

# **Getting Evidence into Practice**

An Investigation of the Use and Understanding of  
Evidence-Based Practice by General Dental  
Practitioners in the West Midlands

by

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## ABSTRACT

**OBJECTIVES:** To determine what factors cause dental practitioners to change their practice  
To investigate the barriers to the successful application of research evidence to dental health care. To make recommendations for future action in light of the results of this study.

**DESIGN:** Qualitative analysis of semi-structured interviews. In-depth interviews using a topic guide were utilised to identify current levels of knowledge and use of evidence-based dental practice amongst dental practitioners.

**SUBJECTS:** A purposive sample of 31 primary dental care practitioners in the West Midlands.

**RESULTS:** Advice from colleagues and respected teachers (“trusted sources”) were drivers for changing practice along with clinical guidelines from respected sources. It was clear that understanding of concepts in evidence-based dentistry (EBD) was limited. There appears to be a need to improve accessibility of evidence and to provide this in a format that practitioners find easily digestible. Common barriers to application of EBD included self-confidence in dentists own skills, NHS legislation and policy, organisational constraints and a lack of knowledge of critical appraisal

**CONCLUSIONS:** Responses highlight a relative gap between the evangelism of evidence-based dentistry and its impact at a grass-roots level. It appears necessary to change the format and availability of evidence if dental practitioners are to maintain contemporary practice with evidence based interventions. The current climate in primary dental care does not appear to favour an evidence-based approach to determining patients’ dental care.

## **DEDICATION**

This thesis is dedicated to my family.

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## **List of Abbreviations**

ADW	Damien Walmsley
BDA	British Dental Association
BDJ	British Dental Journal
CAL	Computer Aided Learning
CDS	Community Dental Service
CPD	Continuing Professional Development
CPG	Clinical Practice Guideline
DoH	Department of Health
DW	Deborah White
EBD	Evidence-based Dentistry
EBH	Evidence-based Healthcare
EBM	Evidence-based Medicine
EBP	Evidence-based Practice
GDC	General Dental Council
GDP	General Dental Practitioner
GDS	General Dental Services
NHS	National Health Service
NICE	National Institute of Health Clinical Excellence
PCD	Professional Complementary to Dentistry
PCT	Primary Care Trust
PDS	Personal Dental Services
RCT	Randomised Control Trial
SHA	Strategic Health Authority
SS	Shuva Saha (Primary Researcher)
VDP	Vocational Dental Practitioner

## CHAPTER 1 - BACKGROUND AND AIMS

Decision making about clinical patient care is often a complex process, governed by patients' needs and expectations on one hand and a clinicians' knowledge and best judgement on the other (Charles C et al, 1999). Such processes are influenced by professional training, past experience prevailing practice and peer opinion. The term 'evidence-based medicine' represents a movement for using high quality research based evidence to influence decision-making processes and thus ensure that, where possible, interventions practitioners prescribe will be both predictable and cost-effective. Evidence-based practice is consequentially an approach to decision making in which clinicians use the best evidence available, in consultation with the patient, to decide upon the clinical care which suits that patient best (Muir-Gray JA, 1997). Evidence-based practice can be applied to all health care fields, including dentistry (evidence-based dentistry), and involves the translation of a particular clinical problem into an answerable question and then application of such evidence clinically. This involves systematically searching for information and then appraising the quality and validity of the research found.

The practice of evidence-based dentistry means integrating individual clinical expertise with the best available external clinical evidence from systematic research (Sackett et al. 1996). Evidence-based practice was one of the first manifestations of evidence-based medicine and has exercised enormous influence, both within healthcare and across healthcare policy more generally (Dopson S, 2002). The concomitant growth of information technology has encouraged the development of research methodology and the availability and dissemination of research findings. Such technologies have also influenced patients' awareness of their own healthcare, options available and their role in decision-making processes. Factors contributing to the rise in evidence-based dentistry mirror those in evidence-based medicine and include cost pressures, technological advances, increased in management-led decision making, consumer awareness, availability of information, political consensus and professional accountability.

Critical appraisal skills can be used to determine the usefulness and reliability of the available evidence. These skills can then be used to inform clinical decision-making. Evidence-based practice

can be taught to and practised by clinicians at all stages in their career and may help close the gap between good clinical research and clinical practice.

It is not currently clear to what extent general dental practitioners have embraced the evidence-based dentistry movement. Many practising clinicians graduated years before the concepts of evidence-based healthcare were accepted as mainstream. Dentists, who often practice in relative isolation, may find difficulty in accessing best evidence and applying such evidence to their own patients. Critical appraisal of research is a skill in itself and requires training and also practice. It is not clear to what extent current general dental practitioners are involved in reading literature and whether they have the skills and time to appraise it.

## **Research Question**

The research questions this study aims to answer are which factors are important in making general dental practitioners change their practice and how these factors influence change.

## **Aims and Objectives**

### **Aim**

The **aim** of this research project therefore is to find out whether evidence-based dentistry has an influence upon primary dental care dental practice. This will be achieved by the following objectives.

### **Objectives**

1. To determine what factors cause dental practitioners to change their practice
2. To identify how dentists access and use evidence-based research
3. To investigate the barriers to the successful application of research evidence to dental health care
4. To make recommendations for future action in light of the results of this study.

These objectives are focused specifically on primary dental care practitioners in the West Midlands.

# CHAPTER 2 - LITERATURE REVIEW

## 2.1 EVIDENCE-BASED MEDICINE

### 2.1.1 INTRODUCTION

The term "evidence-based medicine" was first used in the medical literature by Guyatt *et al* in 1992.

There are several definitions of evidence-based medicine (EBM).

David Sackett, Emeritus Professor of Clinical Epidemiology, McMaster University, Canada and leading proponent of the movement, originally defined evidence-based medicine as:

*'the conscientious, explicit, and judicious use of best evidence in making decisions about care of individual patients'* (Sackett et al., 1996)

The model of health care in which healthcare professionals make decisions on behalf of their patients is being increasingly criticised (Coulter, 1997) and the current NHS climate is leaning towards patient-based or patient-led decision making. The evidence increasingly points to the notion that involvement of patients in their own care produces better health outcomes (Kaplan, Greenfield, and Ware, 1989). A further, commonly cited definition reflects this change in the involvement of patients in the treatment decision process:

*'Evidence based clinical practice is an approach to decision making in which the clinician uses the best evidence available, in consultation with the patient, to decide upon the option which suits that patient best.'* (Muir-Gray JA, 1997)

Such definitions can be equally applied to dentistry. The concepts have been generally developed and applied across all health care areas under the title of either evidence-based healthcare (EBH) or evidence-based practice (EBP).

The notion of evidence in health care is not new. It has been suggested, in fact, that the first recorded clinical trial dates back to biblical times (Enkin and Jadad, 1998). Daniel of Judah compared the health effects of a vegetarian diet (the intervention) with those of the Royal Babylonian diet (control group) over a ten-day period:

*'At the end of the ten days their appearance was better and their bodies healthier than all the young men who had been eating the royal delicacies. So the warden removed their delicacies and the wine from their diet and gave them a diet of vegetables instead.'*  
The Book of Daniel (1.15-16)

The ideas behind evidence-based practice additionally have a long history, although these ideas may not have been applied specifically to medicine.

*'Those who are enamoured of practice without science are like a pilot who goes into a ship without rudder or compass and never has any certainty where he is going. Practice should always be based upon a sound knowledge of theory.'*  
Leonardo da Vinci, Notebooks, 1508-1518 (cited in Nelson and Algate 2007).

The first reported controlled therapy trial took place in the United Kingdom in 1747. Since the early 1600s, many people had felt that citrus fruits might reduce the incidence of scurvy during long ocean voyages. James Lind studied sailors with scurvy and evaluated six potential treatments one of which involved using citrus fruits. The two sailors who received the citrus treatment got better as Lind reported:

*'The consequence was, that the most sudden and visible good effects were perceived from the use of the oranges and lemons; one of those who had taken them, being at the end of six days fit for duty... The other was the best recovered of any in his condition; and being now deemed pretty well, was appointed nurse to the rest of the sick.'* (Lind J, 1753)

### **2.1.2 EVIDENCE-BASED MEDICINE MOVEMENT**

Healthcare professionals have, until relatively recently, practised medicine based primarily on their medical training, individual experience, and personal preference without having to justify clinical decisions. Patients had much less access to access to medical information about treatment modalities or even the performance of their doctor. Healthcare commissioners also had little information and relied largely upon doctors to exercise their best judgment (Rodwin, 2001). As accessibility of information through Internet usage has blossomed, patients are becoming much better informed about treatment modalities that may be available to them; their expectations of health professionals and of health services likewise have changed. Many patients expect to be involved to a greater or lesser extent in decision-making processes. It is therefore necessary for healthcare professionals to be *au fait* with the results of high quality, evidence-based research and to implement such evidence where possible in making decisions about individual patient's care.

Although evidence-based medicine was initially largely professionally driven, provider managers, those who commission health care, the public, and policymakers now consistently consider research evidence when making decisions (Davidoff et al., 1995). Several organisations within the UK have been set up to evaluate, disseminate and encourage the uptake of clinical evidence. These include the NHS Health Technology Assessment Programme, the NHS Centre for Reviews and Dissemination and the National Institute of Health and Clinical Excellence (NICE) (Dopson et al., 2001). Health policy should promote medical practice that is generally based on science and evidence of effectiveness. Cynics have suggested that evidence can be selected which fits in with specific interests to either resist change or promote new treatments (Rodwin, 2001) or to justify rationing treatments. It has also been suggested that managers may perceive evidence-based medicine as a way of gaining control over doctors (Klein, 1996).

Professor Archie Cochrane, who was a British medical researcher, famously observed that the medical profession lacked a critical summary of randomised controlled trials (RCTs). His most influential book, *Effectiveness and Efficiency: Random Reflections on Health Services* published in 1972 encouraged and endorsed the concepts behind evidence-based practice (Cochrane, 1972). Cochrane highlighted the importance of using evidence from RCTs as these were likely to provide much more reliable information than other sources of evidence. In 1992, the first Cochrane centre was set up in Oxford followed by the creation of an international organisation, the Cochrane Collaboration, in 1993. The Cochrane Collaboration is a worldwide, non-profit making organisation, which was set up so that healthcare professionals would have access to systematic reviews of healthcare interventions to help them make better-informed decisions. These reviews are published in the Cochrane Library and are available online, free of charge through the NHS National Library for Health (Bero and Rennie, 1995).

Regardless of its early origins, evidence-based medicine is a moderately young discipline, which has recently gained in popularity, and its influence seems to gain in momentum.

## **2.2 EVIDENCE-BASED DENTISTRY**

Like Medicine, Dentistry has been practiced, until relatively recently, with limited reference to high quality evidence from clinical research.

The American Dental Association has defined evidence-based dental practice as:

*'the integration of an individual practitioner's experience and expertise, with a critical appraisal of relevant available external clinical evidence from systematic research, and with consideration for patient's needs and preferences.'* American Dental Association (2007)

Evidence-based dentistry has filtered into dental research and dental practice only recently in the last few decades, as an offspring, of evidence-based health care in general and evidence-based medicine. The aim of evidence-based dentistry is to encourage the dental practitioner to look for and make sense of the evidence in order to apply it to everyday problems (Richards and Lawrence, 1995). The principles behind evidence-based dentistry are equal to those behind any evidence-based clinical practice – finding the best information quickly, assessing its quality and deciding whether it is relevant to inform decision-making.

Evidence-based dental practice has grown in the last two decades alongside the growth in evidence-based dentistry (Yusof et al., 2008). It is hard to know whether the burgeoning interest in EBD translates to real change in dental practice. It is clear that great efforts have been made to educate practitioners in the importance of evidence-based dentistry both at undergraduate (Azarpazhooh, Mayhall, and Leake, 2008) and postgraduate levels (Richards, 2005). Within dentistry there are a number of resources designed to make evidence accessible to the clinician.

The Cochrane Oral Health Review Group is a review group belonging to the Cochrane Collaboration. It consists of an international group of researchers that undertake systematic reviews of literature, covering all randomised controlled trials of oral health. The Oral Health Group reviews and protocols

are published on the Cochrane Database of Systematic Reviews on the Cochrane Library. In addition, the Cochrane Oral Health Group Trials Register contains reports of controlled clinical trials and randomised controlled clinical trials related to the Group. There are, in addition, two specific journals which publish integrative reports and systematic reviews of recent research in dentistry. The best dental evidence is presented in clear, concise summaries. These journals are 'Evidence-based Dentistry' and 'The Journal of Evidence-Based Dental Practice'.

The availability and accessibility of evidence-based dentistry does not necessarily translate to changed practitioner behaviour. A recent randomised controlled trial in changing clinicians' behaviour (Clarkson et al., 2008) suggests that education is less effective than introducing fees for practicing evidence-based treatments. Healthcare policy, in the context of promoting evidence-based dentistry, has therefore been and will continue to be a major driver in getting evidence into practice.

Many treatment decisions made within dentistry are not based upon sound evidence. It has been suggested that perhaps as little as 8% of dental care is justified by peer-reviewed, published and appropriately analysed dental research (Kao, 2006). Clinical decisions may be based upon increasingly out of date undergraduate training or on practitioners' own experiences with individual patients. This may of course reflect the lack of appropriate evidence upon which to base clinical practice. Cochrane reviews represent the highest level of available evidence. To date, there are 87 Cochrane Reviews related to dentistry. Analyses of the conclusions of these reviews reveal that only a proportion of these reviews promulgate definitive clinical advice. Several of the reviews conclude there is no strong evidence available to support any differences between treatment modalities. Authors often conclude that results have to be interpreted with great caution because of the high degree of heterogeneity observed among trials. Many of the Cochrane reviews show that there are limited numbers of well-designed clinical trials within the specified search area and that high quality randomised-controlled trials with appropriate unit of randomisation and analysis are needed. For example, one of the most frequent treatments that a general dental practitioner will carry out is the

scale and polish. A recent Cochrane Review entitled 'Routine scale and polish for periodontal health in adults' concludes that 'The research evidence is of insufficient quality to reach any conclusions regarding the beneficial and adverse effects of routine scaling and polishing for periodontal health and regarding the effects of providing this intervention at different time intervals '(Beirne et al, 2005).

High quality evidence in dentistry is required to help keep abreast of current advances and techniques. Dentists are inundated on a daily basis with new products or treatments which claim superiority; being able to distinguish between substandard quality information and making use of current best evidence should help dental practitioners make better informed clinical decisions. An example of this relates to the prophylactic removal of third molar teeth. For many years it had been common for dental practitioners to practice the removal of asymptomatic wisdom teeth. In March 2000, after careful consideration of the available evidence, the National Institute of Health and Clinical Excellence (NICE) recommended that the routine practice of prophylactic removal of pathology-free impacted third molars should be discontinued in the NHS. There was no reliable research evidence to support a health benefit to patients from the prophylactic removal of pathology-free impacted third molar teeth (National Institute of Clinical Excellence, 2000). There were several positive outcomes that resulted from this guideline. Firstly, extraction of lower wisdom teeth carries several risks including temporary or permanent nerve damage, alveolar osteitis, infection and haemorrhage as well as temporary local swelling, pain and restricted mouth opening. There are also risks associated with the need for general anaesthesia in some of these procedures, including death. The guideline also had a positive impact on the cost towards the NHS of unnecessary wisdom tooth extraction, saving millions of pounds every year; third molar surgery had been estimated to cost the NHS in England up to 30 million per year. Waiting lists to oral surgery departments within the UK were also decreased (Landes, 1998).

Reliable evidence in dentistry should also help prevent the inappropriate use of modern materials and techniques. The costs of dental procedures are rising quickly. Many common or expensive procedures are unnecessary; some may be detrimental. The use of Ozone in dentistry has been heavily promoted by manufacturers to provide safe, painless dentistry negating the need for drills and injections. The equipment required to deliver Ozone is costly. A recent Cochrane review (Rickard et al.,2004) on Ozone therapy for the treatment of dental caries concludes that 'there is no reliable evidence that application of ozone gas to the surface of decayed teeth stops or reverses the decay process' and the NICE technology appraisal found 'that there was insufficient evidence on the effectiveness of HealOzone treatment for this technology to be recommended, except as part of well-designed RCTs.

It is important that practitioners do not continue to carry out inefficient, erroneous treatment when there is good evidence for different treatments. This has to be seen in context of how much evidence is actually present for guiding clinical practice. Evidence-based clinical guidelines such as the NICE guidelines on the removal of wisdom teeth can help successfully implement research evidence. However it is unfortunate that, for most treatment modalities within dentistry, there is insufficient good quality evidence to support or refute them. Clinicians, healthcare managers and increasingly lawyers acknowledge that decision making in health care should involve the patient and be based on best evidence of effectiveness and harm. Policy makers have begun to take an interest in evidence-based practice. In addition to the National Institute for Health and Clinical Excellence, other systems and organisations have been set up such as NHS Technology Assessment Programme and the NHS Centre for Reviews and Dissemination. It is to be hoped that evidence-based dentistry can be used to close the gap between good quality clinical research and clinical practice and lead to an improvement in the quality of care delivered to patients. Currently, limitations in both quality and quantity of research on this subject make it difficult to know whether evidence-based dentistry really is a tool for improving clinical care.

## **2.3 DENTISTRY IN THE UK – THE CONTEXT OF DENTAL PRACTICE**

### **2.3.1 STRUCTURE OF THE DENTAL SERVICES WITHIN THE UK**

The National Health Service (NHS) was formed in 1948 and since its inception it has strived to provide a comprehensive service to all patients based on clinical need and not ability to pay. The service it provides has undergone radical change in response to societal shifts, health need and political agenda including the way that dental services are provided. Most dentists work as general dental practitioners in the General Dental Services (GDS) carrying out a mixture of NHS and private treatment. Dentists also work in the salaried primary care dental services (subsuming the old community dental services and personal dental services), in hospitals, in universities, in industry or the armed forces.

