have been made available. Farsi (1999) utilised a sample of randomly selected private practitioners in Jeddah, Saudi Arabia. Practitioners were provided with educational material including scientific literature, and a plaster model to allow the visual demonstration of the effect of fissure sealants.

**Table 4: Studies utilising self assessed information from dentists**

Professional group	Study type	Title
Dentists	Self assessed effective modes of CPD	The evaluation and assessment of the effectiveness of personal learning plans for GDPs (Carrotte et al. 2003) Grade 3
		The self assessed impact of a personal development plan upon learning needs, extent of new learning, immediate and longer-term impact on practice (Bullock et al. 2007) Grade 2
		The utilisation of a personal development plan in the identification of learning needs (Wright and Franklin 2007) Grade 3
		The value of the questionnaire as a tool for assessing the impact of short course attendance on general dental practice (Bullock et al. 1999) Grade 3
		The self perceived impact of course attendance on the practice of dentists (Firmstone et al. 2004) Grade 3
		The influence on partial denture design of a teaching video for general dental practitioners (Holt et al. 1994) Grade 3
		The impact of computer-based continuing education upon performance (Marsh et al. 2001) Grade 3
		The impact of a 2-day course organised for dental hospital consultants as part of a project on raising awareness of dental staff about HIV and AIDS (Lewis et al. 2000) Grade 3
		The self assessed impact of CPD programmes in endodontics and implant dentistry on clinical practice (John and Parashos 2007) Grade 3
		The impact of a part-time five-year Master of Science (MSc) programme on participants' knowledge and confidence (Bullock et al. 2009) Grade 3

These studies all utilised various applications of self-perceived data to report on study findings. Topics included the perception of personal learning and development plans on clinical practice and learning needs, the value of a post-course questionnaire, the impact of course attendance upon practice, the impact of a teaching video in partial denture design, the impact of a two day course on HIV and AIDS and the impact of longer term and sustained postgraduate study on knowledge levels.

In a study investigating the impact of personal learning plans for GDPs, Carrotte et al. (2003) demonstrated how dentists perceived that they were being well trained for their job, that they had developed new skills during the study programme, and that subsequently, they used their skills better than before.

Based on self-ratings within a controlled study of 87 participants over a six month period, Bullock et al. (2007) demonstrated that dentists who were supported to develop a personal learning plan (PDP)

perceived greater benefits from their CPD than the control group. Participants felt that being supported to develop a PDP helped them identify learning needs and focused their selection of CPD. They welcomed the help of a tutor in this process. For attendance at courses, the impact of the PDP was more clearly in evidence when there was a good match between the PDP and the CPD activities undertaken. The self-ratings for impact were higher among the group who had been supported in the development of a PDP, and this was particularly true for reading. Furthermore, the authors suggested that being supported to develop a PDP has a greater influence on reading than on courses.

In a study describing the work undertaken by a Postgraduate Primary Care Trust (PCT) Dental Tutor for South Yorkshire and the East Midlands Regional Postgraduate Dental Education Office, Wright and Franklin (2007) demonstrated the role of a PCT Tutor in facilitating the writing of PDPs for 202 general dental practitioners in four Sheffield PCTs. The most common areas of need were endodontics, practice management and development, and computing and IT skills. The authors reported how the introduction of this post also increased the number of Sheffield GDPs with written PDPs, to 45%. The authors cited the GDC reported national average of dentists with a written PDP as 16% (GDC 2001).

Bullock et al. (1999) examined the self-perceived value of a questionnaire as a tool for assessing the impact of short course attendance on general dental practice. The study used a convenience sample of participants attending three short courses who completed delayed impact-on-practice questionnaires. Respondents thought the questionnaire was an appropriate tool for assessing impact on practice, an appropriate interval of time between the course and the delayed questionnaire was about six weeks and that courses most likely to impact on practice were those which offer updates on common clinical topics and are hands-on in nature. Answers to open questions indicated that courses that offered updates on common clinical topics were perceived to have the greatest impact on practice, particularly if they were of a hands-on nature. The authors highlighted how it is not feasible to assess all courses using a delayed impact-on-practice questionnaire, due to the limitations of resource and time.

In a study reporting the self-rated impact of course attendance on the practice of dentists, Firmstone et al. (2004) demonstrated that course attendance was perceived to impact upon practice. Impact was enhanced when the selection of courses was based on an individual's learning needs. Results also demonstrated how the self-assessed impact of continuing education was only significantly affected when a GDP attended a number of courses, rather than just one course. Authors suggested that those practitioners who attend only occasional CPD courses may be put off further attendance, because of their perceived lack of apparent impact on their practices. It was also concluded that course attendance may confirm current practice rather than lead to change, and therefore dentists may self-select courses that reinforce their current knowledge, rather than address areas of deficiency.

Holt et al. (1994) highlighted that although a teaching video in partial denture design had been well received, it only revealed perceived intentions to change clinical practice, not actual changes in practice. In a study assessing the impact of computer-based instructional programs upon a self-selected group of orthodontists, participants reported similar findings of self-perceived changes in clinical practice (March et al. 2001). Following a two day course on HIV and AIDS, Lewis et al. (2000) demonstrated a general improvement in dentists' confidence in their knowledge, ability to communicate with HIV-positive patients and in talking to staff who were unwilling to provide treatment. There was also a reported increase in confidence about knowledge of HIV, oral manifestations and their management immediately following the course, which was maintained two years later.

Longer-term studies were also identified. John and Parashos (2007) showed how following a minimum of three months after attending didactic lecture and interactive hands-on CPD courses, 90 per cent of the 60 respondents who had attended endodontic courses, and 53 per cent of the 19 implant participants felt that their practice had changed as a result of attending these programmes. Bullock et al. (2009) described the impact of a sustained programme of postgraduate study for GDPs in a study assessing the effect of the University of Birmingham Masters Degree in General Dental Practice on the participants' self reported learning gains. The two assessed modules, New Dental Technologies and Periodontology, were shown to increase participants' perceived knowledge and confidence levels.

The inherent limitations of a questionnaire survey design must be acknowledged when considering the findings from these studies. Studies showed that CPD programmes in a range of disciplines significantly impacted on a self-perceived change in clinical practice. While this does provide some evidence of the impact of such programmes on clinical practice, it must be recognised that self-reporting of clinical behaviour may not necessarily correlate with actual practice.

**Table 5: Studies describing modes of CPD that demonstrate no effectiveness for dentists**

Professional group	Study type	Title
Dentists	Modes of CPD which demonstrate no effectiveness	<b>The effect of educational outreach visits on antibiotic prescribing for acute dental pain in primary care. (Seager et al. 2006) Grade 2</b>
		<b>The impact of education in evidence-based practice teaching guidelines on changing dentist behaviour (Clarkson et al. 2008) Grade 2</b>
		<b>The impact of a computer aided learning intervention upon performance (in terms of sensitivity and specificity of dentists' restorative treatment decisions) (Kay et al. 2001) Grade 2</b>

These three Grade 2 studies described modes of CPD or educational programmes which demonstrated no actual effectiveness or impact.

In a study examining the effect of educational outreach visits on antibiotic prescribing for acute dental pain in primary care, Seager et al. (2006) showed how the sole use of evidence-based guidelines on prescribing for acute dental pain did not improve prescribing by GDPs. However, it was noted that visits by a trained pharmacist may be a successful method to improve prescribing.

In a randomised controlled trial investigating the impact of education in evidence-based practice upon clinician behaviour, the educational intervention was designed to influence knowledge about evidence-based practice as a way of encouraging preventive care, using current adult learning practice which advises an interactive approach (Clarkson et al. 2008). The aims were to provide skills to implement an evidence-based approach to clinical practice and to raise awareness of research methods in primary care. Guidelines on targeted caries prevention were used as working examples. The authors demonstrated how teaching an evidence-based approach to primary care dentists may not produce readily detectable changes in clinical practice. The education intervention was shown to have no statistically significant effect.

Kay et al. (2001) sought to demonstrate whether or not an educational intervention delivered by a computer aided learning package improved the sensitivity and specificity of dentists' restorative treatment decisions. Results suggested that the computer aided learning package used in the study had no effect on dentists' treatment decision-making behaviour. The authors concluded that a greater understanding is required of the psychology of treatment decision-making in order to determine the key factors influencing dentists' choices.

**Table 6: Studies claiming actual effective modes of CPD for dental hygienists**

Professional group	Study type	Title
Dental hygienists	Claimed effective modes of CPD	Immediate and long term effects of a continuing education course on dental hygienists' knowledge, attitudes and clinical skills (Young et al 1982) Grade 3
		Factors associated with performance on a continuing education course in periodontics (Young et al. 1989) Grade 3
		Dental hygienists' knowledge, skill level, and clinical practice habits after completion of a 24-hour continuing education course in local anaesthesia (Cross-Poline et al. 1992) Grade 3

These Grade 3 studies all utilised pre and post-course multiple choice questions to test knowledge of periodontics (Young et al. 1989, Young et al. 1982) and treatment procedures with local anaesthesia (Cross-Poline et al. 1992). The periodontal studies demonstrated significant short-term/immediate gains in knowledge at the conclusion of the course. Cross-Poline et al. (1992) demonstrated significant improvements in knowledge gain of local anaesthesia, but a major limitation of this study was the lack of control group.

**Table 7: Studies utilising self assessed information from dental hygienists**

Professional group	Study type	Title
Dental hygienists	Self assessed effective modes of CPD	The likelihood of dental hygienists reporting abuse before and after a training program (Harmer-Beem 2005) Grade 3

This Grade 3 study utilised a self-selected convenience sample of dental hygienists who attended a continuing education training programme for the recognition and reporting of abuse. Participants were asked to complete a before and after course 10-item statement form to ascertain if training would influence dental hygienists' perceived likelihood to report abuse. The results demonstrated that training on this topic increased the self-perceived likelihood to report abuse. The authors also reinforced the importance of clinicians identifying their own educational needs, and then seeking out appropriate continuing education.

The selected literature from other healthcare professional groups provided information on the effectiveness of a range of CPD applications, with particular focus on the benefits of interactive education and active participation, needs assessment and reflective practice.

In a review of systematic reviews, that looked at the effects of continuing medical education on physician clinical care and patient health, Bloom (2005) concluded “ *Burgeoning knowledge from RCTs and meta-analysis of CME is clear on the most-effective techniques that alter medical-care processes and patient health outcomes – interactive education, audit and feedback, reminders, academic detailing and other outreach programmes, and somewhat less so, clinical practice guidelines and opinion leaders. In addition, combining techniques, for example, interactive education plus academic detailing, leads to greater effect than either of the techniques alone. The literature is also clear on the least-effective education methods- didactic lectures and distributed print materials alone. But even a technique of low-efficacy (such as didactic lectures and distributed print materials alone) can become useful when combined with interactive tools.*”

The findings of a Cochrane Review of the effects of continuing education meetings on professional practice and health care outcomes (Forsetlund et al. 2009) echoed Bloom’s conclusions that the effects of such meetings on these aspects were small and that educational meetings alone were not likely to be effective for changing complex behaviour.

In their systematic review of the effectiveness of continuing medical education Marinopoulos et al. (2007) also found multimedia was more effective than print and (unsurprisingly) multiple exposures (to CME) more effective than a single exposure. The need for learning methods for the continuing education of nurses that involve active participation, as opposed to didactic lectures was stressed by Griscti and Jacono (2006). In a review commissioned by the General Medical Council (GMC) and Academy of Royal Medical Colleges (AMRC) (Schostak et al. 2010), this theme was developed further and it was suggested that the literature supports the view that active learning should link CPD with needs analysis and multiple learning activities if it were to be likely to change doctors’ practice. In a review for the Professional Associations Network (PARN), Friedman and Woodhead (2008) stressed the need for individuals to plan their CPD and to reflect after all CPD activities. The need for follow up was also highlighted by Schostak et al. (2010) who reported that “*Effective knowledge should be integrated with everyday working practices and combined with follow-up activities in order to ensure reinforcement and critical development, such as real-time or virtual discussion with peers.*”

Notwithstanding the above findings, a degree of caution should be exercised when selecting effective modes of CPD. Grant (2011) has pointed out that the findings of studies into CPD underline the influence of contextual and intervening variables and the problems associated with trying to isolate their effects on the results. Marinopoulos et al. (2007) concluded that more research is necessary to determine with any certainty which types of media, techniques and exposure volumes (to CME), as well as what internal and external characteristics, are associated with improvements in outcomes.

In conclusion, no studies of high quality existed to demonstrate the effectiveness of CPD, in terms of quality of care delivered, performance, professional standards, competence, public satisfaction or safety, or their longer-term effects on knowledge retention and application. However, particular elements of individual CPD programmes were deemed to be effective. These include the benefits of sustained, repeated, or longer term CPD activities, involving an interactive method of delivery utilising multimedia, or combining techniques, for example, interactive education. The importance of planning, self directed learning and reflective practice were highlighted as were the perceived benefits of personal learning plans and reflection to help clinicians to identify and take part in appropriate CPD.

## What are the least and most effective qualitative and quantitative measures of CPD activity for the healthcare professions, and in particular dentistry?

From the dental literature, the review only revealed one Grade 4 paper (Table 8) which reported on the development of an Index of Dental Educational Activities (IDEA) as part of an exploration of continuing professional development activities among a sample of general dental practitioners in Yorkshire (MacGregor et al. 1991). The authors described IDEA as a measure to demonstrate CPD activities. The index was based upon a variety of CPD activities, where points were awarded for degrees of involvement in each area, to give a simple summation. However, whilst the utility of the index as a summary of CPD practices, and its potential as a comparative measure across health professions was highlighted, the authors also stated how mere attendance at continuing education events will not necessarily result in better patient care.

**Table 8: An index of dental educational activities**

Professional group	Key topic area
Dentists	Utilising an index of dental educational activities (IDEA) to explore continuing professional development activities among a sample of general dental practitioners (GDPs) in the Yorkshire Region in Britain. (MacGregor et al. 1991) Grade 4

The literature from other healthcare professional groups highlighted the challenges in defining the concept of “effectiveness”, and measuring outcomes of CPD. The pharmacy literature revealed a portfolio-based model involving external competency assessment to develop “patient facing scenarios” (CPI 2010). This is described at the end of this section (5.1. of the report).

As mentioned previously, Grant (2011) listed *38 methods of following up CPD and showing its effectiveness*, such as appraisal, audit, educational records and log books, self-assessment. Schostak et al. (2010) considered that *“any meaning we attribute to “effectiveness” is to be left open because it is complex and multi-dimensional and accordingly, incompatible with measurement.”* The same authors also reported that effectiveness is facilitated when professionals are able to determine their own learning needs through reflection within the totality of their practice and that this means being able to go beyond what is quantifiable.

Self-accounting with appraisal by an “independent” professional peer is one technique for measuring CPD activity and is capable of addressing the diversity of practice (Schostak et al. 2010). The same authors (Schostak et al. 2010) and Grant (2011) also recognised the value of self-directed and informal learning and they have been incorporated in the AMRC’s ten principles of CPD (Appendix E) used by Medical Royal Colleges and Faculties.

The difficulties in defining exactly what CME outcomes should be measured and how they should be measured was highlighted over 30 years ago (Bertram and Brooks-Bertram 1977). As Grant (2011) concluded, education and learning do not take place in a laboratory and it is a very great challenge to identify and measure factors relevant to performance and patient care. She went on to state that with many studies which ostensibly concern themselves with the outcomes of CPD, the outcomes are not connected or are loosely connected to CPD, in that they fail to address the issues of changes in practice and in practice outcomes (Grant 2011). Hours undertaking CPD is one such measure.

Grant goes on to suggest that for medical practitioners, far better qualitative measures of successful outcomes after CPD could include changes in:

- Prescribing practices
- Use of screening techniques
- Preventive care practice
- Diagnostic accuracy
- Referral patterns

Each of the 38 methods for demonstrating the effectiveness of CPD, that Grant has identified, have advantages and disadvantages. For example some, such as referral patterns, are simple to record, whereas others such as confidence levels and corporate image are difficult to assess objectively. However, very few studies have attempted to compare their relative value as effective quantitative or qualitative measures of CPD for healthcare practitioners, making evidence-based recommendations impossible.

Some regulatory bodies continue to use input variables such as completed hours as a measure of CPD activity. It has been suggested that hours accumulated from activities involving active and targeted participation, which have been shown to be more effective than passive learning, should attract more credits (Bloom 2005). However, both Schostak (2010) and Grant (2011) have described the weakness of using input to measure CPD. For example, Grant (2011) stated that: *The measurement of participation in CPD by accumulation of credits, or hours, is perhaps the most commonly applied framework. Evidence would suggest that it is probably not effective in ensuring that CPD has an effect in practice.* In the Professional Associations Research Network (PARN) report – *Approach to CPD Measurement*, Friedman and Woodhead (2008) reviewed the advantages and disadvantages of using input versus output to measure CPD. They concluded that although the input approach had the advantages of simplicity and was easy to monitor, it was difficult to assess whether or not the hours of CPD translated into improved performance and could be meaningless if for example participants fell asleep during lectures. They stated that the output approach attempts *“to measure what CPD is intended to achieve directly”* and enabled individual professionals to monitor their own progress (Freidman and Woodhead 2008). They concluded that *“along with improvements in the supply of output measurement techniques, we believe the demand for such systems will grow significantly as pressures on professional bodies towards providing evidence for continuing competence and maintaining professionalism grow both from the professionals themselves and from other stakeholders.”*

The outcomes framework for Pharmacists, evaluated by Donyai et al. (2010) may offer one example of targeted, “active” participation in CPD. The framework is based on the concept that each pharmacist will plan and record their CPD and have to demonstrate that it is relevant to their field of practice and has contributed to the quality of development of their practice (Donayi et al. 2010). However, the evaluation of this outcomes framework involved a small sample of volunteers and further, far larger trials, using representative samples, are necessary before it could be generally accepted as a reliable measure of CPD.