Until 1<sup>st</sup> April 2006, under the NHS system, dentists working in the GDS received a fixed fee for each item of treatment they provide for adults. For child patients, dentists were paid a mixture of fees per item and a capitation fee. Adult patients paid 80% towards the cost of their treatment unless they were exempt from payment. Within this system, dentists were able to set up dental practices where they wanted and carry out as much or as little NHS dentistry as they wished. This led to inequalities in the distribution and provision of NHS dental services in different areas of the UK (Downer and Drugan, 2007). As a consequence of the perceived problems with general dental services, significant changes, led by the Department of Health, have taken place in the last decade. Modernising NHS Dentistry – Implementing the NHS Plan (Department of Health, 2000) set out how the Government would address problems of access to NHS dentistry and how it would tackle oral health issues and issues of quality. It outlined the Government's commitment to improving NHS dental services and set

out its intentions to deliver fast, accessible care. Since the publication of NHS Dentistry: Options for Change (Department of Health, 2002), NHS dentistry has undergone significant changes in its structure and funding mechanisms with the growth of the Personal Dental Services and a consequential end of the old General Dental Services. The new arrangements aimed to focus on a preventative approach towards dental treatment. These developments began with the establishment of the Personal Dental Services. Fundamental to these services was to place the local NHS in charge of commissioning local services and deciding where to locate new services; providing dentists with an agreed yearly income in return for an agreed level of patient care and simplify the charging system by introducing just three charges (Department of Health, 2002). These arrangements were put in place with the aim to encourage dentists to spend more time with patients, devote more time to improving quality with less bureaucracy and enhance opportunities for training and career development and to develop further the evidence base for dentistry. Implementation of these changes was by means of the new dental contract, which was introduced in April 2006 in England and Wales. Paradoxically, there appears to be great concern that the new dental contract has in fact limited patient access and recruitment and retention of general dental practitioners (Milsom, KM et al., 2008)

Health care in the UK is divided into primary and secondary care. Primary care refers to the health services first visited by those who have a health problem. These include general practitioners, dentists, opticians, pharmacists, walk-in health centres and NHS Direct. Secondary care includes NHS acute and foundation hospital trusts, mental health trusts, ambulance trusts and social care services. The majority of dental treatment is carried out in the primary care setting and is restricted to simple procedures and is provided by 'generalists' who usually offer long term care to their patients (Morris, White, and Bradnock, 2000). Dentists working in primary dental care setting refer patients to the secondary care setting who need a diagnosis or treatment outside their knowledge and competence.

The Department of Health (DoH) supports the government in providing strategic leadership of the NHS, monitoring standards and negotiating funding with the Treasury. Strategic Health Authorities (SHAs) are responsible for managing and setting the strategic direction of the NHS locally. There are 10 SHAs covering England and they are the key link between the NHS and the Department of Health. They support Primary Care Trusts (PCTs) and other NHS organisations. The PCTs are the working end of the health service structure and are funded directly by the DoH and a large proportion of the budget of the NHS. Paradoxically, Primary Care Trusts are not only involved with improving the health of the local community and developing community and primary care (e.g. general dental and medical services) but also with commissioning secondary dental care services. Secondary dental care refers to more specialised services (e.g. dental hospital services).

The PCTs are central to the government's plans for modernisation and cost-effectiveness in the NHS (Department of Health 1997). Unsurprisingly, changing patterns of delivery of care from a secondary care to the primary care environment may present significant cost-saving advantages. Patients can be seen and health problems managed quickly and locally, often by the person they spoke to in the first instance. PCTs are obliged to work in partnership with service users (both patients and health care providers) in designing and delivering services so that these, in theory, are meeting the local needs of the population. PCTs provide primary care services through contracting arrangements. Examples include the general medical services contracts and the new contract for general dental services. The PCTs receive a budget from the Department of Health on a formula basis relating to population and specific local needs (Department of Health, 2006). Patient charge revenues additionally, are important to funding of general dental services.

The General Dental Council (GDC) is the dental profession's governing body in the UK to regulate the profession and protect the public. One of the functions of the GDC is to assure the quality of dental education and ensure that dental professionals keep up to date. All practising UK dentists are required to be registered with GDC. In order to remain on the Dentists Register, it is mandatory that dentists undertake 250 hours of Continuing Professional Development (CPD) every 5 years. Of these 250 hours, a minimum of 75 must be verifiable. CPD is a continuing learning process that adds to formal undergraduate and postgraduate education and training. CPD requires dentists to maintain and develop their professional competence across all areas of their practice. The overall objective of CPD is to improve health care for patients. For dentists, the GDC has specified that CPD should include at least 10 hours of medical emergencies per CPD cycle and at least 5 hours of training in disinfection and decontamination and radiography and radiation protection per cycle.

### **2.3.2 THE POLICY CONTEXT**

The current make-up of UK dental services including education and delivery of an agenda of quality has been significantly influenced by iterative change in policy over the years. Changes in political climate has changed the delivery of healthcare (to favour primary care models) and also influenced the growth of evidence-based practice. In particular, the delivery of the most cost effective healthcare has been a major driver in bringing evidence into practice. An overview of these changes aids understanding of the drivers for such change.

In the early 1980's, reforms introduced by the Thatcher government introduced modern management processes in the NHS. The need for such change was outlined in the Griffiths report in 1983 (Department of Health and Social Services, 1983). This report recommended greater involvement of clinicians in management and responsibility for performance with general managers. Greater financial pressures led to further review and reform and in 1989, the white papers "Working for Patients" and

“Caring for People” (Department of Health, 1989 a and b) heralded the introduction of the "internal market" in healthcare. This was set in statute in the 1990 NHS and Community Care Act (National Health Service and Community Care Act, 1990).

Under such arrangements, local health authorities ceased to carry out day to day running of hospital but instead paid for services from their own or other authorities' hospitals under commissioning or purchasing arrangements. The providers of healthcare became independent trusts managed on a local basis. Such arrangements increased competition between trusts and to an extent in some areas with high competition, may have decreased the quality of patient care (BBC News. 2003). The change in healthcare delivery to the purchaser/provider model meant that on a national level differences existed in services available to patients; the “postcode lottery”. Current policy arrangements reflect a move to commissioning care. Herein, local PCTs are devolved a budget by strategic health authorities and are responsible for purchasing care. Providers of such care (acute NHS trusts or Foundation trusts) compete with each other to provide this care establishing an internal market within the NHS. The purchasers are responsible for purchasing cost-effective care but also for delivering adequate standards for the patients they serve.

The Blair government criticised the bureaucracy and inequalities of the internal market system and in its 1997 white paper “The New NHS: Modern Dependable” (Department of Health, 1997) set out its stall for a reformed NHS. This paper was written in response to a several high profile medical malpractice scandals including those at the Alder Hey Hospital and the Bristol Royal Infirmary Paediatric Cardiothoracic Unit. This paper set up the context of clinical governance and advocated the use of evidence-based medicine as a means of improving healthcare standards. The National Institute for Clinical Excellence (NICE) was set up in 1999 as a Special Health Authority of the NHS as a result of the 1997 white paper. On the 1st April 2005 it joined with the Health Development Agency to become the new National Institute for Health and Clinical Excellence (also abbreviated as NICE).

NICE was designed to assess clinical treatments and publishes appraisals of whether they should be provided on an NHS basis. Such appraisals are, in the main, based on cost-effectiveness in healthcare. From 2005 the NHS has been obliged by statute to fund treatments recommended by NICE.

Ironically the Blair government's original intention to disband the internal market had changed by its second term to strengthening the same market but the legacy of NICE remained. NICE may encourage the provision of NHS care of that which is evidence-based and of proven efficacy and cost-effectiveness. In dentistry, NICE guidelines are limited but have been effective drivers of changing to evidence practice in management of third molar teeth (National Institute of Clinical Excellence, 2000), dental recall intervals (National Institute of Clinical Excellence, 2004) and antibiotic prophylaxis for infective endocarditis (National Institute of Health Clinical Excellence, 2008) .

### **2.3.3 POSTGRADUATE DENTAL EDUCATION**

It is mandatory that, following graduation in the UK, a one-year period of vocational dental training within approved dental practice is undertaken for graduates wishing to practise dentistry as an associate or principal within the NHS. Vocational Dental Practitioners (VDPs) immerse themselves into practice within approved training establishments during a one-year programme. A senior colleague within the practice acts as a trainer and helps provide support through tutorials and with clinical advice and help when necessary (Patel and Batchelor, 2007). A number of dentists choose to undertake a period of specialist postgraduate training. Outside of these formal educational training arrangements, dentists are required to undertake a minimum amount of continuing professional development (CPD) to maintain registration with the GDC.

### **2.3.4 UNDERGRADUATE DENTAL EDUCATION**

All undergraduate dental students all initially follow a similar training programme for 4 or 5 years in one of the UK's 14 dental schools. The training consists of an academic education combined with theoretical and practical training in all aspects of dental practice. Subjects studied include an integrated, interdisciplinary programme to include a range of health, biological and behavioural sciences, as well as clinical skills in all dental disciplines. Dental education in the UK is regulated by the General Dental Council. It publishes its requirements on the content and scope of undergraduate dental degree programmes in 'The First Five Years - A Framework for Undergraduate Dental Education'(The General Dental Council, 2008) which guides dental schools to create and develop course curricula. The document specifically stipulates that 'students should be involved in the audit cycle and should understand the importance of evidence-based dentistry and how this relates to clinical practice. They should be able to evaluate the evidence and critically assess its relevance to treatment planning, advice and treatment provision.'

### **2.3.5 QUALITY STANDARDS IN DENTISTRY**

Underpinning the structure of dental services in the UK is the agenda of quality in the NHS. This is as pertinent to general and salaried dental services as it is to secondary care dental services in a hospital setting. Clinical governance is a system for improving the standard of clinical practice and requires that health professionals regularly review their clinical practice and implement change when necessary. Clinical governance can be defined as a 'framework through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care by creating an environment in which clinical care will flourish' (Department of Health, 1998). The government's clinical governance framework aims to modernise and strengthen professional

regulation built upon a culture of lifelong learning. It aims to improve systems for quality control, based on clinical standards and evidence-based practice.

## **2.4 SOURCES OF EVIDENCE**

There is a plethora of information sources available to health professionals seeking information.

These can be broadly divided into:

- The written word
- Communication with colleagues
- Internet sources

### **2.4.1 THE WRITTEN WORD**

Textbooks are a useful source of information for background reading or to obtain an overview of a particular subject. They are often designed, written, published and marketed to target as wide an audience as possible. Textbooks can also be of use in finding more detailed or specific information about particular clinical procedures. They are generally easy to use and interpret and can organise and simplify difficult topics. One of the drawbacks of textbooks is their lengthy production time. By the time they are published and disseminated, some of the information is obsolete, lacking in accuracy and has been superseded by more recent research findings. Often the authors, especially researchers, favour their beliefs or their prior experiences over evidence derived from outcomes based research, a tendency termed "reverse gullibility" (Riffenburgh, 1996).

Most scientific medical and dental journals are peer-reviewed, however the quality of clinical research publications is variable and methodological flaws may significantly limit the applicability of

such evidence. With large numbers of journal publications it can often be difficult to decide which papers are of a good quality and a significant portion of the research is not relevant enough to be clinically useful.

The methodological quality of clinical review articles or narrative reviews can be highly variable, and many do not specify systematic methods. These review articles tend to be written by respected experts in their field who have sought to collate existing knowledge and publicise these summaries. They tend to cover a wide range of issues about a given topic; however they often do not put forward information about the author's criteria for inclusion of evidence or omit how decisions were made about relevance and the validity of the included studies. References can therefore be selected to support the author's conclusions which may lead to unrecognised bias. Unpredictably, cited references often do not actually support the conclusions of the review. One study of review articles has shown that 24% of the referenced articles were not correctly summarised (Neihouse and Priske, 1989). Despite all their shortcomings, reviews were, and still seem to be, widespread and influential.

A systematic review is an overview of primary studies which contains an explicit statement of objectives, materials and methods and has been conducted according to explicit and reproducible methodology (Greenhalgh, 1997). They consist of a retrospective analysis of the literature and assimilate all the available literature on the subject to present balanced, reliable conclusions in an unbiased way.

The key components of the systematic review process are:

1. Formulation of a focussed question
2. Comprehensive literature search of all published and unpublished material
3. Assessment of studies for inclusion in the review
4. Critical appraisal of the studies,
5. Synthesis of the findings production of conclusions and recommendations

Systematic reviews can include a meta-analysis, which is a statistical technique that combines the results of several independent studies. A meta-analysis can provide a quantitative estimate of the treatment effect giving due weight to the different size of the studies included.

There are a number of evidence-based journals in medicine and dentistry. They all follow a similar approach which is to assimilate the best evidence from a wide range of high-quality, valid research articles and provides accurate, essential, clinically relevant evidence-based information in a concise and easy to read format.

Clinical Practice Guidelines (CPGs) have been defined as “systematically developed statements to assist practitioners and patients in arriving at decisions on appropriate health care for specific clinical circumstances”(Field and Lohr, 1990). Well-developed guidelines use the evidence-based approach. Evidence-based guidelines are based on systematic reviews of the literature. The development of CPGs in dentistry is in its infancy. Although a number of organisations have produced parameters of care and expert-derived or consensus-based guidelines and standards of care, there are very few published, peer-reviewed, evidence-based CPGs validated by practising dentists (Sutherland, Matthews, and Fendrich, 2001). Guidelines, both evidence based and non evidence-based in dentistry are available from a variety of sources including the National Institute of Health and Clinical Excellence, Royal College of Surgeons, Specialist Societies, World Dental Federation, Scottish Intercollegiate Guidelines Network, Scottish Dental Clinical Effectiveness Programme and the British Dental Association.

Grey literature is any documentary material that is not published in peer-reviewed journals. Grey literature is produced by government agencies, professional organisations, universities, public institutions, special interest groups, and associations and societies whose goal is to disseminate current information to a wide audience. It usually consists of technical reports, working papers, newsletters, reports, theses, government documents, bulletins, fact sheets, conference proceedings,

business documents and other publications. Several problems exist with grey literature, these include the process of identification consequent to their limited indexing. There is also the problem of absence of editorial control and peer-review. This raises questions about authenticity and reliability of the work. The Internet has become a major source for dissemination and retrieval of grey literature. Web sites give users access to a vast array of digitally produced grey literature and there is growing acceptance of including references to relevant Web sites in scholarly papers and journal articles. Under-reporting of research is a well-recognised problem with serious implications for clinical practice (Chalmers, 1990). Most unpublished research is never submitted to a journal for consideration. Previous investigations suggest researchers are more likely to attempt to publish studies with positive outcomes (Easterbrook et al., 1991). This will lead to publication bias. There has been a recent drive to urge authors of unpublished trials to register the trials in journals, which will make the information more widely available and allow researchers to identify the entire spectrum of research.

#### **2.4.2 COMMUNICATION WITH COLLEAGUES**

Healthcare professionals often turn to colleagues or other specialists find answers to clinical questions. This can be quick, easy and colleagues can also provides guidance, support, affirmation, and other psychological benefits that computerised sources cannot provide (Smith, 1996). One of the benefits of expert based information is that experience can be used to interpret and apply evidence to the care of difficult patients. In opposition to information acquired from colleagues, the information may be based on a highly specific population and therefore not directly applicable to other patient groups. Evaluating the evidence and critical appraisal is not straightforward. It cannot be assumed that an expert is skilled at evaluating medical research and therefore advice from experts may be ‘eminence-based’ as opposed to evidence-based.

Since the GDC made it mandatory for dentists to carry out verifiable Continuing Professional Development, there has been an increase in the number of publicly funded and private postgraduate courses. Information about these courses is often provided by the postgraduate dental deaneries. Other bodies such as the Faculty of General Dental Practitioners and the Specialist Societies also provide and accredit courses. It has been shown that conventional conferences and courses, which focus largely on the passive acquisition of knowledge have little impact on the behaviour of health professionals (Davis et al., 1995). A study or journal club consists of a group of colleagues who meet regularly to critically appraise the clinical relevance of recent articles in the medical literature to help make evidence based-decisions.

Within dentistry, sales representatives are an information source used by dentists on a regular basis. A problem with dental research evidence is that it is unable to inform and update dentists about new materials and techniques, such as the latest implant design, composite materials and adhesives. Dentists often rely upon sale representatives as key information sources about advances in dental services, product and technology (Levin, 2005). There may be the potential for the bias of sales representatives towards the promotion of their company's own products.

### **2.4.3 INTERNET SOURCES**

The Internet offers excellent opportunities for the practitioner to search for information and communicate with other professionals. Information overload has become one of the most significant problems that Internet users face. The content can be highly variable, clinical information is not always separated from non-clinical information and, despite several high quality clinical websites, there is still a large amount of non-useful information on the web. It is rare that information on websites is peer-reviewed. With such a vast resource pool, finding information on, or the answer to, a

specific question can be demanding (Saha, 2005). The Internet is an important medium for evidence-based medicine as there is an increasing amount of full text information such as on-line journals, systematic reviews, textbooks and guidelines. Using the Internet, evidence-based information may be easily accessed, updated and disseminated.

The Web creates new challenges for information retrieval. Internet search engines are very popular; they are well known and well used. Internet search engines are special sites on the Web that are designed to help people find information stored on other sites. One of the most regularly used website is Google. It is a crawler-based service, which provides comprehensive coverage of the web with a good degree of relevance. Typing in keywords is the most common form of text search on the Web. Most search engines find hundreds and thousands of sites from a typical search query. Search engines give each document they find, some measure of the quality of the match to the keyword search query: a relevance score. Relevance scores reflect the number of times a search term appears, if it appears in the title, if it appears at the beginning of the document and if all the search terms are near each other. There three basic types of search engines: those that are powered by crawlers, or spiders; those that are powered by human submissions; and those that are a combination of the two. Crawler-based search engines, such as Google, create their listings automatically. They "crawl" or "spider" the web, then list the websites they have been found. Crawling is the method of following links on the web to different websites, and gathering the contents of those websites for storage in the search engine's database. Human-powered search engines rely on humans to submit information that is subsequently indexed and catalogued.

Academic Centres such as the Centre for Evidence-Based Dentistry (<http://www.cebd.org/>) and the Centre for Evidence-Based Medicine (<http://www.cebm.net/>) have websites which feature many useful resources. These help the user to find valid, relevant clinical information. There are usually links to Medline and the Cochrane Collaboration and to other useful evidence-based websites. These

websites often contain tools to help learn how to practise evidence-based care; for example, the Critical Appraisal Skills Programme (CASP) is a mainly online resource which has helped to develop an evidence-based approach in healthcare.