With regard to qualitative and quantitative measures of CDP the Pharmaceutical Society of Ireland (PSI) propose that all Irish Pharmacists should be required to record a balance of different CPD activities in a portfolio accompanied by a robust external competency assessment which should be developed by peers and recreate “patient facing scenarios” (PSI 2010). The proposals are based on 13 principles with an “overriding focus on patient safety, patient care and public welfare” (PSI 2010). The same report also highlighted the benefits of blended learning using a mixture of online and face-to-face activities and an online portfolio to allow a flexible approach that focuses on outcomes relevant to an individual practitioner’s practice (PSI 2010).



Feedback from workshops indicated that Irish Pharmacists wanted to move away from measuring CPD by hours (PSI 2010). The need for an international benchmark was recognised and the Irish Pharmacists Association has been reported, as encouraging, a move from a purely points gathering exercise by requiring that any CPD undertaken is relevant to the individual pharmacists role (PSI 2010), a view shared by the Institute of Continuing Professional Development (ICPD 2006). There is a view that because of the variety of roles that registrants undertake, other than training and retraining in communication skills, there is no need for compulsory CPD in some topics (Grant 2011).

In conclusion, overall, both the dental and non-dental literature demonstrated the difficulties in developing effective and evidence-based recommendations for quantitative or qualitative measures of CPD. PARN has suggested that output measures may be more effective than input at measures as a means to assess the effectiveness of CPD. A number of regulatory bodies and professional associations are adopting this approach. However, as yet there have been no studies on this topic specifically related to dentistry.

## 5.2 Regulatory purposes of CPD

### **What are the regulatory benefits of CPD participation in dentistry?**

The dental literature did not reveal any studies that demonstrated benefits relating to regulatory purposes of CPD participation in terms of improved quality of care delivered, performance, professional standards, competence, public satisfaction or safety. Only low quality studies (Grades 4 or 5) were found. In one Australian study, its authors suggested that lower attendance rates at CPD courses may occur as a result a lack of mandatory requirements in the country concerned (Abbott et al. 2010). Another study commented on reasons behind attendance at mandatory CPD (Hopcraft et al. 2010).

In 2006, in Western Australia (WA) there was no requirement for dentists to participate in CPD. A Grade 5 study into the participation pattern of dentists in WA in CPD activities between 2001 and 2006 revealed that attendance was low (Abbott et al. 2010). Between 10.1-24.4% of dentists registered in WA attended at least one course each year. The authors drew comparisons with a study in the United Kingdom that showed that 96% of the participants had attended 2.5 hours or more of courses and lectures in a one year period (Bullock et al. 2003). It should be noted that the data for this study (Bullock et al. 2003) were collected before CPD was made a mandatory requirement for UK dentists. Furthermore, Abbott et al. (2010) only included participants who attended courses organised by the University Continuing Dental Education Committee and therefore the results did not necessarily reflect the total CPD activity of all Western Australian dentists.

In a Grade 4 study investigating participation in continuing professional development by dental practitioners in Victoria, Australia in 2007, Hopcraft et al. (2010) found that approximately one in five respondents undertook CPD activities for the sole purpose of meeting the mandatory requirements, rather than for professional and educational reasons.

Care must be exercised when considering the findings from these studies, due to the limitations of self-reported data and convenience sampling. Making direct comparisons between different schemes and countries may not always be appropriate due to the different requirements regarding clinical and non-clinical hours, and verifiable and non-verifiable CPD activities.

The non-dental CPD literature identified a range of regulatory benefits of participation in CPD. These encompass assuring activity levels and competency, satisfying public expectations, keeping abreast of advances in patient care and as a registration instrument.

The PSI (2010) highlighted that the primary benefit of CPD is the assurance of a minimum level of development activity for all members of the profession, which in turn is intended to ensure a certain level of competency thus safeguarding patients.

The ICPD stated that *“professions continually need to be seen to be responding to the public perception that they oversee the competencies of their members, particularly as a result of greater business transparency and an increasingly litigious environment”* (ICPD 2006).

Similarly, although aimed at physicians, Bloom (2005) suggested that *“the objective of physician continuing medical education is to help them keep abreast of advance in patient care, to accept new more-beneficial care and to discontinue use of existing lower-benefit diagnostic and therapeutic interventions.”* Bloom’s suggestion is echoed by Friedman and Phillips (2001).

In conclusion, the literature identifies a range of regulatory benefits of participation in CPD, but fails to demonstrate any clear associations with quality of care delivered, performance, professional standards, competence, public satisfaction or safety.

### **What are the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation?**

The review of dental literature did not reveal any information to answer this question. However, it was apparent from the grey literature (GDC 2011, GMC 2011) that regulatory processes involve both the public, and individual professionals, in assuring and demonstrating professional standards and competency and supporting clinicians to achieve and maintain acceptable standards.

Four of the non-dental publications did provide answers to this question, as follows:

- *To demonstrate that patient care has benefited in some way in the context of safety, quality and efficacy in terms of tangible outcomes* (Donyai et al. 2010).
- *To enable individual professionals achieve a measure of control and security in the often precarious workplace* (Friedman and Phillips 2001) and thus be less likely to act in an unprofessional manner.
- *As a means of assuring a wary public that professionals are indeed up-to-date, given the rapid pace of technological advancement.* (Friedman and Phillips 2001).
- *As a means whereby it can be verified that professional standards are being upheld* (Friedman and Phillips 2001).
- *To support the public service duty by ensuring that anyone claiming to be a member can be relied upon to have kept their knowledge and skills up to date* (ICDP 2006).
- *To assure competency across the profession, to meet patient needs and demonstrate this competency to others* (PSI 2010).

In addition, the GDC website (GDC 2011) reminds registrants that: *“Patients are right to expect that all members of the dental team are keeping their skills and knowledge up to date throughout their*

careers. We ensure that this is happening by making CPD a requirement for all dental professionals registered with us.”

The General Medical Council’s website (GMC 2011) states that the GMC has a statutory role to promote high standards and co-ordinate all aspects of medical education. This includes doctors’ continuing medical education. It also states that “*Good medical practice requires doctors to keep their knowledge and skills up to date throughout their working life and to maintain and improve their performance. Continuing professional development (CPD) is a key way for doctors to meet these professional standards and is one of the sources of information required for appraisal and revalidation*”.

In conclusion, the dental literature did not reveal any studies that demonstrated the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation. Information from other healthcare sectors focussed on maintaining and demonstrating professional standards and competency to the public.

### 5.3 CPD participation

#### **How do healthcare professionals, and in particular dental professionals, currently engage with, perceive and benefit from CPD; and does CPD have particular consequences for different groups and forms of practice in dentistry?**

The dental literature revealed only Grade 2 and Grade 3 studies for this research theme regarding dentists and dental hygienists. Table 9 describes key topic areas arising from papers of Grade 2 and Grade 3 quality for dentists. No studies were found which demonstrated particular consequences for CPD for different groups and forms of practice in dentistry.

Only one Grade 3 paper was identified which examined dental hygienist participants' satisfaction with a continuing education course in periodontics (Young et al. 1989).

**Table 9: How dentists currently engage with, perceive and benefit from CPD**

Professional group	
Dentists	GDP participation rates (Firmstone et al. 2004) Grade 3
	Reasons why GDPs undertake CPD programmes in endodontics and implant dentistry, and participation rates of CPD (John and Parashos 2007) Grade 3
	GDP perceptions of the effectiveness of personal learning plans (Carrotte et al. 2007) Grade 3
	Perceptions of PDP and participation in CPD (Bullock et al. 2007) Grade 2
	Attitudes towards online CPD (Francis et al. 2000) Grade 3
	Perceptions of e-learning cross-infection control CD-ROM provided to all general dental practitioners in England. (Gray et al. 2007) Grade 3
	Orthodontists’ perception of the utility of computer-based continuing education about super-elastic arch wires for the initial stage of orthodontic treatment (Marsh et al. 2001) Grade 3
	The use of targeted email reminders (designed as cues to action) to influence participation by dental providers in an Internet delivered intervention for tobacco control (Houston et al. 2010) Grade 2

These Grade 2 and 3 studies describe GDP participation rates in specific topic areas, and in particular localities; reasons behind choice of CPD topic; perceptions of personal development plans; attitudes towards individual CPD applications and the use of targeted e-mail reminders to influence participation.

In a study utilising a convenience sample of GDPs in three postgraduate dental deaneries in England, Bullock et al. (2004) reported that the most frequently undertaken forms of CPD were found to be journal reading and courses. Specifically, 97% of the dentists who responded reported attending at least one two and a half hour session in the study period and 43% for more than 15 hours.

In an Australian study, John and Parashos (2007) reported that for CPD programmes in endodontics and implant dentistry, overall, most participants (72 %) agreed that they relied on formal CPD programmes to keep up-to-date in practice, with 92% having undertaken their particular course to improve their clinical skills. Interestingly, 35% of participants that reported that they had undertaken the programme to fulfil their Board requirements.

Carrotte et al. (2007) reported very positive feedback from GDPs on the use of a PDP. Practitioners felt that new skills were being employed, or that an improved understanding had led to a reduction of previous inaccurate or wrong practices. The authors suggested that greater ownership of an educational programme, coupled with a sense of belonging to a study group, may stimulate and motivate practitioners to a greater extent.

Bullock et al. (2007) reported similar findings in a RCT investigating GDP perceptions of PDPs and participation in CPD in general. Participants undertook a median number of 17 educational activities in the six month period of the study (mean of 50 hours). Most frequent activities were reading and attendance at courses. These two accounted for over half the total number of educational activities. The main 'other' activities included staff meetings or discussions with colleagues, training activity with new dentists and peer review but a range of other CPD was also listed (including journal clubs, conferences, clinical audit). The results showed that developing a PDP with the aid of a tutor was viewed positively, and almost all would recommend developing a PDP to other dentists. Compared with the control group, those with a PDP in the experimental group engaged in proportionally less reading and more courses and 'other' CPD activity.

In a study investigating the impact of two online modules on dental radiology and occupational safety and health administration standards, Francis et al. (2000) reported positive findings. The majority of participants agreed that accessing online continuing dental education at their convenience was a definite advantage (88%), they would recommend it to their professional colleagues (88%), and the material in the course(s) was useful and applicable to professional activities (76%). Participants were enthusiastic about online learning but desired much more interactivity than existed in the current design. The least-liked aspects related to technical and formatting issues.

Similar findings were reported by a study investigating perceptions of a CD ROM in cross-infection (Gray et al. 2007) and super-elastic arch wires (Marsh et al. 2001). Gray et al. (2007) showed how the majority of participants felt that the CD ROM was well-designed and fit for purpose, and supported and extended their subject knowledge in the area of cross-infection control whilst simultaneously serving as a useful reference tool. Negative comments were limited and principally referred to typestyle and layout, and distribution failures. Marsh et al. (2001) showed how over 90% of the viewers thought the CD ROM program was well-designed and provided useful information.

A more specific finding in the use of online CPD resources was demonstrated by (Houston et al. 2010) who examined the use of targeted e-mail reminders (designed as cues to action) to influence participation by dental providers in an Internet delivered intervention for tobacco control. The e-mail reminders resulted in the largest number of visits on the day the e-mail was sent (e-mail release day). The day after the e-mail also showed an increase in website visits, then returning to baseline. On days when no recent reminders had been sent, very little participation occurred.

Other than the four Grade 3 studies relating to CPD for dental hygienists that have been reviewed earlier in this report, only poor quality evidence (Grade 4 or Grade 5) was found with regard to CPD for DCPs. The relevant studies are listed in Table 10.

**Table 10: How DCPs currently engage with, perceive and benefit from CPD**

<b>Professional group</b>	<b>Titles (NB all only Grade 4/5)</b>
<b>Other DCPs</b>	<b>Perceptions, attitudes and opinions of dental nurses to CPD (Mercer et al. 2007) Grade 4</b>
	<b>Educational needs and employment status of dental nurses in Scotland (Ross and Ibbetson 2006) Grade 5</b>
	<b>Views of dental therapists on the potential use at work of a progress file (Davenport et al. 2003) Grade 5</b>
	<b>Determining dental therapists' views on the development and implementation of a Progress File (Pee et al. 2000) Grade 4</b>
	<b>Attitudes towards an online programme for dental hygienists (Fehrenbach et al. 2001) Grade 5</b>
	<b>Dental hygienists' information seeking and computer application behaviour (Gravois et al. 1995) Grade 4</b>
	<b>Hygienist's participation, attitudes and perceptions of CPD (Ross et al. 2005) Grade 5</b>
	<b>Participation and perception of dental hygienists in oral cancer CE programmes (Ashe et al. 2006) Grade 4</b>
	<b>Participation rates and attitudes of dental technicians towards CPD (Ross and Ibbetson 2005) Grade 5</b>
	<b>Participation rates of dental technicians in the United Kingdom. (Bower et al. 2004) Grade 5</b>
	<b>Continuing professional development needs of dental technicians in the North of England (Reeson and Jepson 2007) Grade 4</b>

Due to differences in employment status and working environments of dental nurses, dental hygienists, dental therapists, and dental technicians, the key findings for each of these professional groups are considered individually under separate headings set out below. These studies described how these DCPs currently engage with, perceive and benefit from CPD.

#### *Dental Nurses*

A study undertaken by the Yorkshire Deanery involved a postal survey of randomly selected GDPs, dental nurses and hygienists to report on attitudes to CPD (Mercer et al., 2007). Overall, the survey findings demonstrate that there is a requirement to promote a culture of lifelong learning within the practice-setting for the whole dental team. In particular, the study highlighted a number of issues that are summarised below:

- Significant differences between GDPs and dental nurses' perceptions of dental nurses needs and preferences for continuing education
- A distinct lack of a culture of continuing professional development for DCPs within practices despite the fairly high percentage of qualified or qualifying dental nurses
- A lack of activities that would encourage dental nurse education, for example the use of appraisals to assess needs, having formal training plans in situ, the use of computers for computer assisted learning, and involvement in quality assurance tools e.g. clinical audit
- A lack of knowledge on the part of the majority of dental nurses about what type of further education was available to them and what their educational needs were. However, the vast majority of dental nurses felt they would benefit from continuing education with most preferring a hands-on training format with training taking place in the practice setting.
- Lack of time was the greatest barrier to CPD for DCPs. Most dental nurses believed that dental nurses were entitled to protected time for training purposes.

Similar findings were reported in a national study in Scotland (Ross and Ibbetson, 2006), undertaken between 2003-2004 prior to mandatory CPD for DCPs, where dental nurses were surveyed to investigate perceived educational needs. Key findings are summarised below:

- Attendance at educational events was low - only 21% of nurses attended scientific meetings or courses on a regular basis, and 51% stated they had attended between 1-4 events in the preceding 12 month period.
- Funding for CPD courses was an issue - of the 75% who responded to this question, only 50% received financial assistance. Of those who responded to a question on the source of funding, 78% stated it had been received from their employer.
- Problems in accessing continuing education included funding issues; travel; geographical location and a lack of opportunity.
- CPD subjects that dental nurses felt would be of benefit to them included (in order of preference): information technology; infection control; oral surgery; health and safety; restorative techniques; periodontology; orthodontics and confidentiality and record keeping.

### *Dental Therapists*

The studies on dental therapists identified in the search of the dental literature, explored their perceptions and experiences of the progress file (Pee et al. 2000, Davenport et al. 2003).

A progress file can be described as a tool to record learning, as a means of recording achievement. It also typically contains an element of reflection (Pee et al. 2000). In this study, participants viewed the tool positively and were able to identify many uses for the Progress File both within, and beyond their courses. However, they also expressed concerns regarding the effectiveness and feasibility of Progress File learning within present educational environments. In particular, they doubted the ability of reflection to enhance learning, and whether the progress file could be integrated with other course activities due to the subsequent increased administrative workloads.

A later study explored the dental therapists' participation in CPD, and their views on the potential use at work of a progress file (Davenport et al. 2003). This study was undertaken prior to the

implementation of mandatory CPD requirements. Results demonstrated how therapists undertook a variety of CPD activities, ranging from formal courses and conferences to in-surgery training and private study, but not all CPD activities were evaluated or recorded. Most therapists felt they would benefit from more CPD and from a formal system or framework for managing it. Regarding the progress file, most therapists were positive about such a programme, but considered its success conditional upon factors such as input from the team leader. Overall, evaluation of the progress file was mainly positive: most therapists felt they would benefit from being more reflective.