Computer Aided Learning (CAL) programmes run on computers either from CD-ROMs or downloaded from the Internet. They provide an interactive learning environment which can provide information to learn, test knowledge and provide feedback on the quality of the answer given. The use of CAL programmes has become established as a useful means of acquiring knowledge in undergraduate medical and dental education. It can provide the student with interactive learning at a personally chosen level with the opportunity to work through material at a chosen pace and repeat selected parts as necessary (Schitteck et al., 2001). One recent paper which examined the potential of information technology in dental education (Mattheos et al., 2008) concluded that students should be supported by their institutions and encouraged to use e-learning materials. It also reinforced that it is important that learning materials must have well defined learning objectives and also processes in place to ensure content validity, accuracy, relevancy and the use of evidence-based information.

Electronic textbooks (e-textbooks) have been available for some years. There has been a recent proliferation in the use of the Internet to deliver text to users and they are growing in acceptance and number. The online environment for textbooks offers several advantages. Whilst traditional textbooks are obsolete from the moment of their publication, online or e-textbooks can be updated and expanded regularly. Useful educational tools that e-textbooks may additionally offer include text search facilities, downloads and audio and video clips. Furthermore e-textbooks are often available free of charge. An example of a popular e-textbook is the “E-medicine World Medical Library” which features up-to-date, searchable, peer-reviewed collection of medical review articles, online reference textbooks, and a full-text article database (<http://emedicine.medscape.com/>). It is written by

leading clinicians from all over the world and is updated 24 hourly. It is difficult to assess the usage and functionality of such websites.

Databases are designed to offer an organised mechanism for storing, managing and retrieving information. The databases used in medicine to retrieve information are primarily bibliographic. Examples of information types found in bibliographic databases generally include title, author, and abstract. They may also include links to full-text content. Examples of bibliographic databases include MEDLINE, EMBASE, CINAHL, CANCERLIT, and PsychoINFO. These databases contain citations representing printed works in a specific discipline. The database publishers, who create the databases, generally adhere to definite and sometimes quite rigorous screening processes for the materials they index. These databases often contain millions of citations and in order for them to be managed efficiently they employ a controlled indexing language system. A highly trained indexer will assign key words to articles to form a standardised set of terms. This is designed to help searchers improve the efficiency and accuracy of their searches and minimise the number of search terms they have to use.

Medline is a huge medical bibliographic database containing over 12 million citations dating back to the mid-1960's. It is one of the most substantial medical and health information resources online and at the present time is one of the most effective ways of searching for medical information. It includes literature relating to medicine, dentistry, nursing, veterinary medicine, pharmacy, allied health and pre-clinical sciences. It is the standard English language database for biomedical information to provide electronic access to medical and scientific literature. Medline was created from Index Medicus. Index Medicus was created in 1879 and was a print version of the bibliographic listing of references to articles from biomedical journals worldwide. In 2000 its publication ceased. There are many organisations which offer access to Medline; the most popular service is that offered by the US

National Library of Medicine in their PubMed service which is a free service. The other accepted method of accessing MEDLINE is through Ovid which has multiple database searching facilities and better phrase and adjacency search options. All Medline literature is analysed by Medline indexers who scan the subject content of the articles and assign approximately ten to twelve Medical Subject Headings (MeSH) to each article. Two or three of these terms will be identified as major topic headings. With primary literature databases such as Medline, it can be difficult and time-consuming to separate the most 'useful' information. There are several evidence-based medicine databases. The Cochrane Library itself contains several. These include the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effects (DARE), the Cochrane Central Register of Controlled Trials (CENTRAL), the Cochrane Methodology Register, the NHS Economic Evaluation Database, the Health Technology Assessment Database and the Cochrane Database of Methodology Reviews (CDMR). These databases evaluate and synthesise studies that report on the effectiveness of a treatment or prevention strategy. The small size of these databases makes searching relatively easy, although often searches may retrieve few or no results (Stave, 2003).

A blog is a non-commercial website with regular entries of commentary, descriptions of events, or other material such as graphics or video. Their use is a relatively recent development in medical education but they are widely used by the general public. These blog sites can provide a learning resource that can be read by learners, they can be written by learners as a portfolio, and they can be used as a collaborative learning space. Wikis are interactive websites that can be edited and contributed to by anyone who has access to them (Boulos, Maramba, and Wheeler, 2006). The most popular example of a wiki is 'Wikipedia'. Podcasts are audio and video files that can be downloaded to media players providing the potential for "anytime, anywhere" learning experiences. In a questionnaire-based study involving 211 medical students, a revision podcast was shown to be a useful learning supplement. Students felt that similar resources for the remainder of the undergraduate medical syllabus would be useful for revision purposes (Shantikumar, 2008).

There has been a recent explosion in the use of social networking websites such as Facebook and My Space. These types of sites allow users to join and create a personal profile and post information on their own web space such as photos and interests. Members can communicate with each other, and connect to other member with similar interests and join common groups. There is a Facebook “Page of Dentistry” which when last accessed had over 10,740 members, the American Academy of Esthetic Dentistry also have a page on Facebook which when last accessed details information regarding their 34th Annual Meeting and 6th World Congress of IFED. Future challenges may lie in integrating social software into current institutional learning frameworks as use of these websites appears to be high amongst undergraduate students (Cain, 2008).

A mixed economy of resources exists to allow general dental practitioners to access evidence-based dentistry. These are the written word (or printed material), communication with colleagues and the Internet. The written word has been held in high regard in medicine since the time of Hippocrates. There is growing recognition that not all that is written is necessarily accurate and it appears that clinical dentistry is not an exception. Such material can be variable in quality and critical appraisal is a necessary skill if evidence-based practice is to be practised. Communication with colleagues is a traditional and potentially influential medium through which evidence may be transmitted and received. Expert opinion may be biased and limited in availability. Discussion with colleagues may result more in transfer of anecdote, than evidence-based advice. The Internet presents an exciting and growing medium for evidence-based dentistry. Information may be easily available and practitioners can have instant access. Significant cost may be associated with some sources. Additionally variable quality of sources can make selecting best evidence difficult. Editorial controls often associated with the printed material may be less stringent, or even absent on the Internet. Educational strategies for general dental practitioners may need to acknowledge the influence of media on uptake of evidence and be designed accordingly.

## **2.5 USING THE EVIDENCE**

A fundamental issue in evidence-based practice is that not all evidence is of equal importance. The available evidence is very variable in terms of quality and a hierarchy exists of study design. Systematic reviews and randomised controlled trials represent the highest levels of evidence, whereas case reports and expert opinion are considered to be the lowest. In order to make proper use of original research, critical appraisal skills are required to make judgments on its scientific value, and to consider how its results may be applied in practice (Silagy and Haines, 2001).

A recent study of a large sample of junior doctors revealed deficits in knowledge of evidence-based medicine and critical literature appraisal skills with the majority of respondents not confident in their ability to assess research studies (Hadley, Wall, and Khan, 2007). A systematic review which investigated whether postgraduate teaching in evidence based medicine changes anything revealed that standalone teaching improved knowledge but not skills, attitudes, or behaviour and that clinically integrated teaching of evidence-based medicine is more likely to bring about sustained changes in behaviour (Coomarasamy and Khan, 2004).

### **2.5.1 BARRIERS TO EVIDENCE-BASED PRACTICE**

Several studies have aimed to identify barriers to evidence-based practice in primary care (McKenna, Ashton, and Keeney, 2004; Thompson et al., 2005; Freeman and Sweeney, 2001; Mayer and Piterman 1999; O'Donnell, 2004). In the main, studies on barriers to evidence-based practice are present in medical literature. There appears to be little evidence for this in dental journals. Some of the recurring perceived barriers from the medical literature include: time constraints; the limited relevance of research to practice; the proliferation of medical and dental literature; limited funding for primary

care research and results not being easily transferable into practice; difficulties with searching for evidence-based information. The majority of results from research appear in peer reviewed journals of which there are a multitude. It is simply not possible for readers to keep up to date with the small number of important publications spread thinly in the literature. In a number of the studies, dissemination of evidence was also perceived to be a problem, mainly because of limited library and computer facilities. Respondents' confidence, from these studies, in using computers to search for research information was low. In addition, respondents felt that not having undertaken a research course limited their ability to judge and use evidence.

Even if clinicians are aware of new evidence and are willing to change, to alter well established patterns of care is difficult, especially if the clinical environment is not conducive to change (Lanier et al., 2003). Two studies (Freemantle et al., 2000; Oxman et al., 1995) findings concur, that didactic training and simple dissemination of information (e.g., medical journals received in the mail) are generally ineffective with little impact on the behaviour of health professionals and that most passive educational activities are poor at changing physicians' behaviour. Active approaches were more likely to be effective, however more costly (Mowatt et al., 2001). Several systematic reviews have identified that the most effective interventions were educational outreach, reminder systems and multi-faceted interventions and interactive educational meetings (Bero et al., 1998). Educational outreach refers to personal visits from trained professionals to practitioners in their own care setting with the purpose of delivering educational intervention. Studies determining the attitudes of general practitioners toward evidence-based medicine (McColl et al., 1998) revealed that respondents mainly welcomed evidence-based medicine and agreed that its practice improves patient care. There was a low level of awareness of extracting journals, review publications and relevant databases and the major perceived barrier was lack of personal time. Most respondents felt the best way to move from opinion-based to evidence-based medicine was by using evidence based guidelines or protocols developed by colleagues for use by others.

Evidence-based practice can be difficult to accomplish. One of the biggest drawbacks is that it takes significant time to learn and practise. Not all practitioners have been taught critical appraisal skills at an undergraduate or at a postgraduate level. Good computer literacy skills are a minimum requirement and for some practitioners this may be discouraging. Even after a lengthy search process, searches may at best only expose gaps in the evidence. There are very few systematic reviews that definitively guide practitioners on clinical procedures (Chalmers, Dickersin, and Chalmers, 1992).

Considerable amounts of time and money are spent carrying out clinical research; however, less attention has been paid to the implementation of research evidence into clinical care. There has been recent interest in knowledge translation which is the scientific study of the methods for closing the gap between knowledge and practice and the analysis of barriers and facilitators inherent in this process (Davis et al., 2003). Proponents of knowledge translation have identified that changing behaviour is a complex process requiring comprehensive approaches directed towards patients, doctors, managers and policy makers, and providing evidence is but one component (Grol and Grimshaw, 2003).

## **2.6 CHANGING PRACTICE**

Clinical research is constantly generating new findings that may contribute to an improved standard of patient care. However, new research cannot make advances in patient outcomes unless it is adopted by health services and healthcare professionals (Foy, Eccles, and Grimshaw, 2001). The gap between research evidence and its implementation in clinical practice is not new. An early example of delayed uptake of medical evidence is the use of lemon juice to prevent scurvy. James Lancaster demonstrated its effectiveness in 1601, but it was not until 1747 that James Lind repeated the experiment. The British Navy did not fully adopt the innovation until 1795 and the merchant marines not until 1865 (Mosteller, 1981). Despite the rapid growth of medical research evidence and information technology, the medical literature is still littered with examples of research findings that have not found timely acceptance in practice (Dopson et al., 2002).

The reason for the apparent gap between the available scientific research evidence and its application in practice is complex. In some instances, it reflects upon the lack of rigour that has been applied to synthesising the results of primary research in a systematic manner. In other instances, it reflects the inability of the available research evidence to provide the relevant information that consumers and healthcare professionals need to make decisions. At a broader level it reflects upon the lack of appropriate frameworks, systems and strategies for effectively influencing professional behaviour (Silagy and Haines, 2001).

Much of the research that has been carried out remains unread and unused by busy practitioners. The need to attach more importance to the dissemination of research findings has been recognised and with this recognition has come an awareness of the complexity of changing practitioner behaviours and the behaviours of the organisations in which they work. Evidence derived from culture, custom

and narratives or that relating to anecdotes from experience has a strong influence upon the development of practice, most likely through the medium of modelling. This is often one of the most influential ways in which practitioners develop their practice (Hamer and Collinson, 1999).

### **2.6.1 BEHAVIOUR CHANGE**

The field of behaviour change among health professionals is itself developing an evidence base, through which it is clear that multifaceted strategies are needed, using a range of techniques. Analysis of barriers to change in clinical practice showed that obstacles to change in practice occurred at different levels in the healthcare system: at the level of the patient, professional, the healthcare team, the healthcare organisation or the wider environment (Oxman et al., 1995). The National Institute for Health and Clinical Excellence have recognised the fact that instituting change can be challenging. They have therefore created a programme to help support implementation, and develop tools, resources and advice to help healthcare professionals to make the necessary changes to follow relevant guidance. A document entitled “How to change practice: Understand, identify and overcome barriers to change” was published in 2007 (National Institute for Health and Clinical Excellence, 2007) and aims to improve care standards by advising and encouraging healthcare professionals and managers how to change their practice.

There are a number of different models to explain behaviour change; however there is not one universally accepted model that can be applied to all circumstances. A selection of the most popular theories is described. The transtheoretical model explained by Prochaska and DiClemente (1983) describes behavioural change as a five-step process. The five stages are precontemplation, contemplation, preparation, action, and maintenance. This theory suggests that the needs of particular groups should be assessed before behaviour change interventions are designed, so the intervention is tailored to specific needs. The Social Cognitive Theory puts forward that change in behaviour is determined by environmental, personal, and behavioural elements. It suggests that people learn by

watching what others do. A key concept of this theory is the concept of self-efficacy; a person must believe in his or her capability to perform the behaviour and must perceive benefits for that change (Bandura, 1989). Learning theories propose that praise, encouragement and other extrinsic rewards such as financial incentives may help people adopt a change in behaviour. Positive reinforcement and rewards are essential to ensure the repetition of the desired behaviour (Skinner, 1953). The organisational context also plays a major role in change and again there are many theories of organisational change. These are covered succinctly in a review by Garside (1998) and it is recognised that organisational change has to be both “led” and “managed” to succeed. It has been said that organisational change is “typically modelled as a three part process that takes a flawed organisation, moves it through an arduous transitional stage, and deposits it at the end in the enriched, desired state.”(Kanter, Stein, and Jick, 1992).

Whilst theoretical models of change present interesting arguments, on a practical basis, there is said to be no ‘magic bullet’ for changing professional behaviour (Oxman et al., 1995), and a complex relationship exists between knowledge, beliefs and attitudes and actual behaviour change. A systematic review of professional behaviour change interventions which examined 41 reviews (Grimshaw et al., 2001) showed that passive information dissemination techniques such as educational materials are ineffective. However another large systematic review by the same author which included a total of 235 studies concluded that printed educational materials may lead to improvements in care and that this method should not be ignored given its possible influence, relative cost effectiveness and feasibility within the NHS (Grimshaw et al., 2004). Multifaceted interventions, such as educational materials plus outreach or educational meetings targeting different barriers to change are more likely to be effective than single interventions alone (Grol, Wensing, and Eccles, 2005).

It has been shown that the circulation of clinical practice guidelines without an implementation strategy is unlikely to result in changes in practice (NHS Centre for Reviews and Dissemination,

1994). Some guidelines are better adhered to than others. This difference may be due to a number of different reasons such as type of health problem addressed, method of development used, content of the recommendations, the source of dissemination, or the format and layout (Davis and Taylor-Vaisey, 1997). Several studies (Burgers et al., 2003; Grilli and Lomas, 1994; Grol et al., 1998) have looked at which features of clinical guidelines might affect compliance in practice. Results suggest that improved uptake of guidelines was linked with type of health problem; better quality of evidence supporting the recommendations; compatibility of the recommendations with existing values; less complexity of the decision making needed and less organisational change needed to follow the recommendations. A systematic review was carried out (Cabana et al., 1999) to identify barriers to adherence to guidelines. This review, which studied a total of 76 articles, revealed a variety of barriers that included lack of awareness and lack of familiarity or disagreement with their content. In terms of physician attitudes, lack of agreement, self-efficacy, outcome expectancy, and the inertia of previous practice were also identified as potential barriers.

Educational meetings, such as large scale lectures, have shown not to produce any significant change in behaviour (Davis and Taylor-Vaisey, 1997). Smaller group meetings have been shown to be more successful in facilitate change in behaviour although they are more expensive and time consuming to administer. Some research has been carried out to investigate the role of “opinion leaders” and their role in influencing behavioural change in healthcare professionals. They have been described as ‘authorities who use their respected influence to promote behaviour change’ (Grol, Wensing, and Eccles, 2005). Some studies have revealed that opinion leaders have mainly positive effects upon behaviour change (Greenhalgh et al., 2004); it has been shown that they can help remove barriers to change and increase the rate of the diffusion of innovations (Valente and Pumpuang, 2007).

The medical sciences literature is vast and is continuing to expand at an exponential rate. With the recent advances in information technology, clinicians may be suffering with information overload.

Clinicians need timely, valid and relevant evidence-based information available at the point of decision-making. A number of educational delivery methods exist and the usefulness of these sources depends on the relevance and validity of the information and the ease of use (Slawson and Shaughnessy, 1997). Clinicians are struggling to cope with not only the amount of published literature but also the recent avalanche of electronic mail, information from Internet newsgroups, discussion lists and other electronic information sources. Although the availability of systematic reviews and guidelines reduce the need for clinicians to read original studies, they may still find it hard to keep up with secondary research (Guyatt et al., 2000).

## **CHAPTER 3 - RATIONALE FOR RESEARCH**

It is evident that evidence-based medicine and evidence-based dentistry are becoming established movements in healthcare. These fields are developing and are beginning to shape undergraduate and postgraduate training for the future. Additionally, evidence-based healthcare now plays an important role in influencing clinical practice, for example, NICE clinical guidelines.

It is clear that evidence-based dentistry comprises a very small part of the information that is available to the general dental practitioner. Dentists are bombarded with information from different sources namely the written word, the Internet and communication with colleagues. It can be difficult with limited training in critical appraisal and little time to spend on such activity to select information of a high quality with direct relevance to clinical practice. It is notable in the medical model, that even in possession of best evidence, it is difficult for practitioners to change their practising behaviour.

Dentists' knowledge and attitudes towards evidence-based dentistry are unclear at the moment. Indeed, there is very little research which has investigated the attitudes of general dental practitioners towards evidence-based dentistry and their ability to access and critically evaluate any available evidence. Much of the research that might be regarded as pertinent has been carried out in medicine as opposed to dentistry. The results of this research are not wholly applicable to dentistry because of the differences in training programmes, funding arrangements and work settings that exist for doctors and dentists (McGlone, Watt, and Sheiham, 2001).