### *Dental Hygienists*

In a national survey of all registered dental hygienists with postal addresses in Scotland (Ross et al. 2005) reported on dental hygienists' involvement in and attitudes towards CPD. The results highlighted a number of issues. Although hygienists' involvement in CPD was good, results indicated that despite commitment to their profession, respondents felt that they did not always have support for CPD activities. Absence of funding for CPD was raised repeatedly, with only 41% reporting a degree of financial assistance. A total of 182 (65%) respondents reported that it was difficult to access continuing education and only 96 (35%) maintained that access was not a problem. A number of reasons were offered as to why access proved difficult, but 'funding issues', and 'family commitments' were most commonly cited. Geographical location was reported to be a barrier to education by 79 (28%), and 57 (21%) individuals highlighted 'travel' and 'lack of opportunity' as reasons for non-attendance. The demand for distance learning was investigated and, of those who replied (270; 93%), the majority (198; 73%) reported that this would be a desirable alternative mode of educational delivery, particularly in remote and rural settings.

A few international studies reported on information seeking behaviour, and attitudes towards online CPD, and individual programmes. In a questionnaire study of 197 registered dental hygienists residing in Alaska, Delaware, and Idaho, it was found that the most common sources used for professional development and information retrieval were continuing education courses, discussions with colleagues, and journals (Gravois et al. 1995). The respondents' own experience, credibility of the journal, and discussions with colleagues were the most frequent methods used to evaluate professional information. The hygienists tended to use continuing education courses, discussions with colleagues and journal literature as primary sources of information. They limited their use of the library and computers to obtain information pertinent to practice and professional development.

In a study originating from Marquette University, Wisconsin in the USA, dental hygienists' attitudes towards an online programme were sought (Fehrenbach et al. 2001). The program followed a case-based educational model, and also included recent developments in dental theory and practice, with links to other Internet sites. An online feedback form was used. More than 77% of the participants felt that overall, the program met its objectives on an excellent to near excellent level. 81% felt the organisation, material presented, appropriateness of material and satisfaction of individual course objectives were met to an excellent or near excellent level.

Another international study related to participation levels and perception of dental hygienists in oral cancer CE (OCCE) programmes (Ashe et al. 2006). In a random sample of 651 dental hygienists practicing in North Carolina, authors reported that only 21% had attended an OCCE course within the past year. A total of 47% indicated having attended a course within the past 2 to 5 years, and 15% indicated that it had been more than 5 years since they last attended an OCCE course. Almost 10% indicated having never attended a course regarding oral cancer, although 96% indicated interest in attending such a course.

## *Dental Technicians*

The dental literature search identified three studies investigating dental technicians participation in CPD in the UK, attitudes towards these programmes, and barriers to uptake.

In a survey of 250 dental technicians with postal addresses in Scotland, conducted prior to mandatory CPD, only 47% had attended an educational event within the preceding year, and of those who had not done this, a period of between two and 32 years had elapsed since any CPD involvement (Ross and Ibbetson 2005). A cross-sectional postal questionnaire survey of 1,650 dental technicians registered with the Dental Technicians Association in the UK revealed similar findings, where almost two thirds of the respondents had undertaken no verifiable CPD in the previous year.

Reeson and Jepson (2007) surveyed 39 commercial laboratories with postal addresses in the North of England, and 32 dental technicians working within NHS hospitals, community dental laboratories and a university dental school. Results demonstrated that the majority of technicians kept up to date with changing practice by reading journals, such as the *Dental Technician* (n = 34). Other methods were through contact with the Dental Laboratories Association (DLA), and the Dental Technicians Association (DTA). Universities and Colleges were also referred to along with conferences and exhibitions. Use of the internet and dialogue with colleagues were also mentioned.

In considering perceptions of CPD, Ross and Ibbetson (2005) found that 64% of the respondents felt they were out-of-date with professional education. A lack of educational structure was identified, as was poor remuneration and an absence of opportunity for career progression.

Regarding the introduction of mandatory CPD, Reeson and Jepson (2007) demonstrated that most technicians were prepared to record their CPD activity each year. However, willingness to do so was not as strong amongst those employed in commercial laboratories (n = 12 of 17 responses) as it was for NHS/University employed technicians who all answered yes. Popular topics for CPD were shown to be implantology and precision attachments.

In analysing barriers to CPD, although the prospect of CPD appeared to be desirable to many dental technicians, constraints around cost, time and access were highlighted (Reeson and Jepson). Specifically, Ross and Ibbetson (2005) demonstrated how many respondents reported that they would be penalised financially for undertaking CPD. Of these respondents, only 34% stated that any financial assistance had been available for educational purposes. There were also conflicting views as to who should meet the costs of such training. Those working in commercial laboratories felt it was up to the individual where as those in the NHS/University felt it was the responsibility of the employer (Reeson and Jepson 2007).

CPD was often dependent on the co-operation of the employer, and in certain cases access to this was denied. Other employment difficulties were highlighted where it was reported that staff shortages restricted the opportunity to undertake CPD and that long hours and poor wages in some commercial laboratories, removed the possibility of undertaking further education programmes (Ross and Ibbetson 2005). The survey also suggested that the main challenge facing laboratories is the meeting of production deadlines, particularly in the NHS sector, which together with long working hours means that CPD may be given a lower priority (Bower et al. 2004).



## Other healthcare professional groups

The literature for other healthcare professional groups demonstrated a wide range of factors that can motivate practitioners to undertake CPD, as well as highlighting barriers to CPD.

From her recent literature review, Grant (2011) has produced a comprehensive list of factors that motivate or facilitate participation in CPD by doctors (Table 11).

**Table 11: Factors that motivate or facilitate participation in CPD**

Authors and Dates	Motivating/Facilitating Factors
Cividin and Ottoson (1997)	<ul style="list-style-type: none"> <li>▪ Perceived need to conform or alter current practices</li> <li>▪ The chance to network with others</li> </ul>
Byers et al. (1996)	<ul style="list-style-type: none"> <li>▪ Satisfaction with previous courses/programmes attended</li> </ul>
Gear et al. (1994)	<ul style="list-style-type: none"> <li>▪ The presence of a climate conducive to learning</li> </ul>
Department of Health (1995)	<ul style="list-style-type: none"> <li>▪ A need to keep up to date</li> <li>▪ A career change (specialty)</li> </ul>
Vaughan (1991)	<ul style="list-style-type: none"> <li>▪ To become/stay up-to-date</li> <li>▪ To train for new, additional roles</li> <li>▪ To increase job satisfaction and personal effectiveness</li> </ul>
Woolf (1990)	<ul style="list-style-type: none"> <li>▪ Interest in the topics covered</li> </ul>
Fox et al. (1989)	<ul style="list-style-type: none"> <li>▪ A desire for competence</li> <li>▪ Pressure to change arising from the clinical environment</li> <li>▪ Financial incentives</li> </ul>
Wood and Byrne (1980)	<ul style="list-style-type: none"> <li>▪ A desire among GPs to escape from problems associated with their practices</li> <li>▪ A desire to communicate with other GPs and health professionals</li> <li>▪ A hope for intellectual stimulation</li> <li>▪ A general desire to keep up-to-date</li> <li>▪ A need to refresh the memory and increase confidence</li> </ul>
Barham and Benseman (1984) and Gross (1976)	<ul style="list-style-type: none"> <li>▪ Working in group settings</li> </ul>
Grant et al. (1998)	<ul style="list-style-type: none"> <li>▪ Need identified from practice e.g. management training</li> <li>▪ Peer contact</li> <li>▪ Keeping up to date</li> <li>▪ General interest</li> </ul>

*This table appears in the Good CPD Guide (Grant 2011) and is reproduced with the kind permission of Professor Janet Grant.*

The ICPD has highlighted the problems of resources and the reliance ultimately on the co-operation, goodwill and responsibility of individual professionals to undertake appropriate CPD. It suggests that encouraging and rewarding voluntary CPD activity, over and above any necessary and existing level of compulsion, is the most effective means of propagating good practice (ICPD 2006).