Of the limited research of this nature in the dental setting, several studies have focussed on which information sources dentists prefer (Selvi and Ozerkan, 2002; Strother, Lancaster, and Gardiner, 1986) and accessibility of dental research (Bedos and Allison, 2002). One UK-based study looked at general dental practitioners' knowledge of and attitudes towards evidence-based practice (Iqbal and Glenny, 2002). This was undertaken by using a postal questionnaire with general dental practitioners in 2001. Respondents showed a degree of understanding of some of the technical terms used in evidence-based practice, however almost three-quarters of the sample had not heard of the Cochrane Collaboration. The authors concluded that not all dentists were familiar with the concept of evidence-based practice and most turn to friends and colleagues for help and advice. Most respondents felt that the use of evidence-based practice was important but lack of time was a major factor identified as being a barrier to implementing evidence-based practice. A questionnaire survey carried out in Sweden (Rabe, Holmen, and Sjogren, 2007), examined attitudes, awareness and perceptions of evidence-based dentistry, results showed that the dentists had a positive attitude towards evidence-based dentistry, however perceived barriers towards its practice, were 'lack of time' and 'poor availability of evidence'. The aforementioned studies were all questionnaire-based studies. Problems inherent in such study designs are the inability to elicit an understanding of peoples' knowledge, beliefs, attitudes and preferences and the difficulty in answering the whole question of how evidence is turned into practice (Green and Britten, 1998; Pope and Mays, 1995). A qualitative study (Kay and Blinkhorn, 1996), which explored factors governing dentists' treatment decisions, concluded that patients and patients' values were two of the main influencing factors. Dentists' feelings of self-esteem and conscience were also identified as factors influencing treatment philosophies.

A comprehensive overview of the current knowledge base in evidence-based dentistry (McGlone, Watt, and Sheiham, 2001) highlighted the fact that very little research has been undertaken to investigate which factors influence the choices dentists make in their clinical practice. The authors of this overview state that 'research is needed to uncover the detailed range of factors involved in the

process of change in dental practice and to disentangle the various influences on clinical practice. Research is also needed to assess the mechanisms of support that are necessary to achieve the changes that are being advocated.' Since the above review was published, a number of key pieces of research in bringing evidence to practice within dentistry have been carried out in the UK. The first, a postal questionnaire survey (Watt et al., 2004) which examined the self-reported changes in general dental practice. This showed general dental practitioners' work patterns to be dynamic and changing. This was followed up with a qualitative study by the same workers (Watt et al., 2004), in which general dental practitioners were interviewed to investigate barriers and facilitators to change in clinical practice. This identified a range of factors which influenced change. These included financial risks associated with adopting a new practice, patient factors, organisational issues, contact with peers, and access to appropriate training courses. A randomised controlled trial of a behavioural intervention to influence dentists' intention to implement evidence-based guidelines for extraction of wisdom teeth revealed that the intervention was successful in reducing the intention to extract (Bonetti et al., 2003). In another randomised controlled trial, a financial incentive encouraged more dentists to undertake a clinical procedure (Clarkson et al., 2008).

Given the potential problems identified with evidence-based dentistry and its uptake by general dental practitioners, this research has been carried out to determine what factors cause dental practitioners to change their practice. In doing so the study aims to identify the educational tools required to help dentists access and understand evidence-based research. In addition, it is hoped to investigate the barriers to the successful application of research evidence to dental health care. None of the studies discussed previously have used a qualitative approach to focus specifically upon evidence-based dentistry and its influence upon the decisions dentists make in clinical practice. Investigating evidence-based dentistry and its influence upon general dental practice is important because it has been shown that useful evidence relating to clinical practice is not necessarily taken on board and implemented by clinicians (Oxman et al., 1995).

The nature of this research almost certainly could not be investigated thoroughly by a quantitative study alone. Questionnaire-based research is not always able to harvest rich qualitative data in a bespoke, personalised manner with study subjects needed to answer such wide-ranging questions with personal, intellectual and professional dimensions. It is worth noting that whilst qualitative responses are possible with questionnaire-based research, replies may be limited or incomplete. Furthermore it may not be possible to probe deeper where a response may reveal interesting information (Pope and Mays, 2000). It was decided that a qualitative approach using semi-structured interviews would be therefore better suited to explore dental practitioners' views and perspectives regarding this subject. Such a research design should glean valuable insights into knowledge and understanding of evidence-based dentistry amongst general dental practitioners and to explore whether this influences decisions made in clinical practice. Qualitative research would appear to be well suited to answering questions about what makes general dentists change their practice and for generating further hypotheses therein.

The aim of this study is to explore the knowledge and understanding of evidence-based dentistry amongst general dental practitioners and to investigate whether and how this translates into evidence-based dental practice.

## CHAPTER 4 - QUALITATIVE RESEARCH

Qualitative research is concerned with developing explanations of social phenomena. It is a form of social inquiry that focuses on the way people interpret and make sense of their experiences and the world in which they live (Holloway, 1997). It begins with an intention to explore a particular area, collects "data" (observations and interviews), and generates ideas and hypotheses from these data largely through what is known as inductive reasoning (Pope and Mays, 2000). Qualitative research was first used amongst anthropologists and sociologists in the early twentieth century to investigate other cultures and groups of people.

Qualitative research can investigate practitioners' and patients' attitudes, beliefs, and preferences, and the whole question of how evidence is turned into practice. It focuses on the meanings that people attach to experiences, the relationship between knowledge, experience and action and the social factors that shape these processes. Personal experience is often characterised as being anecdotal, not generalisable, and a poor basis for making scientific decisions. However, it is often a more powerful persuader than scientific publication in changing clinical practice (Green and Britten, 1998).

Much of qualitative research is aimed at generating theory. Researchers usually approach participants with the aim of collecting rich and in-depth data that may become the basis for theorising.

## **4.1 TYPES OF QUALITATIVE RESEARCH**

There are a variety of qualitative methods that researchers can adopt to achieve the aims of research, however the differences between them may not always be clear cut. The main ones include phenomenology, ethnography, case study research and grounded theory although there are other approaches. Grounded theory is the development of new theory through the collection and analysis of data about a phenomenon. It was developed by Glaser and Strauss in the 1960s (1968). It is particularly useful in situations where little is known about a subject or where a different outlook is needed. Phenomenology is the study of phenomena. It is a method of describing specific events, situations, experiences or concepts. Typically this approach involves in-depth interviews. Ethnography is a methodology for studying cultures and people. Information is usually collected by observation and interviews to gain a broad understanding of culture and practices. In a healthcare setting, ethnography is used to help professionals develop increased cultural awareness and understanding of people from different backgrounds. Finally, case study research is an investigation of an organisation, an event, a process or a programme (Merriam ,1988).

## **4.2 QUALITATIVE RESEARCH IN HEALTHCARE**

For health services researchers it has historically been difficult to secure funding for qualitative research projects or to publish findings of qualitative studies in health services research journals, particularly when the studies have employed qualitative research methods exclusively. Due to these reasons, qualitative methods may not have been used as often as they could have been, and research results may not have been disseminated as widely and effectively as possible (Devers, 1999). Qualitative research methods are becoming increasingly popular in areas of health care research and there has been a significant rise in the reporting of qualitative research studies in medical and related healthcare journals. Another prominent field of qualitative research, which has much to offer evidence-based practice, is that which offers insights into the factors that shape clinical behaviour. Such work can explain why uptake of care by patients or innovations by clinicians is poor and uneven and may have important implications for the type of, and manner in which, services are provided (Popay and Williams, 1998).

Qualitative research has so far made a limited impact upon the dental literature (Newton, 2000). Medline searches for studies in dental journals which have employed qualitative techniques reveal a limited number of search results (Stewart et al., 2008). The recent emergence of the importance of evidence-based dentistry has seen a drive towards more quantitative methods of research such as the randomised controlled trial (Blinkhorn, Leather, and Kay, 1989).

### **4.3 THE QUALITY OF QUALITATIVE RESEARCH**

The quantitative research approach is an objective, formal, systematic process in which numerical data are used to quantify or measure phenomena and produce findings. In contrast, qualitative research differs from quantitative approaches as it develops theory inductively and there is no specific intention to quantify findings. Historically quantitative research has been given a higher status in research fields as qualitative research often seems to be anecdotal and unscientific to many medical researchers. The value of qualitative methods lies in their ability to pursue systematically the kinds of research questions that are not easily answerable by experimental methods (Green and Britten, 1998).

Scientific rigour is essential to maintain the credibility of the qualitative research process. The strength of qualitative research lies in validity (closeness to the truth). Good qualitative research, using a selection of data collection methods, really should touch the core of what is going on rather than just skimming the surface. The validity of qualitative methods is greatly improved by using a combination of research methods, a process known as triangulation, and by independent analysis of the data by more than one researcher (Greenhalgh and Taylor, 1997). Bracketing is a technique in which the researcher does not allow prejudgments or biases to influence data analysis. It is described by Crotty (1996) as ‘The means by which researchers endeavour not to allow their assumptions to shape the data collection process and the persistent effort not to impose their own understanding and constructions on the data.’

Qualitative research is more credible when multiple coders for data are used and inter- and intra-coder reliability is obtained. Intercoder reliability refers to consistency among different coders. Intracoder

reliability refers to consistency within a single coder. Coding is the process by which the data is analysed and organised. The final step involved in good quality qualitative research is peer review and publication which gives evidence that the study has been externally judged as valid.

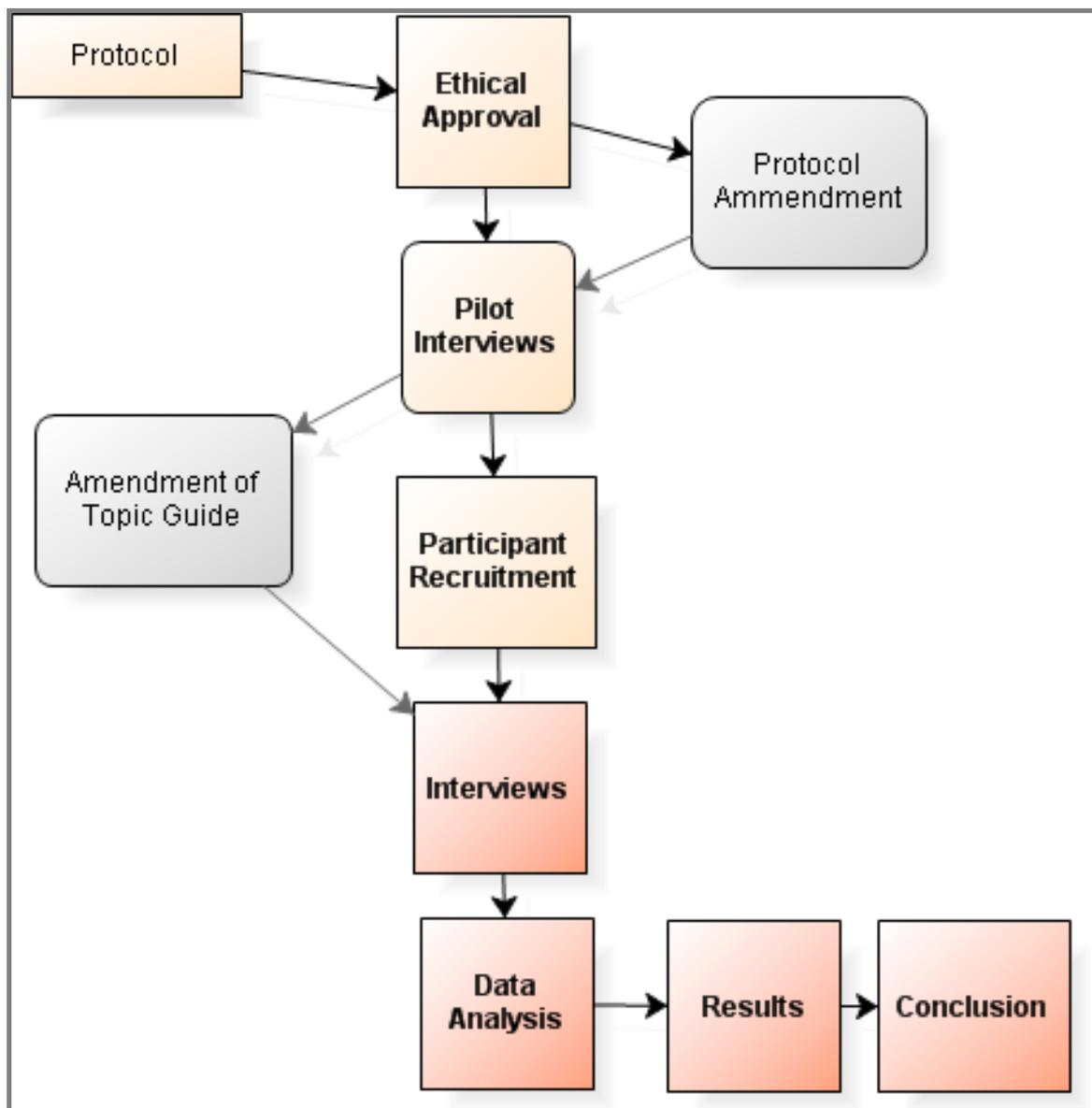
Qualitative research is an appropriate tool to explore practitioners' attitudes and to engage their feelings on the question of what makes them change their practice given the specific and personal nature of the response expected. A quantitative approach to answering the current research question, for example with a closed questionnaire, could yield only limited data, much of which would be determined by the design of the questionnaire and the nature of the questions. A probing, exploratory approach to data collection, through a semi structured interview is able to yield rich, valuable data and is well supported in the previous literature as a valid research method. Reliability of data analysis has been shown to be good particularly if there is collaboration and discussion with researchers in the team.

## CHAPTER 5 – METHODS AND MATERIALS

### 5.1 PROJECT SUMMARY:

To further investigate which factors make general dentists change their practice a qualitative research study was designed. The following schematic diagram (Figure 5-1) summarises the research process from protocol to conclusion.

Figure 5-1



The research process

The study utilised a qualitative research design to yield rich meaningful data. A pilot study of initial semi-structured interviews was trialled. With a successful initial harvest, topic guides were further developed and semi-structured interviews were conducted with a single researcher (SS). Data were analysed with the aid of NVivo social research software by the principal investigator, (SS) and validated jointly by all investigators (SS, ADW, DW).

## **5.2 PRELIMINARY WORK**

### **5.2.1 ETHICS**

Following a review of the literature, a research question was defined through discussion with senior researchers (ADW and DW). The questions this study aimed to answer are which factors are important in making general dental practitioners change their practice and how these factors influence change.

An initial plan for conduct of the research study was agreed and formalised with a study protocol (Appendix 1). To ensure ethical rigour and to protect participants in the research study, an application was submitted for ethical consideration to the local research ethics committee. Ethical approval was subsequently gained from the Solihull Local Research Ethics Committee, REC reference number 06/Q2706/68.

In preparation for this research project, the primary researcher undertook extensive training in qualitative methodology (Appendix 2).

### **5.2.2 PILOT STUDY**

A topic guide was designed (Appendix 3) which included pre-determined questions, probes and potential subtopics. A snowballing sampling method was used to identify the pilot interviewees from the researcher's initial contact with individuals known to staff members. The pilot interviews gave the primary researcher an opportunity to practice interviewing skills and to test and subsequently modify the interview guide.

Three pilot interviews were conducted and were audiotape recorded with permission of the participants. The participants were actively encouraged to raise and discuss further issues where

relevant. The interviewer transcribed two of the interviews to allow familiarity with the data. This helped to ensure intimate knowledge of and closeness with the data. The interviewer reviewed each transcript and made notes of topics to be followed up at subsequent interviews. The topic guide was adjusted slightly for subsequent interviews.

Once the interviews were transcribed, the process of data analysis began by coding the transcript thematically. This was firstly carried out manually using a Microsoft Excel Spreadsheet and cutting and pasting selected sections of data together with similar themes. In a separate process, the transcripts were then imported into the NVivo software package (NVivo Version 7.0.281 SP4, QSR International) and codes were assigned a database fieldcode to a segment of text so that analysis could be automated. For this pilot study, both manual and computerised coding methods were carried out to allow the researcher to gain an insight into the two possible methods for data handling. It has been shown that software packages have the potential to improve the rigour of data analysis; (Kelle, Prein, and Bird 1995) this, coupled with the fact that the researcher found the NVivo software package supportive and straightforward to manage it was decided to use this method for analysis in the main study. A second researcher (DW) independently checked the themes that emerged from the transcripts.

Following successful completion of the initial pilot study with a successful and rich initial yield, research progressed on to the main body of the study.

## **5.3 MAIN STUDY**

### **5.3.1 SUBJECT SELECTION**

In qualitative research the aim of sampling is to gain a rich source of data which may not be generalisable. Sampling techniques are usually determined by the purpose of the research and statistical representativeness is not normally required (Mays and Pope, 1995). A purposive (non-random) sampling technique is typically used where individuals with characteristics of relevance to the study are selected.

The study population was drawn from primary dental care practitioners practising in the area defined by the West Midlands Strategic Health Authority. Participants were purposively selected taking into account time since qualification, type of practice, age, sex and practice size to ensure a broad range of practitioner perspectives and diverse characteristics as outlined in Table 5-1.

**Table 5-1**

<b>Primary dental care practitioners, practising in the West Midlands region of the UK</b>
<b>Practices in varying locations within the West Midlands</b>
<b>Reflected a wide range of cohorts with varying years from their qualification date</b>
<b>Graduated from varying university dental schools</b>
<b>Included both males and females</b>
<b>Reflected a diverse range of practising profiles</b>
<b>Were of varying levels of job seniority</b>
<b>Had obtained different types of postgraduate qualification.</b>

**A table to illustrate the characteristics of participants included in the study**

A letter was sent to individual primary dental care practitioners inviting them to participate (Appendix 4). This letter included details regarding the study and information about anonymity and confidentiality. This was later followed with a telephone call to discuss potential participation and to arrange a convenient time for the interview. The majority of the GDPs who were invited to participate in the interviews agreed to do so. Where practitioners declined to be interviewed (two in total), practitioners with similar characteristics were invited.