Friedman and Phillips (2001) considered barriers to professionals in CPD and cited time, cost and access as the most frequent. They pointed out that professionals are not homogenous and a range of factors – such as differences in career stage, preferred learning style(s) and individual ambition – affect the likelihood of taking part in CPD (Freidman & Phillips, 2001). They also drew attention to the fact that employers are in a strong position to influence participation in CPD. From their review of the literature on pharmacists' CPD, Donayi et al. (2010) concluded that the barriers to engagement were: financial costs and resources issues, understanding of (the purposes of) CPD, facilitation and support, motivation and interest, attitudes towards compulsory CPD, system constraints and technical problems. Grant (2011) cited Cerverro (1988) and Langster (1994) and concluded that there was evidence that the following factors deterred doctors from engaging with CPD:

- The costs involved in terms of money and time.
- Dissatisfaction with the quality of the programmes on offer and a lack of personal benefit from participation.
- General apathy with respect to education
- A preference for self-directed learning

In conclusion, factors motivating practitioners to undertake CPD, and barriers to CPD appear to be influenced by work-related factors such as work environment, working patterns and employment status, which are all specific to each healthcare professional group, as well as individual perceptions of CPD. Cost, ease of access and perceived relevance which can influence engagement with CPD.

## 5.4 CPD and performance

### **Is CPD participation a valid indicator of professional competence or performance? Based on what criteria?**

It was not possible to answer this question from the literature reviewed. Grant (2011) suggested that this is because there has never been a satisfactory approach to the outcome of CPD. Griscini and Jacano (2006) observed that: *“The effectiveness and impact of continuing education remains unexplored and that continuing education is intended to ensure healthcare practitioners' knowledge is current but it is difficult to determine if those who attend these courses are implementing what they have learnt”*.

Grant (2011) cited Branthwaite et al. (1988) who found that GPs who were regular attenders at CPD meetings were more progressive in their work than those who did not attend regularly, more concerned about developing their skills and about having time and scope to practise effectively and more conscientious with respect to developing and improving their work. However, Gray (1998) questioned whether this was due to CPD participation or because the GPs who attended CPD courses regularly innately possessed the characteristics found by Branthwaite et al. (1988).

In conclusion, both the dental and non-dental literature did not provide any information to demonstrate if CPD participation is a valid indicator of professional competence or performance. This is principally due to the challenges of assessing outcomes of CPD in terms of effectiveness and

impact.

### **Is there a link between participation in CPD activity and performance enhancement in the healthcare professions including dentistry, and how is that formed?**

No dental literature was identified that helped to provide an answer to this question. The medical literature demonstrated a wide range of studies which develop an association between performance enhancement in specific areas, after undertaking CPD activities.

In her recent literature review, Grant (2011) identified 13 studies that indicated that the doctors concerned enhanced their performance in specific areas after CPD activities. This suggests that for doctors there is a link between participation in CPD activities and performance enhancement. Two of the 13 studies raised issues about the differences in outcomes between the participating doctors and highlighted the need for contextual factors to be considered in connection with outcomes. Although it involved only six doctors, one of the studies followed the outcomes closely. It was based on a qualitative case study approach and followed their practice for a period of six months after they had attended a conference on cardiac arrhythmias (Crandall 1990). The differences between the participants, in terms of both decisions to change practice and actual changes made prompted Crandall to state that "CME does make a difference, but program planners must pay attention to the circumstances under which it does." This conclusion suggests that targeting and management of CPD are important if performance is to be enhanced, and that individual clinicians may be more likely to achieve performance enhancement after CPD if they plan their CPD and its effects are appraised and validated independently. Personal development plans and annual appraisals are tools which seek to promote performance enhancement and are incorporated in the CPD systems advocated by the AMRC and the PSI (AMRC 2010, PSI 2010).

In conclusion, the dental literature did not address either of the two parts of this question. However, the medical literature suggested an association between undertaking CPD activities and enhancing performance. The benefits of targeting and management of CPD were highlighted, especially through the use of personal development plans and annual appraisals.

## 6. Conclusions

The review of the literature on CPD, both dental and from other healthcare professions, has produced few robust evidence-based answers to the seven questions posed by the GDC. This is perhaps unsurprising as numerous authors have commented on the difficulties of conducting robust research into educational outcomes (Bloom 2005, Marinopoulos et al. 2007, Schostak et al. 2010, Grant 2011). It is not the purpose of this review to analyse these difficulties. However, they should be borne in mind when considering the conclusions, set out below, which address each of the seven questions posed by the GDC.

### Models of CPD

**Question 1.** What are the least and most effective modes of CPD for the healthcare professions, and in particular dentistry?

It is evident from the literature that no studies of high quality exist to demonstrate the effectiveness of CPD, in terms of quality of care delivered, performance, professional standards, competence, public satisfaction or safety, or their longer-term effects on knowledge retention and application. However, particular elements of individual CPD programmes were deemed to be effective. These include the benefits of sustained, repeated, or longer term CPD activities, involving an interactive method of delivery utilising multimedia, or combining techniques, for example, interactive education and academic detailing. The importance of planning, self directed learning and reflective practice was highlighted in the literature. As were the perceived benefits of personal learning plans, in a process through which clinicians can be supported in the identification of their learning needs, to focus their selection of appropriate CPD.

**Question 2.** What are the least and most effective qualitative and quantitative measures of CPD activity for the healthcare professions, and in particular dentistry?

The Pharmaceutical Society of Ireland (PSI) highlighted the benefits of blended learning using a mixture of online and face-to-face activities and an online portfolio to allow a flexible approach that focuses on outcomes relevant to an individual practitioner's practice (PSI 2010). The clearest advice with regard to qualitative and quantitative measures of CPD came from this report, where authors suggested that all Irish Pharmacists should be required to record a balance of different CPD activities in a portfolio accompanied by a robust external competency assessment which should be developed by peers and recreate "patient facing scenarios" (PSI 2010).

Overall, both the dental and non-dental literature demonstrated the difficulties in developing effective and evidence-based recommendations for quantitative or qualitative measures of CPD. PARN has suggested that output measures may be more effective than input at measures as a means to assess the effectiveness of CPD. A number of regulatory bodies and professional associations are adopting this approach. However, as yet there have been no studies on this topic specifically related to dentistry.

### Regulatory purposes of CPD

**Question 3.** What are the regulatory benefits of CPD participation in dentistry?

The literature identified a range of potential regulatory benefits of participation in CPD, but did not demonstrate any direct associations with quality of care delivered, performance, professional standards, competence, public satisfaction or safety.

**Question 4.** What are the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation?

The peer reviewed dental literature did not reveal any studies that demonstrated the regulatory purposes of making CPD a mandatory requirement in healthcare professional regulation. However, the GDC website (GDC 2011) reminds registrants that: *“Patients are right to expect that all members of the dental team are keeping their skills and knowledge up to date throughout their careers. We ensure that this is happening by making CPD a requirement for all dental professionals registered with us.”* Information from other healthcare sectors focussed on the role of CPD in maintaining and demonstrating professional standards and competency to the public.

### **CPD participation**

**Question 5.** How do healthcare professionals, and in particular dental professionals, currently engage with, perceive and benefit from CPD; and does CPD have particular consequences for different groups and forms of practice in dentistry?

The concept of self-directed assessment of CPD needs, and reflection of any subsequent improvement or achievements, has been highlighted in a range of healthcare professional groups. For dentists especially, the benefits of the personal development plan have been highlighted. Factors motivating practitioners to undertake CPD, and barriers to CPD appear to be influenced by work related factors such as environment, working patterns and employment status, which are all specific to each healthcare professional group, as well as individual perceptions of CPD.

### **CPD and performance**

**Question 6.** Is CPD participation a valid indicator of professional competence or performance? Based on what criteria?

Both the dental and non-dental literature did not provide any information to demonstrate if CPD participation is a valid indicator of professional competence or performance. This is principally due to the challenges of assessing outcomes of CPD in terms of effectiveness and impact.

**Question 7.** Is there a link between participation in CPD activity and performance enhancement in the healthcare professions including dentistry, and how is that formed?

The dental literature did not address either of the two parts of this question. However, the medical literature appeared to suggest an association between undertaking CPD activities and enhancing performance. The benefits of targeting and management of CPD were highlighted, especially through the use of personal development plans and annual appraisals.