### **5.3.2 DATA COLLECTION**

The main methods for collecting qualitative data are individual interviews, focus groups and observation. Interviews are used to establish the variety of opinion concerning a particular topic. They can also be used to form tentative hypotheses about the motivation underlying behaviour and attitudes (Gilbert, 1993). In a structured interview, the wording of questions and the order in which they are posed is the same for each interview. In a semi-structured interview, the interviewer asks particular, important questions in the same way but can vary their sequence and is free to ask further questions to probe for more information. This type of interview is used most frequently for healthcare, research as it provides participants with some guidance on what to talk about, which many find helpful (Gill et al., 2008). In-depth interviewing is also known as unstructured interviewing. Researchers use this type of interview to gain an understanding of the interviewee's point of view or situation. The type of in-depth interview techniques can vary considerably. The interviews described in this study were designed in a semi-structured manner. Initially closed questions were used for recording of demographic data. The interview then progressed to exploration through open-ended questions and gentle probing to further explore areas of interest. These were asked to encourage a detailed response. The topic guide (Appendix 3) was used to lend structure to the interviews, and was developed throughout the study, to emphasise emerging areas of interest, and to indicate when data saturation had occurred. At the start of the interview the following issues detailed in Table 5-2 were discussed and clarified with the participants.

**Table 5-2**

<b>Explanation to participants about the purpose and format of the interview</b>
<b>The participant should speak freely in response to questions</b>
<b>The participants were assured that there are no right or wrong answers; it is his or her personal opinions and perspectives that are of interest to the study</b>
<b>The voluntary nature of the interview</b>
<b>Consent for the interview to be recorded digitally on electronic Dictaphone was obtained.</b>
<b>Written notes may be taken during the interview</b>
<b>The confidential and anonymous nature of the interview</b>
<b>Allow interviewee to clarify any doubts and ask any questions about the interview.</b>

**A table to illustrate issues discussed with participants at commencement of interview**

The interviews were in-depth and were carried out face to face with the participant. The interviews commenced with collection of several items of demographic information detailed in Table 5-3.

**Table 5-3**

<b>Gender and Age</b>
<b>Year and place of graduation</b>
<b>Geographical location of dental practice</b>
<b>Length of time at that particular job</b>
<b>Sphere of Practise (e.g. NHS, Salaried, PDS)</b>
<b>Number of dental colleagues in the dental practice</b>
<b>Post-graduate qualifications</b>
<b>Membership of the British Dental Association</b>

**A table to illustrate demographic information collected**

The interview commenced with these closed questions that participants could answer easily. Starting with “easier” questions such as these has been shown to help put respondents at ease, build up confidence and rapport and generate rich data that subsequently develops the interview further (Pope and Mays 2006).

Topics covered in the interviews included dental journals, postgraduate courses, critical appraisal, evidence-based dentistry and clinical practice guidelines. Respondents were guided to discuss what influenced a change in their clinical practice. Two visual prompts were used during the interview; the first being a copy of the Evidence-Based Dentistry journal and the second a copy of the NICE dental recall clinical guideline.

During or directly after the interviews, the interviewer (SS) took observational notes to capture nonverbal information such as reactions and body language of the participants. These handwritten notes were collated with transcripts of each interview. At the end of the interview the participants were thanked for their time and asked if there was anything they would like to add. All interviews were face-to-face interviews and were carried out by a single interviewer (SS) in the dental practice where the participant worked. The interviews took place between January 2006 and October 2008. The interviews were audio taped with a good quality digital voice machine and transcribed verbatim. In total 31 interviews were conducted which lasted between 23 minutes and 1 hour 38 minutes.

The sample size was not determined by statistical analysis but aimed to be sufficiently large and varied to capture the full range of views and opinions of primary dental care practitioners working within the area (MacDougall and Fudge, 2001). No further interviews were carried out when it was felt that no “new” data or themes were emerging.

### **5.3.3 DATA ANALYSIS**

Qualitative data cannot be analysed statistically. Interpreting data from qualitative research involves summarising the findings, coding of the data and exploration of meanings and contexts obtained from the data. The data in qualitative research has often begun to be analysed during the data collection process e.g. during an interview. This is known as “interim analysis” and allows the researcher to refine interview guides or pursue new avenues of enquiry (Pope, Ziebland, and Mays, 2000). Transcribing is the procedure for producing a written version of an interview. It is a full script of the interview. Words are transferred words from the taped interview to a word processor. It is useful to attempt to transcribe tone and inflection by using punctuation marks, and techniques such as upper case lettering, underlining and boldening. Transcribed data is then divided into meaningful analytical segments by identifying key issues, concepts and themes. Whenever a meaningful segment

of text is found in a transcript, a code or a category name is assigned to signify that particular segment. This is continued until all data is coded. This is called content analysis (Pope, Ziebland, and Mays, 2000). As a result of this process, research data have been sorted into manageable pieces for further exploration and easy retrieval. This process can be facilitated by using a specifically designed software package for help with analysis of qualitative data. An example of such a software package is NVivo which can help to arrange, sort, organise and classify large volumes of qualitative data. Using more than one researcher to analyse the data has shown to improve the consistency and reliability of the analyses (Pope, Ziebland, and Mays ,2000).

There are a number of theoretical approaches by which qualitative research data can be analysed. Grounded theory is the development of new theory through the collection and analysis of data about a phenomenon. It was developed by Glaser and Strauss in the 1960s (Glaser 1968). It is particularly useful in situations where little is known about a subject or where a different outlook is needed. As the research is carried out, core theoretical concepts may emerge from the data and hypotheses developed.

The data is then ready to be further interpreted, explored and explanations provided for the findings, this is known as inductive reasoning (Pope and Mays, 2006). The generation of theory from the interview data can be achieved through the comparative analysis approach which involves reading and re-reading the data to search for and identify emerging themes in the constant search for understanding and the meaning of the data (Silverman, 2005).

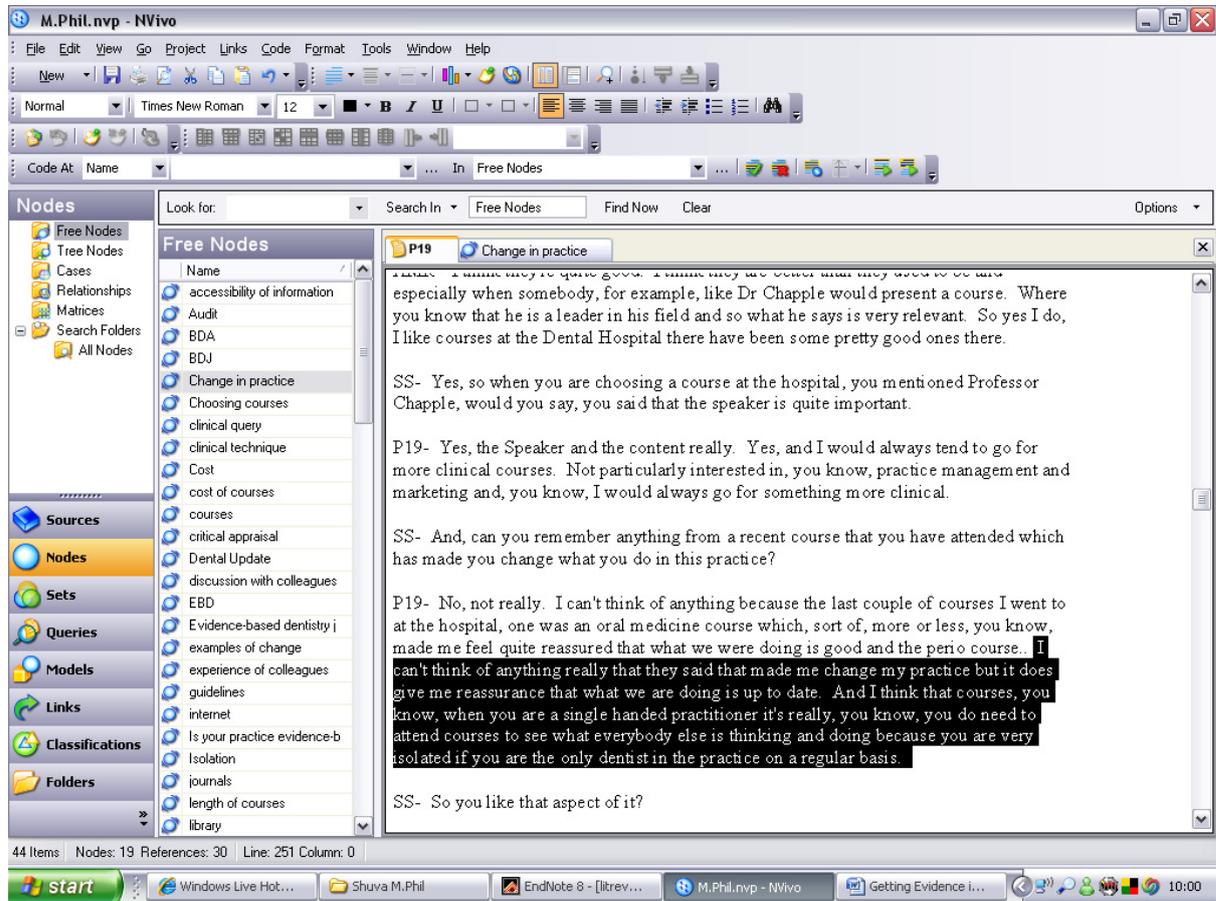
The first phase of the analysis in the present study consisted of accurate transcription of the recorded interviews. The participants' names were changed to numbers to preserve their anonymity. The

transcripts were corrected and verified by SS. The transcripts and the observational notes were read independently by SS and DW. All data were stored securely, with access only to the interviewer.

The data from the interview transcripts was analysed using thematic content analysis. The transcripts were analysed without pre-conceptions about the expected content. Themes were identified using a constant comparative method which involved reading and re-reading data to identify emerging themes (Silverman, 2005). These were derived inductively i.e. obtained gradually from the data. Inductive reasoning uses the data to gradually generate ideas (hypothesis generating) as opposed to deductive analysis which begins with the hypothesis and uses the data to confirm or reject the hypothesis (Holloway, 1997).

The transcribed interviews were imported into NVivo 7 (NVivo Version 7.0.281 SP4, QSR International) as previously described. NVivo was used to organise the raw data files (Word documents) from the interviews and observation notes and also used to help code each transcript, a process whereby a theme or themes were assigned to segments of text (Figure 5-2). This process continued until no new themes could be identified. Codes were then assigned to the identified concepts that emerged from the data.

Figure 5-2

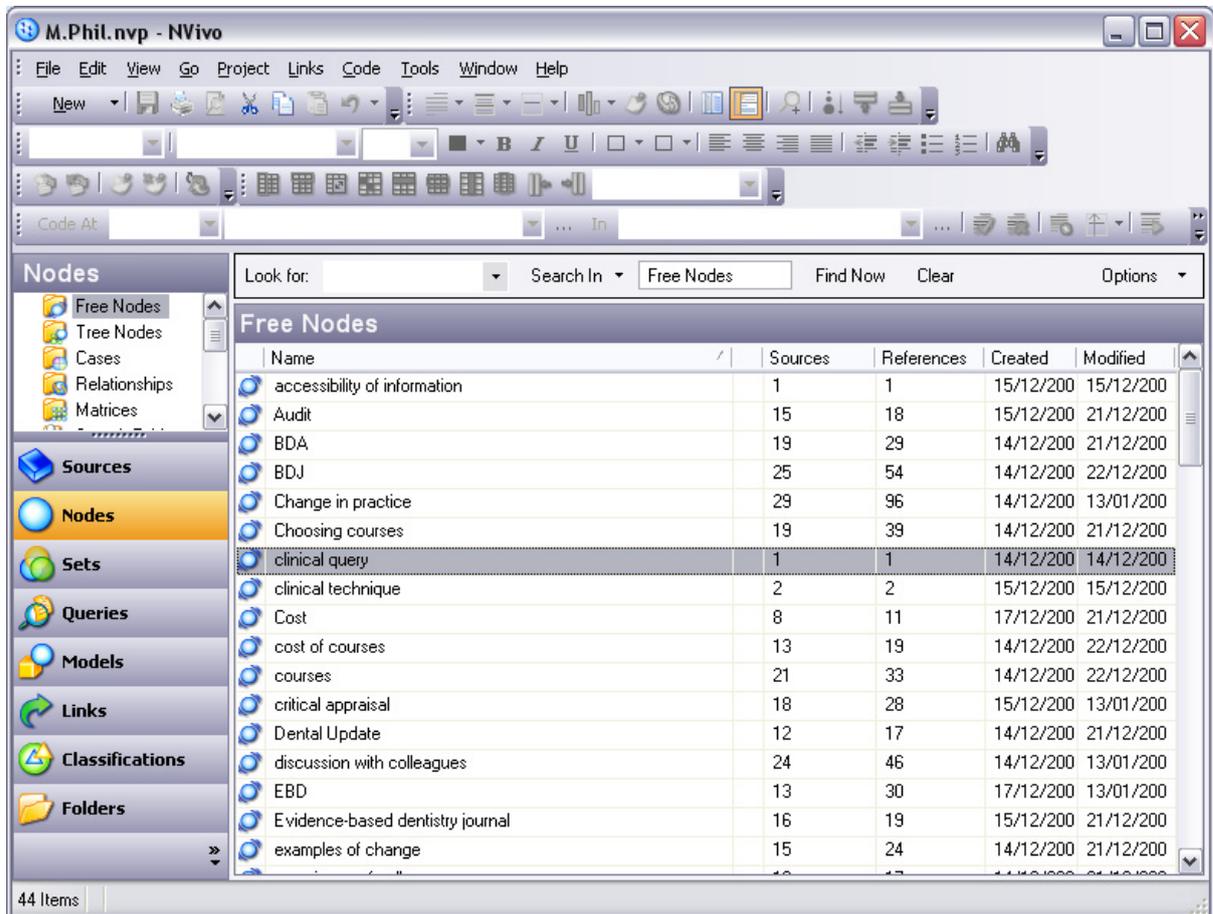


A screen shot to illustrate assigning themes to segments of text with NVIVO software

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An example of some of the initial codes that emerged from the data is illustrated in Figure 5-3 which is a screen shot from the NVivo data analysis package.

**Figure 5-3**



**A screen shot to illustrate the initial coding process using the NVivo data analysis package**

The initial themes and responses were discussed and coded to produce an initial framework for analysis. The framework was refined according to new, emergent themes and the modified framework was re-applied to all transcripts. This iterative process ensured the findings were heavily grounded in the data. The researchers identified emergent themes and then met to construct an agreed list and coding frame. The researchers applied this to two transcripts; comparison of coding decisions enabled some codes to be clarified and others merged. The transcripts were subsequently imported into the NVivo qualitative data analysis package for detailed coding and subsequently analysed. During the write up of the project, NVivo was used to report the data from the interviews using the contents of the created database, including information from the original interview and the ideas and concepts developed from them.

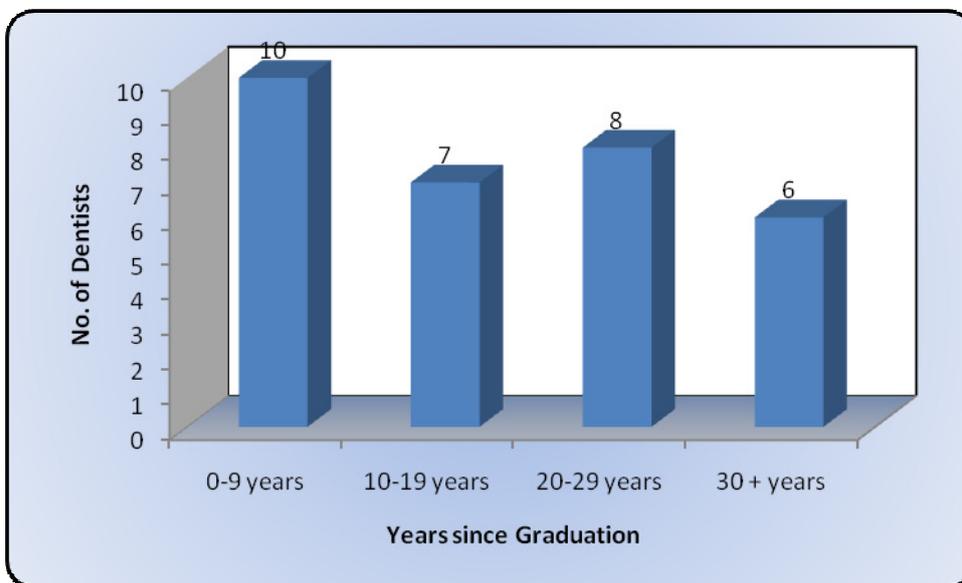
## CHAPTER 6 – RESULTS

### 6.1 CHARACTERISTICS OF PARTICIPANTS AND THEIR PRACTICES

Thirty-one interviews were carried out in total. The characteristics of the participants are outlined in Table 6-1. Each participant was assigned a numerical identifier which is used in the remainder of this thesis to protect participant confidentiality.

Of the 31 participants 16 were male and 15 female. The years since graduation varied from 1-40 years and this is illustrated in Figure 6- 1.