## 6. Glossary of terms

Term	Definition
<b>Activity</b>	An educational event for professionals which is based upon identified needs (a needs assessment), has specified educational objectives and is evaluated to demonstrate that the needs have been met.
<b>Appraisal</b>	An ongoing, two-way process involving reflection on an individual's performance, identification of education needs, and planning for personal development. The focus is on the appraised and his or her professional development needs.
<b>Audit (clinical)</b>	A quality improvement process that seeks to improve patient care and outcomes through systematic review of care against explicit criteria and the implementation of change.
<b>Cochrane Collaboration</b>	This is an international not-for-profit organisation preparing, maintaining and promoting the accessibility of systematic reviews of the effects of health care.
<b>Competence</b>	This term is used to encompass knowledge, skills, attitudes, behaviours and performance. The effectiveness of a CPD activity may be evaluated by documenting a change in one or more competencies. However, this is not the only way of evaluating effectiveness.
<b>Convenience sample</b>	A convenience sample is a type of non-probability sampling which involves the sample being drawn from that part of the population which is close to hand. That is, a sample population selected because it is readily available and convenient. Generalisations about the total population could not be made from this sample because it would not be representative.
<b>Continuing Dental Education</b>	The terms Continuing Professional Development and Continuing Dental Education can be, and are frequently used interchangeably. This is in spite of the fact that Continuing Education (CE), be it Continuing Dental Education (CME), differs from CPD in that it may not include the element of planned development of an individual.
<b>Continuing Medical Education</b>	The terms Continuing Professional Development and Continuing Medical Education can be, and are frequently used interchangeably. This is in spite of the fact that Continuing Education (CE), be it Continuing Medical Education (CME), differs from CPD in that it may not include the element of planned development of an individual. Furthermore, some countries, including the USA, still refer to CME rather than to CDP.
<b>CPD Activity</b>	An educational event or product (activity) for professionals, which is based upon identified needs, has an educational purpose or objectives, and is evaluated to ensure that defined educational or professional development needs are met.
<b>Distance learning</b>	The provision of education through print or electronic communications media to professionals engaged in learning at a time and place of their own choosing and at a distance from a presenter, facilitator or tutor. The education may be web-based or fixed-format (e.g. CD-ROM).
<b>Evaluation form</b>	A form given by event providers to event participants in order for the participant to communicate, and the provider to determine, the relevance, quality and effectiveness of an activity.

<b>Focus group</b>	A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes towards an event, product, service, or concept. Questions are asked in an interactive group setting where participants are free to talk with other group members.
<b>Grades of evidence</b>	Evidence-based medicine categorises different types of clinical evidence and Grades them according to defined scientific criteria.
<b>Grey literature</b>	Grey literature refers to a body of information that cannot be found easily through conventional channels such as publishers. Examples of grey literature include technical reports from government agencies or scientific research groups, working papers from research groups or committees, or white papers.
<b>Interview-based questionnaire</b>	This is a quantitative research method. The aim of this approach is to ensure that each interview is presented with exactly the same questions, in the same order. This ensures that answers can be reliably aggregated and that comparisons can be made with confidence between sample subgroups or between different survey periods. The data is collected by an interviewer rather than through a self-administered questionnaire.
<b>Journal based CPD</b>	A specifically identified article within a peer-reviewed professional journal that serves as a planned learning activity and meets specific pre-defined educational quality criteria.
<b>Literature review</b>	A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings, as well as theoretical and methodological contributions to a particular topic. Literature reviews are secondary sources, and as such, do not report any new or original experimental work.
<b>Multiple choice</b>	Multiple choice is a form of assessment in which respondents are asked to select the best possible answer (or answers) out of the choices from a list.
<b>Outcome</b>	A change in knowledge, skills attitude or behaviour as a result of participation in a CPD activity.
<b>Qualitative interview</b>	The qualitative interview seeks to understand the meaning of what the interviewees say, to incorporate both a factual and a meaning level. The interviewer can pursue in-depth information around the topic.
<b>Random sample</b>	A sample is a subject chosen from a population for investigation. A random sample is a sample chosen by a method involving an unpredictable component.
<b>Randomised controlled trial</b>	A randomised controlled trial (RCT) is a type of scientific experiment - a form of clinical trial - most commonly used in testing the safety (or more specifically, information about adverse drug reactions and adverse effects of other treatments) and efficacy or effectiveness of healthcare services, or health technologies. The key distinguishing feature of the usual RCT is that study subjects, after assessment of eligibility and recruitment, but before the intervention to be studied begins, are randomly allocated to receive one or other of the alternative treatments under study. Random allocation in real trials is complex. After randomization, the two (or more) groups of subjects are followed up in exactly the same way, and the only differences between the care they receive, for example, in terms of procedures, tests, outpatient visits, follow-up calls etc. should be those intrinsic to the treatments being compared.

	The most important advantage of proper randomization is that it minimises allocation bias, balancing both known and unknown prognostic factors, in the assignment of treatments.
<b>Response bias</b>	Response bias is a type of bias which can affect the results of a statistical survey if respondents answer questions in the way they think the questioner wants them to answer rather than according to their true beliefs.
<b>Systematic review</b>	A systematic review is a literature review focused on a research question that tries to identify, appraise, select and synthesise all high quality research evidence relevant to that question. Systematic reviews of high-quality randomised controlled trials are crucial to evidence-based medicine. An understanding of systematic reviews and how to implement them in practice is becoming mandatory for all professionals involved in the delivery of health care. Besides health interventions, systematic reviews may concern clinical tests, public health interventions, adverse effects, and economic evaluations.



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## 9. Appendices

### 9.1 Appendix A: Search strategy and terms

An important early stage of the literature review was an initial search to identify and clarify the major concepts and terms (keywords) for use. This involved defining the search terms (key words). Strings (combinations of search terms) were used to narrow the focus, for example “dentist” with “continuing education” and “performance”.

Search term	Combined with	Professional title
Outcomes	in combination with <b>Continuing education</b>	Dentist Dental hygienist Dental nurse Dental technician Dental therapist Orthodontic therapist Dental care professional Professions allied to dentistry
Benefits		
Competence		
Participation		
Performance		
Continuing Professional Development*		
Accreditation		
Revalidation		
Improving performance		
Effectiveness		
Assessment		
Learning style		
Evaluation		
Educational needs		
Regulation		
Impact / value		
Experience / perceptions		
Preferences / attitudes		
Behaviours		
Setting standards		
Professional conduct		
Models of learning		
Modes of learning		
Delivery		
Access		
Strengths		
Weaknesses		
Barriers		
Quality		
Core topics		
Essential criteria		
Returning to practice		
Hands on learning		
Appraisal		
Reflective practice		
Frequency		
Intensity		

\* For this term, the following combination was used: Continuing Professional Development – professional title.

### **EMBASE search**

The EMBASE search consisted of: “Search terms” – “continuing education” – “professional titles” for all the terms listed in the above table.

### **Medline search**

In the Medline search: “Search terms” – “continuing education” - and only the following professional titles: “Dentist, dental hygienist, dental nurse, dental technician, dental therapist”. This was because very few papers were found in the equivalent EMBASE search using the professional titles “orthodontic therapist”, “dental care professional” and “professions allied to dentistry”.

### **Study Selection**

After searching the electronic databases, the research team scanned all titles, and selected those relevant to the research questions for further review. From this list, two independent reviewers conducted title scans in a parallel fashion. For a title to be eliminated at this stage, both reviewers had to indicate that it was ineligible. If the two reviewers did not agree on the eligibility of an article, it was included in the next stage (review of abstracts). This review stage was designed to capture as many studies as possible that reported on the research questions. All titles that were thought to address these questions were included in the review of abstracts.

The resulting abstracts were then reviewed independently by two investigators. At this stage, abstracts were excluded if both investigators agreed that the article met one or more of the exclusion criteria, which had previously been agreed with the officials of the GDC.

When an abstract did not give sufficiently precise information about the study or such information was not available at all, the full paper was obtained so that its inclusion or exclusion could be decided. In addition, full versions of the all papers whose abstracts met the criteria were obtained.

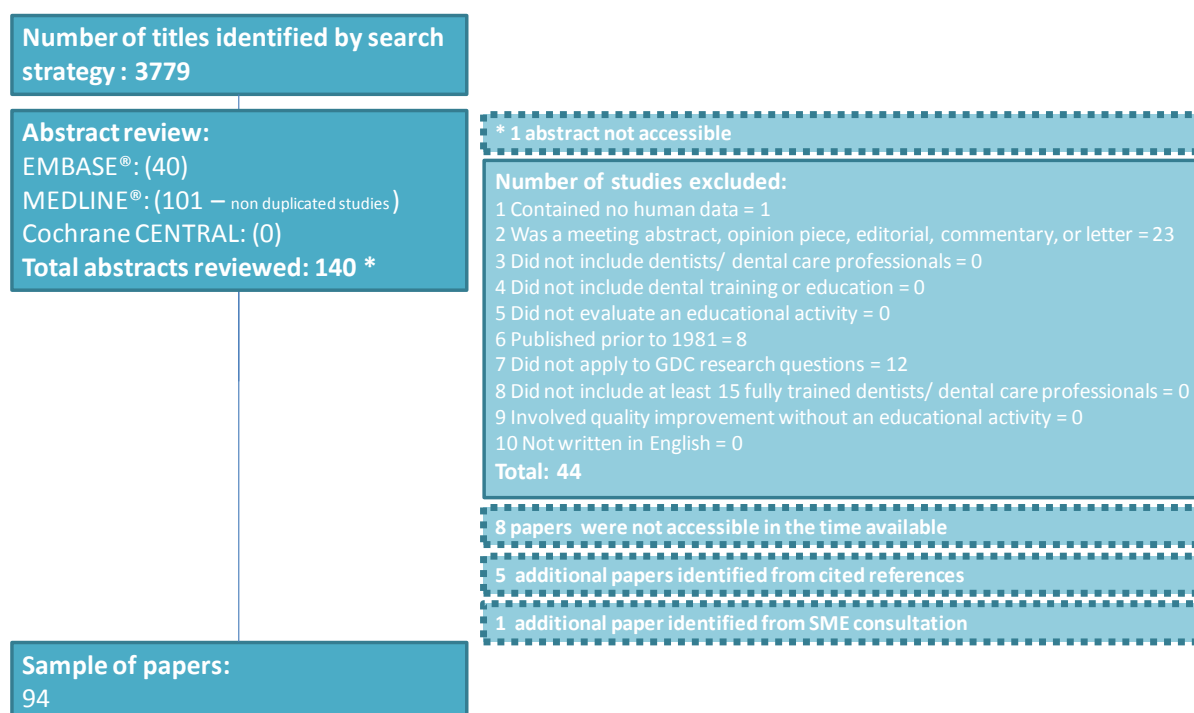
## 9.2 Appendix B: Data Extraction Process

To minimise the risk of bias in how data were extracted from eligible studies and to maximise consistency in identifying all pertinent data available for subsequent analysis, a standardised form (data template) was used for data extraction from the full versions of the papers. The data collection template that was used is shown below. Additionally, the first completed templates were reviewed by the Principal Investigator and study team, to quality assure the consistency of data extraction.

Paper title and author (s)	Text
	Quality rating (1-5)
	Study conducted in UK or NON UK
	Randomised or convenience sampling
	<b>Research method:</b> Interview-based questionnaires Self-completed questionnaires Focus groups Qualitative interviews Other – please state
	1: Models of CPD
	2: Regulatory purposes of CPD
	3: CPD participation
	4: CPD and performance
	5: Other Important points
	Conclusion
	Discussion
	Appraisal of significant findings
	Any transferrable models
	Future considerations
	Recommendations

### 9.3 Appendix C: Results of search strategy, and data analysis broken down by country, methodology, quality grading and research area

**Figure 1: Results of search strategy**



**Table 1: Numbers of papers by country and methodology**

Criteria	Number of Papers
UK based	52
Non UK based	42
Randomised sample	41
Convenience sample	43
Interview-based questionnaires	3
Self-completed questionnaires	63
Focus groups	1
Qualitative interviews	2
Other*	25

**Table 2: Numbers of papers by quality grading**

Criteria	Number of Papers
Quality rating 1:	1
Quality rating 2:	6
Quality rating 3:	20
Quality rating 4:	25
Quality rating 5:	42

**Table 3: Summary of the number of papers (n=94) by the four research areas**

Research areas	Total No. papers found	Total No. Papers 1-3	No. Papers by Quality Grading
Models of CPD	55	26	Quality grading 1: n=1
			Quality grading 2: n=5
			Quality grading 3: n=20
Regulatory purposes of CPD	2	0	Quality grading 1: n=0
			Quality grading 2: n=0
			Quality grading 3: n=0
CPD participation	54	9	Quality grading 1:n=0
			Quality grading 2:n=2
			Quality grading 3: n=7
CPD and performance	0	0	Quality grading 1:n=0
			Quality grading 2: n=0
			Quality grading 3:n=0

## 9.4 Appendix D: Outcome of SME consultation process

The table below describes the outcomes of the SME consultation process.

Relevant Organisation	Subject Matter Experts	Literature Identified
<b>Faculty of General Dental Practice, The Royal College of Surgeons of England</b>	Virginia Wykes Head of Education / Deputy Registrar	No grey literature identified
<b>The Committee of Postgraduate Dental Deans and Directors</b>	Professor Chris Franklin Chair	Wright and Franklin (2007). The use of significant event analysis and personal development plans in developing CPD: a pilot study. British Dental Journal. 203, 43 - 47 2007  South Yorkshire and East Midlands Course statistics (PowerPoint presentation)
<b>General Medical Council</b>	Richard Marchant Assistant Director – Regulation	Continuing Professional Development The international Perspective G Murgatroyd July 2011
<b>General Optical Council</b>	Linda Kennaugh Head of Education & Standards	No grey literature identified
<b>National Clinical Assessment Service</b>	Professor Pauline McAvoy Associate Director (Assessment Development)	No grey literature identified
<b>British Dental Association</b>	Ulrike Mattheus	No grey literature identified
<b>Dental Practitioners Association</b>	Derek Watson Chief Executive Officer	No grey literature identified
<b>British Association of Dental Nurses</b>	Pam Swain Chief Executive Officer	BADN Members Guide to CPD
<b>British Society of Dental Hygiene and Therapy</b>	Marina Harris Immediate Past President	No grey literature identified
<b>British Association of Clinical Dental Technology</b>	Richard Daniels Chief Executive	No grey literature identified
<b>The Cardiff Unit for Research and Evaluation in Medical and Dental Education</b>	Professor Alison Bullock	No grey literature identified
<b>Centre for Research in Medical and Dental Education (CRMDE). School of Education. University of Birmingham</b>	Dr Vickie Firmstone	No grey literature identified
<b>Council of European Chief Dental Officers</b>	Dr Paul Boom President	No grey literature identified
<b>British Association of Dental Therapists</b>	Bal Chana President	No grey literature identified
<b>Northern Ireland</b>	Dr Davis Hussey Postgraduate Dental Dean	Influence of a Postgraduate Course on Quality of Endodontics - a Pilot Study. Hussey D, Killough S, McCaughey D, Humphreys M. Poster presentation: IADR



		2006
<b>Scotland</b>	Margie Taylor Chief Dental Officer who Referred to Dr Ann Walsh NHS Education in Scotland (NES)	Draft NES CPD Strategy and List of grey literature

## 9.5 Appendix E: Academy of Medical Royal Colleges

### Principles of CPD – The Ten Principles for College Faculty Schemes

1. An individual's CPD activities should be planned in advance through a personal development plan, and should reflect and be relevant to his or her current and future profile of professional practice and performance. These activities should include continuing professional development outside narrower specialty interests.
2. CPD should include activities both within and outside the employing institution, where there is one, and a balance of learning methods which include a component of active learning. Participants will need to collect evidence to record this process, normally using a structured portfolio cataloguing the different activities. This portfolio will be reviewed as part of appraisal and revalidation.
3. College/Faculty CPD schemes should be available to all members and fellows and, at reasonable cost, to non-members and fellows who practise in a relevant specialty.
4. Normally, credits given by Colleges/Faculties for CPD should be based on one credit equating to one hour of educational activity. The minimum required should be an average of 50 per year. Credits for un-timed activities such as writing, reading and e-learning should be justified by the participant or should be agreed between the provider(s) and College/Faculty directors of CPD.
5. Self-accreditation of relevant activities and documented reflective learning should be allowed and encouraged.
6. Formal approval/accreditation of the quality of educational activities for CPD by Colleges/Faculties should be achieved with minimum bureaucracy and with complete reciprocity between Colleges/ Faculties for all approved activities. The approval/accreditation process and criteria should be such as to ensure the quality and likely effectiveness of the activity.
7. Self-accreditation of educational activities will require evidence. This may be produced as a documented reflection. Formal CPD certificates of attendance at meetings will not be a requirement, but evidence of attendance should be provided, as determined by each individual College or Faculty. Participation in College/Faculty based CPD schemes should normally be confirmed by a regular statement issued to participants which should be based on annually submitted returns, and should be signed off at appraisal.
8. In order to quality assure their CPD system, Colleges/Faculties should fully audit participants' activities on a random basis. Such peer-based audit should verify that claimed activities have been undertaken and are appropriate. Participants will need to collect evidence to enable this process.
9. Until alternative quality assurance processes are established, the proportion of participants involved in random audit each year should be of a size to give confidence that it is representative and effective. This proportion will vary according to the number of participants in a given scheme.
10. Failure to produce sufficient evidence to support claimed credits will result in an individual's annual statement being endorsed accordingly for the year involved and the individual subsequently being subject to audit annually for a defined period. Suspected falsification of evidence for claimed CPD activities will call into question the individual's fitness for revalidation, and may result in referral to the GMC/GDC

*This list appears in Continuing Professional Development – Guidelines for Recommended Headings under which to Describe a College or Faculty CPD Scheme (Academy of Medical; Royal Colleges, 2010) and is reproduced with the kind permission of the AoMRC*