**Figure 6-1**



**A graph to illustrate the length of time since graduation**

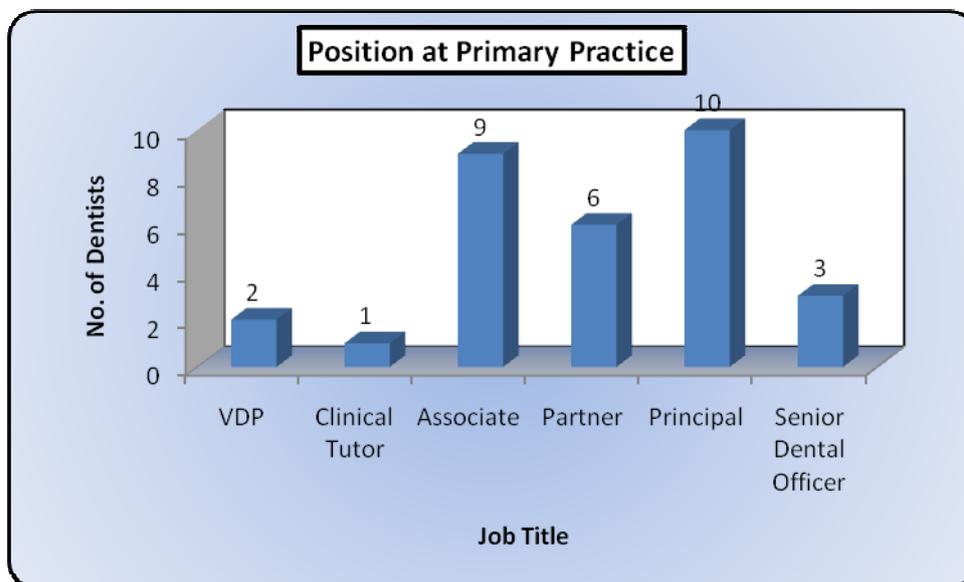
**Table 6-1**

Identifier	Sex	Year of Graduation	Place of Graduation	Type of Practice 1	Type of Practice 2	Position
P 01	F	2006	Birmingham	NHS/VDP		VDP
P 02	F	2006	Birmingham	NHS/VDP		VDP
P 03	F	2001	Birmingham	Private	PDS	Associate/SDO
P 04	M	2001	Liverpool	NHS		Principal
P 05	F	2000	Cardiff	PDS		SDO
P 06	F	2000	Kings, London	NHS		Associate
P 07	F	2000	South Africa	NHS		Principal
P 08	F	1999	Birmingham	Mixed	PDS	Associate/SDO
P 09	M	1998	Birmingham	NHS	PDS	Principal/SDO
P 10	M	1998	Sheffield	Private		Partner
P 11	M	1994	Guys, London	Private	Clinical Tutor	Associate
P 12	F	1993	Newcastle	Private		Partner
P 13	F	1993	Newcastle	PDS		SDO
P 14	M	1993	Birmingham	NHS		Principal
P 15	F	1990	Birmingham	NHS	Clinical Tutor	Associate
P 16	M	1990	Birmingham	Private	Clinical Tutor	Associate
P 17	F	1989	Dundee	NHS	Private	Associate
P 18	F	1987	Birmingham	Mixed		Partner
P 19	F	1987	Birmingham	Private		Principal
P 20	M	1986	Birmingham	Mixed		Partner
P 21	M	1986	Sheffield	Private	NHS	Associate /SDO
P 22	M	1984	Kings, London	NHS	Mixed	Associate
P 23	M	1981	Leeds	Mixed	Private	Principal
P 24	M	1981	Birmingham	Mixed		Principal
P 25	M	1979	Birmingham	Private		Principal
P 26	M	1973	Birmingham	Private		Partner
P 27	F	1972	Sheffield	Clinical Tutor		Clinical Tutor
P 28	F	1971	Birmingham	NHS		SDO
P 29	M	1970	Birmingham	Private		Partner
P 30	M	1967	Birmingham	Mixed		Retired Principal
P 31	M	1967	Edinburgh	Mixed		Principal

**Participant and practice details**

The participants represented a wide range of practice backgrounds with a wide range of practice sizes; the majority of participants worked in practices with other colleagues however there were three participants from single-handed dental practices. Amongst the participants, twenty-seven dentists worked full time, two worked part time and one had recently retired from general dental practice. Ten of the interviewed dental practitioners worked in more than one practice location. An illustration of the participants' job positions in their primary practice is illustrated in Figure 6- 2.

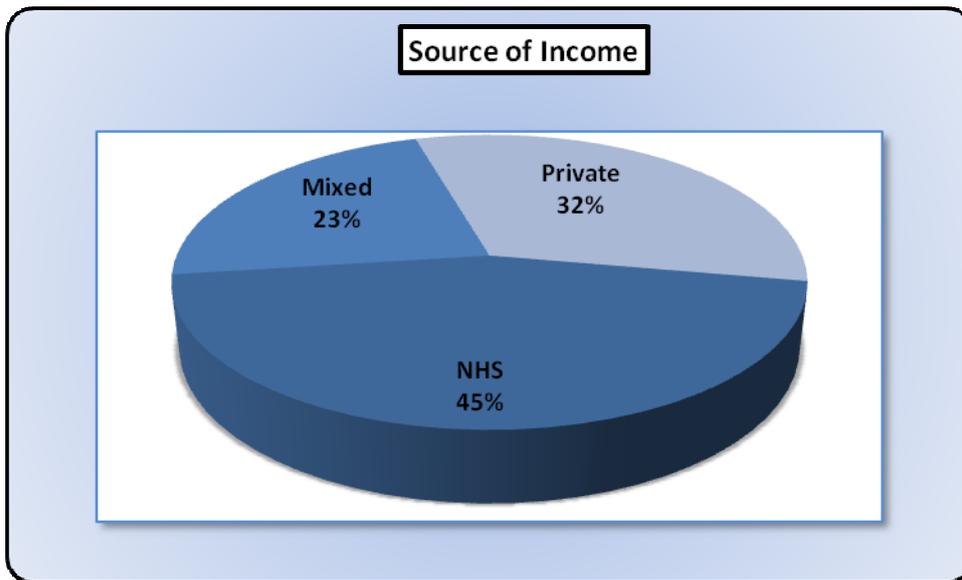
**Figure 6-2**



**A graph to illustrate the job role of the participants at their primary practices**

The proportion of participants receiving incomes from solely NHS patients, private patients or a mixture of both are illustrated in Figure 6-3. Approximately half of the participants were solely NHS practitioners. More than half of the sample (17 participants) were graduates of the School of Dentistry, University of Birmingham. There was one participant who had graduated at an overseas institution in South Africa.

**Figure 6-3**



**A graph to illustrate the source of income of the participants working in general dental practice**

Of the participants ten held a postgraduate dental qualification. Seven participants held the MFGDP (Membership of the Faculty of General Dental Practitioners) qualification; one held the DGDP (Diploma in General Dental Practice) qualification, one held the MFDS (Membership of the Faculties of Dental Surgery) qualification and one held the MGDS (Diploma of Membership in General Dental Surgery), FDS and a PhD.

## 6.2 INTERVIEW THEMES

A number of key themes emerged from the 31 interviews with general dental practitioners. The dominant themes are listed in Table 6-2. They emerged through the iterative process of coding, analysis of coded text, and discussion among the members of the research group: SS, DW and ADW. Direct quotes are used to illustrate the themes that emerged. When presenting the quotes, the participant identifiers shown in Table 6-1 have been used. Themes were subdivided according to the objectives of the research study though thematic crossover was evident in many of the responses from participants.

**Table 6-2**

<p><b>What factors cause dentists to change their practice?</b></p> <p>Guidelines</p> <p>Anecdotal/ Based-Dentistry (Peer Review and Discussion with Colleagues)</p> <p>Eminence-Based Dentistry (Influence of Trusted Source)</p> <p>Aspects of Clinical Governance</p>
<p><b>Which educational tools are required to help dentists access and understand evidence-based research?</b></p> <p>Journals</p> <p>Courses</p> <p>Relationship with Evidence-Based Dentistry</p>
<p><b>What are the barriers to application of research evidence and change in practice?</b></p> <p>Experience-based Dentistry (Self-Confidence in Own Skills)</p> <p>Legislation and Policy</p> <p>Organisational Constraints</p> <p>Lack of Knowledge of Critical Appraisal</p>

**A Table to Illustrate the Main Themes that Emerged from the Data**

## 6.2.1 WHICH FACTORS CAUSE DENTISTS TO CHANGE THEIR PRACTICE?

### 6.2.1.1 GUIDELINES

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There were widely differing views with regards to evidence-based clinical guidelines. Many had a positive view on the value of evidence-based guidelines and that such guidelines were useful in their day-to-day practice. Of these, a few respondents felt that it made them feel more protected in a patient culture that is becoming increasingly litigious.

*“...cos you don’t want to be sued. So as soon as they appeared on the dental protection website then we went for it.” (P10)*

Others felt that they helped to save time so that they would not have to spend time searching for appraising and distilling the evidence themselves. Amongst these individuals, there was a desire for greater availability of evidence-based guidelines to help explain and/ or justify certain treatments to patients. Generally it was apparent that participants closer to the beginning of their career were more in favour of having clinical guidelines than the older practitioners.

*“It’s compulsory, you know, for litigation, for standards, for quality assurance and I think for a lot of our dentists for security..... I’m pretty sure that not everybody accesses the information so I think you still have to have guidelines in place so that the contemporary information is fed rather than them having to seek it” (P13)*

*“I think that’s really useful and it’s a really good benchmark when you explaining to a patient why you may or may not do it and say the evidence suggests that and its very nice to have that very clearly laid out for you in a very accessible format and then you can say.....the patient can go away and look it up on the Internet if they want to so formal guidelines yes they are useful but it has to be clear and concise and it has to have a lot of evidence behind it” (P12)*

Conversely, there were strong views at the other end of the spectrum. There were a number of practitioners who seemed uncomfortable with such guidelines. These, who were not in favour of evidence-based clinical guidelines seemed to resent them for several reasons. A few dentists alluded to the fact that because there is such a difference in the practising profiles of dentists and the type of patients they treat, one broad set of guidelines for a particular subject could not be universally applicable. In particular, one recurring criticism of guidelines was that they posed an infringement on their clinical autonomy.

*“There’s a danger that we could lose our clinical independence and I think it’s dangerous”. (P29)*

*“I don’t think our professional judgement should be removed so that we are told what to do.” (P05)*

*“We’ve now been told we can’t reuse sterilised endodontic instruments, now I think on Monday when I go back, I’ll have to do that because these are the guidelines and the last thing I want to do is fall foul of any of these regulations even though I think it’s a very draconian imposition because there’s no evidence to suggest that anyone’s ever caught anything....” (P14)*

Some of the participants viewed guidelines with a degree of scepticism and cynicism. In particular the NICE guideline for dental recall was singled out for criticism. Participants felt that they were produced as a government cost-cutting exercise. A number of participants postulated a relationship between the launch of these guidelines and the initiation of the new NHS contract. A flavour of conspiracy of the two events and distrust of NICE appeared evident amongst these participants. It was also clear that a number of participants felt that these particular guidelines were not based upon a sound evidence-base.

*“I read....looked at to see the NICE regulations on recall which is basically in scientific terms a whole pile of rubbish..... what I am against is guidelines which are of no significant merit being used for political purposes” (P20)*

*“It’s interesting about the guidelines about dental interval, they came about more or less in the same sort of time that the new contract was coming there’s a bit of distrust about*

*the guidelines. They make sense, but in terms of the new contract, it means that you will actually, should see your patients less, which should free up more time to see new patients .....most of us are really sceptical why they've come out now, the timing of them coming out was rather suspicious". (P11)*

*"...as you probably know, it's sometimes called the National Institute of Clinical Economics."(P29)*

Some participants remarked that their patients had actually expressed dissatisfaction with the recent NICE guidelines for dental recall and recommendations for dental scaling and prophylaxis. A number of patients were reported to have been somewhat irritated at being asked to attend for routine examination and a scaling at longer intervals than six months.

*"My patients now are disappointed if I say you don't need a scale and polish every six months, because we've been told we don't need to do it At the end of the day I've got to go by the guidelines as much as I resent having to do that, you know." (P14)*

A minority of practitioners were ambivalent about evidence-based guidelines. Amongst them there was a feeling that they should be available and were useful in some cases, but should be interpreted flexibly and not followed slavishly or without appraisal of their merits.

*"Well guidelines are as the name suggests guidelines so they are not written in stone and you have to assess the situation with the guidelines in mind and see how it's applicable to that patient or that situation."(P18)*

*"Some of their suggestions are not always appropriate but again they are guidelines and they are there to guide you." (P10)*

In general, dentists expressed that they were more like to pay attention to a guideline and follow it depending upon whether they perceived the issuing body to be 'important'. As one participant commented, the advice for dentists on re-use of endodontic instruments was seen to carry more weight after receiving a personal letter from the Chief Dental Officer. Another example of a guideline

which was considered to carry more weight, was the NICE guideline for prophylaxis against infective endocarditis.

*“...Barry Cockcroft actually writes a letter to every practice in dentistry in the country, you are gonna pay attention to it. So I think that’s still the best way for the message to be got across.” (P15)*

The delivery of such guidelines can have a strong and positive influence on general dental practice and may be a useful tool to facilitate change.

### 6.2.1.2 ANECDOTAL BASED-DENTISTRY (PEER REVIEW AND DISCUSSION WITH COLLEAGUES)

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It was clear from the responses that interaction with colleagues played a very significant role in guiding and changing clinical practice. In general dentists interviewed appeared unaware that advice from colleagues may not represent good evidence for treatment decision-making. There was a strong feeling that changing practice was in fact related to personal and professional relationships with these colleagues, with more senior or 'respected' colleagues' advice carrying more weight. Interestingly, a snatched conversation or snippet of advice actually seemed to be able to induce rapid change in some aspects of practice. It was not clear from the data whether there was a difference in attitudes to consulting colleagues depending upon the practitioner's age.

*"I don't actually look at, kind of, evidence based dentistry that often. I'm aware of it, but as I've said, I think that my choices of practice are more based on, kind of, colleague discussion and peer review, rather than actual evidence based, but I mean I have read through some of the evidence based dentistry booklets.(P03)*

*"...this is a very opinion-orientated profession isn't it?" (P11)*

*"Sometimes I will hear something and I will think of yeah, I can see how that can improve the way that I am doing...." (P19)*

On the whole peer review was felt to be a valuable tool for changing practice amongst general dental practitioners. There was a general agreement that, although not necessarily evidence-based, formalised peer review was a useful way to gain new clinical information. Several dentists were disappointed that the new NHS dental contracts did not provide a separate financial allocation for carrying out peer review. A number of dentists thought that it was peer review that made them examine and think about, more closely, aspects of their own clinical practice. In addition many of the participants enjoyed the social aspect of peer review. There was no feeling that peer review was

threatening in any way and the overall feeling was that dentists would welcome this as an educational forum.

*“I don’t actually look at, kind of, evidence based dentistry that often. I’m aware of it, but as I’ve said, I think that my choices of practice are more based on, kind of, colleague discussion and peer review, rather than actual evidence based.....”(P03)*

*“I think there’s a certain amount of peer review that goes on, not necessarily related to the journals, if somebody’s read something, heard something about something, then we talk about it and, you know, kind of try and come to a conclusion about it, or give it a go and see what happens.”(P06)*

It appeared that single-handed practitioners particularly felt peer review was essential to them to maintain contemporary practice.

*“if you’re a single handed practitioner it can be very easy to have a blinkered approach to things and I think probably meeting up with other colleagues does people good” (P22)*

On a less formal basis, discussion with colleagues seemed to, almost unanimously, have enormous powers upon influencing dentists to change their practising ways. During the interviews, the influence of and specific recommendations from colleagues were repeatedly mentioned as being a driving force behind change in practice.

*“The main person that I learn, kind of, odd bits and pieces from at the moment is a dental colleague who’s a lot older than myself.... and he does keep up to date with everything. So it’s very handy just to pop in to a colleague’s surgery and ask them a concise question and normally they can give you, kind of, a relevant answer back and I do trust this person’s clinical judgement, and experience, and I think that if you do have somebody that’s working, you know, in general practice who’s very experienced, then it does count for a lot.” (P04)*

*“I would normally ask a trusted colleague, somebody who I felt, you know, was up to date and knowledgeable and...” (P19)*

*“I think so we all have different ways of doing things don’t we and its a case of mixing with people who have similar values to yourself that you can learn off..”(P15)*

*“We would always take juniors on and by taking new graduates we could mould them.....I do think the older experienced principals influence the new young dentists.”*  
(P30)

There were two vocational dental practitioners who were interviewed and their views echoed those of their more senior colleagues in that they agreed that discussion with and observing colleagues significantly impacted upon their clinical decisions.

*“You learn a lot if you watch someone who has got like, he’s got twenty five years experience.”* (P01)

#### **6.2.1.3 EMINENCE-BASED DENTISTRY (INFLUENCE OF TRUSTED SOURCE)**

Amongst participants, several acknowledged that there were specific professionals who were more likely to influence their clinical decisions and change the way they practised.

*“...just because he is a brilliant speaker, his reputation is flawless and his presentation just proved beyond doubt what he was trying to say instantly I would change my practice next day and never do as previously in the past even though I may be getting ok results.”*(P28)

*“If it was somebody who was considered to be eminent in their field..... I might take more notice of what they have to say than I would of maybe just my colleague who had been in practice for just a few years.”* (P12)

Some participants declared that their choice of course was heavily influenced by who the speaker was.

*“...where you know that he is a leader in his field and so what he says is very relevant.”*  
(P19)

Of the participants, five, in particular, had attended year long courses on implantology, cosmetic and restorative dentistry hosted by a Specialist in Prosthodontics in the North-West. Unanimously all participants mentioned these courses as very positive and found that the experience significantly impacted upon their clinical practice and careers.

*“You know Paul Tipton the Manchester private course fella....I did part of his course, the hands on restorative, the phantom head course which is the best course I have ever done...I mean I would never let him treat my teeth erm he is very aggressive in his erm in his preparations but as a teacher, he is one of the best teachers I have ever had contact with, his course completely changed my career.” (P16)*

*“....and also Paul Tipton, I feel that when he has recommended products I have gone out and got them straight away because he has access to a lot of dental information and materials and he evaluates all these things and then he comes to a conclusions its good...you know a particular reason, I’ll have to take that on board it saves me doing all you know the hard work sifting through.” (P18)*

There was a general consensus that sales representatives were a useful source of information however the products that they were trying to sell were often viewed with suspicion. There was a consistent view that they would not get an unbiased viewpoint regarding materials from sales representatives. From the interview data, it was perceived that participants who were not the practice principals had less of a say in what materials and equipment they could purchase or use in the practice. Participants were most likely to look to change a particular dental material that they were using if they were unhappy or not achieving the desired results with the particular material that they were using at that time.

*“The problem with asking a rep is that you tend to get a very biased view.”(P11)*

*“I very often found the sales reps were not that well educated in the subject.” (P27)*

#### 6.2.1.4 ASPECTS OF CLINICAL GOVERNANCE

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Participants were asked directly if they carried out audit. The majority of the participants in this study had carried out some sort of audit activity. Opinions regarding the usefulness of audit were varied. Some practitioners deemed audit to be time consuming and boring. Of note, a large proportion of practitioners had been involved in audit assessing the quality of radiographs. This seemed to be a popular audit theme and in fact more often than not had led to a change in practice.

*“audit I find a bit boring maybe that’s just me, I don’t know, and in busy practice that’s a drag; its hard work to do.” (P15)*

It came across though that some practitioners were doing audit to meet the expectations of peers and governing bodies; not because they felt that it was a valuable tool for changing practicing patterns.

*“...there is a real danger that people do use it as a tick box exercise.”(P22)*

To an extent, a degree of ignorance of the expected structure and function of audit was evident from the responses of practitioners on this theme. It emerged from the interview data that many of the participants carried out what they felt was a process of ‘self-audit’ on an informal basis. This seemed to involve asking for and receiving feedback from colleagues and patients or self-assessment of their own work.

*“what do you think of this? I am thinking of doing this, what would you do?” (P25)*

*“...crowns I have done because I have been here for all those 19 years now I can look back on work that I did a few years ago.”(P19)*

A few participants mentioned that patient dissatisfaction had caused them to examine and potentially change certain elements of how they practised dentistry.

*“...if there has been a complaint in that area, patient complaint or staff complaint. That always makes you look at an issue further doesn't it?” (P02)*

## 6.2.2 - WHICH EDUCATIONAL TOOLS ARE REQUIRED TO HELP DENTISTS ACCESS AND UNDERSTAND EVIDENCE-BASED RESEARCH?

### 6.2.2.1 COURSES

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The majority of interviewed participants mentioned attendance at formal courses as one of the main ways of keeping up with continual professional development. Factors influencing the type of course practitioners chose to attend included the cost of the course, course length, course location, who the key speakers were and, as previously mentioned, the availability of verifiable CPD points. Even though cost was a limiting factor when it came to choosing courses, dentists were happy to pay more expensive fees if they felt the course was likely to lead to a significant change and impact upon their clinical practice. Additionally, it appeared to be important that the resulting changes in practice profile would be able to generate future income and therefore recoup course costs.

*“I would be prepared to pay a couple of hundred pounds a session to go on a course that if I felt it was really going to change my, my dentistry.” (P03)*

*“I am very much looking for getting value for money from courses. If I go on the course and I don’t learn something that is going to generate that sort of income for me in practice to compensate for the amount it has cost, I do feel that that it has been a waste of time.” (P12)*

*“It needs to be something, well frankly, where you are going to be able to make a financial return on it... to be an investment in financial terms as well as an investment in erm educational terms.”(P20)*

There was a feeling amongst participants that longer courses were more beneficial than shorter ones.

*“I mean, if it's a complicated subject, a couple of hours isn't really going to get us anywhere.” (P29)*

Several participants alluded to the difficulty in trying to organise courses to fit in around their home lives and for these dentists daytime courses were preferable to evening or weekend courses. Responses indicated that the majority of participants preferred to attend courses with a hands-on or clinical component which could potentially expand their repertoire of skills.

*“..from the courses really particularly the hands on ones where you can learn a new skill then you have the confidence then to try it.” (P15)*

A few participants acknowledged that shortly following attendance at a course there was a degree of eagerness to put into practice new information or skills learnt; for some dentists, this was short-lived.

*“going on a Section 63 course, you often come away thinking that a Section 63 course with sort of enthusiasm sort of what you've done and I think that continues for a while but often you, you know, you get the tendency to drift back to the tried and tested things that you have always done.” (P22)*

*“You go to one course you know you do it but often if it's not implemented immediately it's not saved in your memory and so it never gets implemented.” (P18)*

For a number of the participants, the type of course they chose to attend was strongly influenced by areas where they felt their knowledge was lacking.

*“I usually choose ones where I've a weakness, if I don't have a lot of confidence in a certain area and I just feel that I need refreshing, then I would choose those.” (P08)*

Interestingly not one of the participants mentioned evidence-based dentistry or critical appraisal of evidence as being an important part of these courses that had led to them changing their practice.

### 6.2.2.2 JOURNALS

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All of the interviewed dentists had access to and read dental journals at least occasionally or on a regular basis. The most frequently mentioned journals were the British Dental Journal and Dental Update. Some dentists read free dental publications such as the Dental Tribune and The Probe. The majority of the participants mentioned that they enjoyed reading clinically based and clinically relevant articles which included information about clinical techniques. Case studies also proved to be popular.

*“I like reading about the general practice things rather than the academic research, I find they are more interesting than the academic research articles.” (P05)*

*“I’m more interested in those of that are of slight clinical or practice base, so things that may affect practice or clinical aspects of practice tend to interest me more, I suppose we all have a weakness for case studies as well.”(P21)*

*“...anything that’s beneficial to improving the service I can offer my patients.” (P31)*

The participants seemed to have more negative views towards the more ‘academic’ or ‘research’ type articles which they found irrelevant to their daily practice.

*“as you get to the research papers it’s too academic, it looks academic, and I think dentists maybe shy away from that.” (P11)*

Most of the participants declared that they tended not to read the full article but instead read the abstract or just the conclusions of research based articles. A few participants remarked that they would read the full version if it was of great interest or importance to them. Some practitioners confessed to scanning journal articles specifically to glean information to answer questions to gain CPD points. It was viewed as being important to be able to have paper copies of the articles rather than having to go online to access them.

*“I would read the whole article if it is something that really inspires me to read it but otherwise it will be just the...the...the abstract part of it.” (P09)*

*“If it looks interesting I will read it cover to cover but if it’s something I am just doing to get the CPD points I would read the abstract or whatever I need to read to get answer to the questions.” (P10)*

It was perceived that information read in dental journals rarely persuaded dentists to modify their clinical practice in any way. A minority felt that it was reassuring that information they read about in journals confirmed and reinforced that what they were doing was correct in practice.

*“I wouldn’t think just reading a journal article would make you change, I mean what it would make you do is to think about what you are doing and to look further into it and seek further information on it erm... I can’t imagine that I would have radically changed anything just from reading a journal article.” (P30)*

Several participants pointed out the usefulness of review articles; this prevented them from having to search for information about a particular subject of interest.

*“...those papers are my favourites because you think right all the information’s in here- the conclusions from all the different erm articles on this particular subject are all crystallised in this one paper and then you haven’t got to go and read the 50 papers...” (P16)*

With regards to specific journals, the British Dental Journal (BDJ) was one which was commented on numerous times. Participants’ views on the structural elements of the journal, for example its layout and professional appearance were on the whole positive. It was also clear that participants thought it covered political issues well. A large proportion of the participants criticised the fact that it was too ‘scientific’ and several suggested that it was geared more towards hospital based practitioners.

*“A lot of the articles in the BDJ are really of a scientific nature and I think that some other journals are maybe more suitable and useful in some respects in terms of general practice.” (P29)*

For those practitioners who had access to both the British Dental Journal and Dental Update, Dental Update appeared to be the favoured journal. There was overall agreement that Dental Update was more relevant to clinical practice and easier to understand.

*“Dental Update just seems more just sort of clinically relevant and easier to read.” (P01)*

*“I like the way that the journal’s written and it seems more practical with more things that I can relate to.” (P08)*

The Evidence-Based Dentistry journal is published quarterly and is delivered alongside the BDJ to BDA members. A copy of this journal was used as a prompt towards the end of the interviews to further discussion about evidence-based dentistry. It was noteworthy that only three participants mentioned this journal without it being used as prompt. Those participants that did read it, demonstrated a positive attitude towards it though they were sometimes disappointed that conclusions from research articles did not always have a clear take home message for their clinical practice. Participants also seemed to enjoy the concise format of the journal.

*“They’re obviously very, very good and they are very concise and they tell you, you know, an exact outcome of the study and what, how to practise dentistry and I would say that they are very good.” (P03)*

*“...the dental articles very often they conclude they have not got any evidence to draw any conclusions.” (P21)*

As with the other dental journals, none of the participants had changed what they did in their own clinical practice after assimilating information from the Evidence-Based Dentistry Journal.

*“Some of the articles I read and I am not too sure they, well they don’t influence my practice even though they are supposed to be evidence- based. Sometimes they contradict things that I have read somewhere else so often I don’t change my guidelines and perhaps stick with the historical teaching that I have been given.” (P05)*

It was apparent that quite a few participants who did receive the BDJ often did not read the Evidence-Based Dentistry Journal. Other than mentioning time constraints, there were no clearer reasons for this. Participants commonly remarked that they did keep several years worth of journals either at home or in their practice although they did admit that they rarely if not ever referred back to them.

One other source of information mentioned by the participants was the use of textbooks. A number of the participants did say they referred to textbooks on an occasional basis especially pertaining to the field of oral medicine. Many of them did keep textbooks in their surgery and found them to be a reasonably helpful source of information.

*“I just use old textbooks to be honest if I’m really stuck, rather than, I mean, up to date journals and I rarely once I’ve read the journal, I mean I’ve got about 15 years of Dental Updates in the surgery and once I’ve read it I file it, I never go back to it to be honest”(P14)*

### 6.2.2.3 RELATIONSHIP WITH EVIDENCE-BASED DENTISTRY

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A significant goal of the study was to explore understanding of evidence-based dentistry amongst general dental practitioners and to investigate whether and how this translates into evidence-based dental practice. For many of the participants it appeared difficult to gather ‘rich’ responses on these issues. Participants generally seemed to have limited knowledge of the principles behind evidence-based dentistry and a number of responses betrayed profound ignorance of this.

Most of the participants were asked ‘What do you understand about the term evidence-based practice?’ The majority of participants responded with their interpretation but responses were very variable. Some participants, certainly, had a clear notion of what evidence-based practice entailed. Some participants were familiar with the concepts of evidence-based dentistry but were unable to articulate this clearly. It was evident that a majority had misunderstood the accepted meaning and had confused ideas about basic concepts.

A misconception evident amongst many of the practitioners was that evidence –based dentistry was based on one’s own evidence and clinical experience rather than seeking to combine it with the best available evidence from research and also patient preference.

*“I think most dentists work to an evidence base. I think, you know, after I mean certainly when you first start practice you haven't really got any evidence base. You have to generate an evidence base to the way that you actually work. And I think that most people look at what has been successful over a long period of time and analyse why in that particular instance it has been so successful.” (P22)*

*“Correct me if I’m wrong but evidence based dentistry is where you’ve actually tried it clinically and see if something is, is that correct, have I got that right, where you’ve tried something clinically and seen if it’s been successful, or am I misunderstanding?” (P08)*

*“If you use say for example a particular bond, a dentine bond....and your own composites don’t fall out..... well, that’s your own evidence isn’t it? And if somebody else says that there is a better one, well I’m less inclined to try it out because I’ve never had a problem with my own.” (P25)*

*“Can I ask you, when you say evidence based, do you mean as partaking as part of clinical trials?” (P07)*

When asked directly if participants thought their own practice was evidence-based:

*“I suppose its more anecdotal evidence isn’t it cos he says this has worked really well in this case and I have followed that over a period of time and I think ooh maybe I can use that for this patient cos it has worked really well on X’s patient and I will try it on mine but again its less evidence based in terms of a large sample size, it’s basically anecdotal cos it’s based on one person’s success with that particular technique.” (P12)*

*“I think so, there’s no, it’s very tricky you know when they say is it evidence based, so what evidence based is that, I’ve done it for this long and it works, so yes it is evidence based but every little procedure in the practice you can’t look up, when you see a journal or something like that swing by, or you hear something on the grapevine from a mate, have you tried this, and he does no longer does this because of this, again that’s evidence based and you change your practice to accommodate that.” (P04)*

*“I think the practice is based upon the best available evidence that we have accessed.” (P20)*

*“...it has made me very wary of.....of so called evidence based research.....erm research, I want practical erm...it’s not good enough to say ‘this works in the lab’. I.....I need to know it works on patients.” (P16)*

For those participants who did have a reasonable understanding of evidence-based dentistry it was apparent that they perceived that there was not that much evidence available to them.

*“I think one of the big problems with dentistry is that erm the degree of evidence...erm or the quality of evidence isn't quite there.” (P24)*

Although a number of participants were aware of evidence-based practice; several of them mentioned that they did not or found it difficult to integrate it into their own practising habits.

*“I would like to think so but there are certainly inconsistencies in my decision making that I recognise everyday erm and you can put that down to, I suppose maybe experience or just clinical opinion but sometimes I wonder whether I am doing the right thing on the evidence base that's there.” (P12)*

*“I am sure that there is plenty of evidence out there erm...which we are not aware of to change the way that we practice but it's...you know...it's difficult. The reality of the day is that by 31<sup>st</sup> March next year I have got to do 8,612 UDAs and you have to think carefully about introducing something which might be best practice but would meant that I would have difficulty getting my targets by the end of the year.” (P20)*

Understanding of terms associated with evidence-based practice was variable. In the main, participants were unaware of Cochrane Reviews and the purpose of the Cochrane Collaboration. Some participants had a limited understanding of what systematic review and meta-analyses were. More participants seemed to be more familiar with and could discuss the concepts of different levels or hierarchies of evidence at a basic level.

SS        *“ok, and do you know what a Cochrane review is?”*

31        *“err, funnily enough I...I....I only found out about it a few months ago after er.. a lecture I was at I think Oral B and we had a seminar and the lady who gave it who came down from Dundee mentioned the Cochrane reports.”*

SS        *“Are you aware those there different levels of evidence, like different qualities of trials or papers that you need?”*

22        *I would guess but I wouldn't know the details of it at all. No.*

SS        *“I see, and are you aware of any different hierarchies of evidence?”*

08        *“No”*

SS        *“Or different types of studies, things like that. Do you know what a systematic review is?”*

There was an impression of a distinct lack of formal critical appraisal skills amongst the majority of participants included in this study.

*"..like when you know you read, say a tetracycline article, you have a quick read through that and you find out that they did it on the researcher's mum and dad, you know then you think that's not particularly fair, I'm not really going to trust this one. I suppose it's just a term that they've given to something that people do already." (P04)*

Participants who had gained postgraduate qualifications, in particular, the MFGDP appeared to have a greater awareness and had received some basic training in critical appraisal of dental research. These participants generally felt that despite their training, they still found critical appraisal of research a challenge.

*"I found it really, really hard and I still do find some of the statistics bits quite hard because I don't work in research so but yeah it was quite an eye opener I found it very, very hard to do it to start with but once I got the hang of it but I never would have really persevered unless I had done the exam. (P15)*

*"Just from our very, very limited exposure that we got during MFGDP, in our critical reading, I do try to look at what they're saying, especially the results, and their methods and try to evaluate." (P06)*

*"I really feel that it's something a bit like resuscitation, you need to keep again and again and you need somebody sort of almost pointing out the pitfalls until you have got it in your head exactly, you know, what you're looking for to make the evidence stand up, so to speak, and I do find that quite difficult." (P28)*

The following comment by one participant illustrates the point that practitioners seem to rely on a multitude of different factors to produce a change in their practising habits.

*"...in an environment where you've had university professionals teaching you in a postgraduate setting, combined with the journal, combined with the lectures, makes you more prone to accepting the information. Whereas you get a journal on its own and*

*you're sat in the afternoon reading it, you're not going to think - 'Monday morning I'm changing the way I practice'.*" (P11)

One comment which seemed to summarise succinctly the feelings of many of the participants towards what information they sought was:

*"wouldn't it be brilliant if you could just get a textbook that just said; Dentistry, this is how to do it"* (P16)

## 6.2.3 WHAT ARE THE BARRIERS TO APPLICATION OF RESEARCH EVIDENCE AND CHANGE IN PRACTICE?

### 6.2.3.1 EXPERIENCE-BASED DENTISTRY (SELF-CONFIDENCE IN OWN SKILLS)

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Participants were asked directly what made them change their practice and whether they could describe any examples of recent changes they had made. This was to elicit whether any evidence-based information had any influence over their day-to-day choices. The most frequently cited drivers to change included attending courses, peer review and discussion with colleagues, guidelines and the new NHS dental contract.

A concept evident from many participants, especially older dentists, was a strong sense of ‘if it ain’t broke, don’t fix it.’ Many participants believed that if they felt what they were doing was successful or did not cause problems they found it unnecessary to look for new evidence for these treatments. It was unclear from respondents how they assessed success of treatments other than their own informal ‘audit’ processes. Where current practice was felt to be adequate there appeared to be a relatively blinkered attitude and new research, innovations or evidence-based guidelines might not be important to them. There seemed to be a widespread philosophy of regarding change as being necessary when things went wrong.

*“What I’m saying is, you know in general dentistry, once you have found a method which works for you doing standard procedures, it’s very difficult to find the motivation to change those ways. You know if something works er reasonably reliably, there’s not much reason to change that...Once you’ve done things a few thousand times than it’s, you know, things are working then, there’s not a lot of need to change that.” (P31)*

*“You know, if something works and it’s worked for 30 years why do you want to, you know, and changing is hard and the longer you’ve been doing the job, the harder it is to change, I mean, we’re all resistant to change aren’t we.” (P25)*

*“I don’t feel I need to keep looking for answers at the moment so....perhaps I am doing it wrong but erm....I don’t feel as though there is a problem with carrying out practice I might be old fashioned and doing it wrong.” (P26)*

*“I have to say, you do get lazy and you use what you are comfortable with and it does take, you know, some real effort even when you are given some free samples to change the way you practice and do it.” (P19)*

For some participants, financial reasons were significant motivators for change. Participants were inclined to change what they did in practice if it would lead to financial rewards.

*“I think if you like something and you’re comfortable with it, you don’t want to change, but if perhaps it does boil down to money as well, if it’s more cost effective to change to something else.” (P14)*

*“I mean the bottom line is it had to be cost effective, cost and profitability was a big driver in practice.” (P30)*

### **6.2.3.2 LEGISLATION AND POLICY**

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The New Dental Contract came into effect on 1 April 2006 and mainly affected dentists working within the NHS. The introduction of the New Contract proved to be a significant driver towards a change in practice. Many participants had reservations about the New Contract and were seeking to leave the NHS and convert their practices to private practices.

*“I mean, most of my colleagues are in NHS practice, those that are in practice and as a result of the new contract a lot of them are now changing their ways and looking to get out of the NHS, they’ve had enough.” (P20)*

*“..hopefully private work will increase the desire to do evidence based work.” (P16)*

There seemed to be a general feeling of unrest with the new system. Participants frequently held negative views and felt that the system was too target driven and that this impacted upon treatment planning.

*“I don’t think you can do a good enough standard of dentistry in the NHS, certainly not now with the new contract cos your treatment planning now is skewed on getting your UDA points so you’re not gonna.” (P08)*

*“I think certainly people are treatment planning now based on a system of remuneration to hit a target.” (P18)*

Approximately half of the dentists interviewed were members of the British Dental Association (BDA). Several of the participants had been members in the past but had left the BDA for a variety of reasons. There was general agreement that the BDA had been unsupportive of dentists when the New Contract had been negotiated with the government and there was a strong sense of disillusionment towards the BDA for this reason. Participants expressed a desire for the BDA to be stronger in terms of leadership and expressed a lack of confidence in the BDA to act as their trade union.

*“I think that it hasn’t acquitted itself well in the recent negotiations with the new NHS contract.” (P31)*

*“I feel that when government have been twisting our arms up our backs on so many occasions over my career, the BDA have been spineless, they haven’t supported the interests of the dentists, they’ve supported the interests of government, they very often mouth support for us and then back down.” (P27)*

Some of the participants criticised the fact that the membership costs were too high and that being a member did not give them value for money. Some participants in particular, commented that they felt that the BDA was not as strong as The British Medical Association (BMA), the professional association for doctors.

*"I just think, they are a trade union and they've unfortunately got into bed with the government yet again, they've not been supportive, they've not been supportive of practitioners like myself who have had a contract enforced on us, I just feel disappointed, let down, very let down, I just think that they should have been more vocal, the BMA would never let the government treat their profession like the BDA have us."* (P14)

In contrast, the views of some participants were very positive about the BDA. The more positive feelings towards the BDA tended to come from dental practitioners whose practices were mainly private. There was wide agreement that the BDA advice sheets were particularly useful to them.

*"The British Dental Association, I mean, I do as a member of it, their advice tends to be the current sort of standard so I know that if I'm keeping on the right side of their advice then I'm not going to get into trouble with the government people.... I stick to what the BDA say I should be doing, that's the biggest influence on my practising life I would say, on what we carry out on a day to day basis and clinical practice as myself as a dentist."* (P21)

Others commented that the BDA offered useful resources such as the library services and educational materials.

*"I think the educational materials that they provide are very informative and are very positive really. There is lots of negativity that's spoken about the BDA at the moment and that comes from my NHS colleagues but because I don't have any involvement with the national health service, it doesn't really mean anything to me."* (P10)

*"I've managed to get copies of journals and things from the library that I've found very difficult to get from elsewhere."* (P22)

It was clear that some of the participants were BDA members mainly to receive the British Dental Journal.

*"Well, I think in the past negotiating sort of issues regarding our contracts and things they seem to have been pretty poor. And, you know, now that I'm not involved with the National Health Service and, you know, completely private I don't really worry about that side of it any more and the main, you know, the main thing that I get is, from my subscription, is just reading the journals and other than that I don't really have a strong opinion about them."* (P19)

### 6.2.3.3 ORGANISATIONAL CONSTRAINTS

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The organisational strictures of NHS general dental practice did appear to be a clear barrier to implementing changes in clinical practice and in particular change to an evidence-based practicing profile. Constraints were also evident with regards to CPD and reading. Those organisational constraints consisted of primarily, lack of time, financial disincentives and domestic constraints.

Lack of time was an important theme that recurred constantly throughout the interviews and for the great majority of participants such time constraints made reading journals and attending courses difficult. One participant commented that:

*“I’d probably, with the amount of time that I have in the evening say that I skim through articles and just take out the relevant point, or even read the summary and then some of the conclusions at the end” (P 03)*

*“I’m not up to date with it (Evidence –based dentistry) I really need to do more reading and familiarise myself with, with research papers a little bit more than I do but when you are running a practice and, you know, it’s probably something that gets put at the bottom of the list.”(P19)*

Another participant stated:

*“I think working in practice nine till five and a busy practice, you don’t have any time in the day to do any reflective learning”(P03)*

There were domestic constraints that were mentioned by a few. Amongst a number of participants, there seemed to be a general feeling of resentment and reluctance to spend time at home with continuing professional development.

*“I wouldn’t have the time to read ever single article because, quite frankly, at my age I’m getting tired, you know when you get home at night.”(P29)*

*“I mean occasionally I do some at home but I resent having to do it at home, I’ve got so many other things to do.”(P28)*

*“I have got two kids at home so I want to be home with my kids they are very young they are only toddlers at the moment,...I try to keep my evening courses probably down to once a week.” (P09)*

A number of participants identified that CPD courses were chosen to maximise hours of verifiable CPD rather than for interest or professional development.

*“it’s very CPD driven, everything that you do, obviously if you have got limited amount of time to go on these courses, you’d rather go on the courses that are going to give you the verifiable CPD first” (P06)*

Time was also seen as a barrier to trying new clinical techniques or changing practice for one participant.

*“cos you have got to take time out of your day to do something new. You are not going to do it well quickly to begin with so if your patient is booked in for a certain procedure and you think ooh I will try doing it this different way now....you will rush it and then you will make a mess of it and you will have a bit of a downer on it” (P16)*

All thirty-one participants had access to the Internet at home, at work or both. Google search engine followed by PubMed, Yahoo and the BDA websites were the most frequently identified online resources. Many were using search engines on a regular basis to obtain a wide variety of information ranging from dental equipment to looking for online articles or carrying out CPD questions. A number of the participants expressed frustration with the difficulties of retrieving specific journal articles.

*The Internet, it’s all hit and miss sometimes you get the complete article, sometimes you don’t, it is frustrating, although you always get, well sometimes you don’t even get an abstract.” (P21)*

Several of the participants also expressed dissatisfaction with the fact that some of the articles in the British Dental Journal were only accessible online. It appeared that some participants expressed a definite preference for reading printed material as opposed to reading from a computer screen.

*“I’m a very paper orientated person, if I use the Internet it’s because that’s the only way I can get hold of the thing I want.” (P 27)*

It was generally felt that there was a vast amount of information available online; however some participants raised the issue of finding lots of redundant or not so useful information amongst their searches.

*“I don’t know if I’m not using the correct search engine or whatever, but I don’t find it that useful. It’s great if you have no knowledge- if you’re a lay person but anything a bit more in depth it’s very difficult.” (P14)*

The quality of evidence and information was also perceived to be a problem.

*“I suppose with the Internet it’s so fantastic you can type anything in and you can get pretty much any information there; but you have obviously got to be a bit careful as to what’s actual proven sort of scientific facts or what someone’s just written.” (P19)*

#### **6.2.3.4 LACK OF KNOWLEDGE OF CRITICAL APPRAISAL**

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As critical appraisal of literature and particularly research, is seen as fundamental to practising evidence-based dentistry, participants were questioned about their knowledge of and ability to carry out critical appraisal. Amongst the participants, it was apparent that those individuals who had a postgraduate qualification were more likely to have had training in how to critically appraise research evidence. This did not necessarily translate into these individuals putting these skills into practice when reading the literature. Some of the participants spoke of the difficulty of critical appraisal of literature without continued practice on a regular basis.

*“We did spend time learning how to critically read a research paper...but it’s not easy reading research papers because we don’t do it regularly.” (P11)*

Most participants did not feel adequately trained to carry out critical appraisal when reading journal articles. In particular, interpreting statistical aspects of the papers was found to be difficult with only a minority of the dentists interviewed having the confidence to do so.

*“I mean certainly things that involve statistics and graphs and various other things often, you know, it becomes a blur and I wouldn’t know how to appraise it really.” (P22)*

*“Even though I’ve done A’ level maths, I find it very, very difficult to comprehend.” (P14)*

Many of the participants in this study admitted to often only reading the abstracts of papers or the summary or conclusions at the end. Otherwise several participants remarked that they did not read through the whole article but skimmed through it quickly and this was largely due to time constraints.

*“I would say that I’d probably skim through articles and just take out the relevant point, or even read the summary and then some of the conclusions at the end.” (P03)*

*“I’d read the introduction and the conclusion and that sort of gives me the gist” (P14)*

On the other hand several participants did attempt to attach a level of importance to journal articles they read.

*“I do try to look at what they’re saying, especially the results, and their methods and try to evaluate. I wouldn’t be confident in my own evaluation though, I would have to probably speak to someone else and see what they thought and then kind of rattle it out with them” (P06)*

There was an assumption from some individuals that if an article appeared in a peer-reviewed journal that a sound, scientific methodological approach had been used and therefore that the article was of good quality and the results valid.

*“You do assume that the proper, you know, protocols have been followed and that things are done properly, so you’re not really too interested in the methodology of it.” (P05)*

*“I assume wrongly probably, that if it has got through the panel and put it in the BDJ in the first place it must have some credence.” (P2)*

### **6.3 OBSERVATIONS FROM THE FIELD**

During or directly after the interviews observational notes were taken, if perceived by the interviewer to be significant. These included observations regarding feelings and reactions of the participant, how the participants reacted to questions and what the rapport was like between the interviewer and participant.

It was significant and important to note that a large proportion of the participants were evidently unfamiliar with concepts of evidence-based dentistry. When the discussion was brought round to discuss this subject area, a number of participants became defensive during the interview. It was necessary for a number of participants to brush only lightly on these topics and move the conversation away where the interviewee was visibly uncomfortable. This may not be particularly clear from the text of the transcripts. An example in point is when the interviewer sometimes asked “Have you received training on critical appraisal?” or “Are you aware of different levels of evidence?” It was evident that some of the participants were uninformed about these concepts and some gave a staccato response such as “No” where previously respondents had been giving more fulsome replies. In these interviews, at times, feelings of embarrassment were palpable and the situation was felt to be somewhat awkward by probably both parties.

## **6.4 THEORIES EMERGING FROM THE STUDY**

It appears that even with growing popularity and the synthesis of evidence-based information; this is not enough to influence the knowledge of, or uptake of that evidence by primary dental care practitioners. From the research data in the present study, it emerges that evidence-based clinical information appears to be under-utilised in the clinical practice setting. It is apparent from these interviews that searching for relevant clinical information and applying research findings imposes a personal cost for the practitioner, at least in terms of their time lost and required effort. Primary dental care practitioners do not necessarily seem to want to develop their skill sets in practices such as critical appraisal but would prefer instead to have the relevant information readily available and synthesised for them.

To reiterate, one important theme that emerged from this study was that the participants indicate that that reports aimed at summarising and synthesising clinical dental research literature is most useful to them. The practitioners seemed to specifically appreciate journal articles which translate research findings into practical, clinically relevant pieces of information which include explicit recommendations.

If primary dental care practitioners are to be encouraged to make use of evidence-based information, there needs to be a practical and accessible way for the relevant information to be synthesised and then disseminated. A second key theme emerging from this study is that it seems that the dental practitioners seem to have their own personal “trusted suppliers” to obtain their information needs from, these include colleagues and specific, well-known dental professionals or leading key experts. Clinical judgement and experience of the primary dental care practitioners themselves and of their “trusted suppliers” of information seem to have a greater importance and impact upon their clinical

practice than evidence-based research findings and practitioners may be heavily influenced by these people. It could be that certain leading experts may be the key to encourage and lead primary dental care professionals in their pursuit and uptake of evidence-based research. These expert leaders could serve to increase local awareness of evidence-based information and support willingness to change clinical practice if necessary by lecturing, facilitating discussion and potentially creating positive attitudes towards evidence-based dentistry.

It would be interesting to deduce whether or not these influential colleagues realise their potential responsibilities for disseminating evidence-based information into clinical practice.

## **CHAPTER 7 - DISCUSSION**

This study employed a qualitative methodology to assess whether evidence-based dentistry has an influence upon general dental practitioners and what factors influence them to change their practice. It also aimed to make a contribution to the existing but small body of knowledge investigating the implementation of evidence-based dentistry among general dental practitioners. Intrinsic to the qualitative methods employed was the ability to yield rich, descriptive data and thus convey themes and nuances that quantitative methods could not. Some limitations of the study design became evident through the course of the research. Thirty-one dental practitioners from the West Midlands region were interviewed and from the analyses of these interviews, eleven main themes emerged. Many of the responses were difficult to categorise into distinct themes resulting in some crossover and interrelations between themes. Some significant and surprising issues arose which would appear to question (at least in this sample) the success of evidence-based dentistry at a grass-roots level.

### **7.1 STRENGTHS OF STUDY METHODS**

The study utilised a non-probabilistic sample technique. Interviews were conducted iteratively and included 31 general dental practitioners. The sample itself was purposive with selected general dental practitioners in the West Midlands chosen for interview. Such a sampling technique is entirely consistent with qualitative research methodology where the aim is to yield rich data and generate further hypotheses. The last few interviews conducted generated few new concepts that had not already been voiced by other practitioners. Carrying out further interviews may not have yielded much more useful information or changed the main findings of this study; thirty-one practitioners was an adequate sample size in this respect. One characteristic of qualitative research is that sample size,

and location of participants may not necessarily affect the validity of the findings. The aim of such a sample is not for statistical representation and therefore external validity, but instead to identify participants who possess characteristics relevant to the phenomenon being studied (Mays and Pope 1995). Participants were often known to the research group and were therefore approachable and in the main interested in taking part. This meant that the data yielded from participants was good.

The study used a semi-structured interview as a tool for data collection from general dental practitioners. An interview script was agreed amongst researchers in the group to explore the themes of interest. The benefits of using a semi-structured interview based approach rather than a questionnaire were numerous. One potential problem with questionnaire-based surveys is the poor response rate which reduces the effective sample size and can introduce bias (Richards 2007). Questionnaires also only allow limited participant responses and are therefore of limited use if more meaningful, rich data is required. A rigidly structured interview might enforce constraints on the interview participants where, for example, a particular area of interest warranted further exploration or where interviewees were obviously uncomfortable with subject matter under discussion. With the aims of this research study in mind the semi-structured interview was able to explore the motivation underlying behaviour and attitudes of general dental practitioners and yield rich interesting data.

The interviewer tried hard to ensure that her beliefs and attitudes did not influence the participants in any way. There was good agreement between researchers of emerging themes from the analysis of jointly reviewed transcripts. The results obtained from the study appear to concord well with both qualitative and quantitative studies in medicine and dentistry despite minor limitations of the method.

## **7.2 DEVELOPMENT OF THEMES**

### **7.2.1 WHAT ARE THE BARRIERS TO APPLICATION OF RESEARCH EVIDENCE AND CHANGE IN PRACTICE?**

Many of the themes that emerged from interviews highlighted perceived barriers to change in practice. In particular, lack of time. This is one of the most consistent reasons given by healthcare professionals for not practicing evidence-based medicine. It was clear that financial factors played an important part in influencing change in practice.

A large number of the participants in this study were working in the National Health Service providing NHS dentistry. According to participants, the new dental contract, introduced in April 2006, has undoubtedly had an influence on how treatment-planning decisions are made for patients. The target driven units of dental activity system appears to have limited treatment options for patients. Some participants, for example, pointed out that the new system provided financial disincentives for carrying out more complex treatment such as endodontic treatment of a molar tooth. Here they felt that extraction would be their preferred option. A frequent view held by participants was that conversion of their practices to the private sector was an option that they were forced to consider. These findings correlate well with the results of a questionnaire which studied English general dental practitioners' views on the new contract (Milsom et al., 2008). This study found that dentists were unhappy with the UDA target system of payment and felt that the new system would reduce their commitment to the NHS. A recent randomised controlled trial (Clarkson et al., 2008) compared the effect of direct financial incentives with educational sessions on increasing the number of fissure sealants placed by general dental practitioners. There is sound evidence to suggest that fissure sealants reduce caries in susceptible, high risk patients (Ahovuo-Saloranta et al., 2004). Results

showed that even though the educational session increased the likelihood of sealant placement, if the GDPs were offered a fee to place the sealants, they were far more likely to place them.

### **7.2.2 WHICH EDUCATIONAL TOOLS ARE REQUIRED TO HELP DENTISTS ACCESS AND UNDERSTAND EVIDENCE-BASED RESEARCH?**

The results of this study demonstrate that for most of the participants, attending courses or reading journals formed a large part of their continuing professional development. The results from the study would suggest that this does not seem to be effective at changing practice behaviour.

In a study which tested audit and feedback and computer-aided learning as strategies used to increase evidence-based extracting of third molars, both strategies failed to significantly influence the behaviour of dental professionals. Both strategies were successful in increasing knowledge however failed to influence change in practice (Bonetti et al., 2009).

With regards to understanding of terms associated with evidence-based dentistry, the findings of this study are corroborated by another UK-based study in which a self-administered, structured, postal questionnaire in 2001 was used to assess general dental practitioners' understanding of, and attitudes towards, evidence-based practice (Iqbal and Glenny, 2002). The findings of their study revealed that over 72% of respondents were unaware of the Cochrane Collaboration. It is rather disheartening that in the 5 years that have passed since this study, knowledge of the Cochrane Collaboration appears not to have progressed even though there are increasing numbers of Cochrane Reviews that are being published with relevance to dentistry. In contrast with this study, the results in the postal questionnaire study showed that many respondents were aware and were able to define other terms associated with evidence-based practice such as critical appraisal, systematic review and clinical effectiveness. This may be a consequence of respondents having had more time to research questionnaire answers. The findings in this study also greatly contrast their study in which 87% of the

respondents claimed to have changed their practice as a result of reading a research article. The findings of this study are to the contrary with very few participants claiming to have changed their practice following reading a journal article.

The aim of evidence-based health care is to ‘provide the means by which current best evidence from research can be judiciously and conscientiously applied in the prevention, detection and care of health disorders’ (Sackett et al., 1996). The practice of EBD relies on two important foundations. Firstly, that the dentist is able to access the current literature and secondly, the dentist is able to critically appraise the literature. The findings from this study suggest that many dentists experience fundamental difficulties with both accessing and appraising research. For some dentists there appeared to be a lack of clarity about what evidence-based dentistry actually means; a number felt the ‘evidence’ was that based on their own clinical experience. Without using the best evidence available, clinical practice may risk becoming outmoded and potentially detrimental to patients. From this study it was evident that participants did not see the relevance of EBD to their own clinical practice.

To integrate evidence-based dentistry into clinical decision making effectively, five stages have been identified by (Niederman and Badovinac, 1999). Each stage will be discussed in turn with reference to the results obtained from this study. These stages were represented to differing extents from the interview data.

### **Stage 1) converting clinical information needs into an answerable question;**

Insight into this part of the evidence-based practice process was not really picked up from the interviews. It would appear that this may not be a strategy in common use by general dental practitioners.

## **Stage 2) using electronic databases to find available evidence;**

All of the participants had access to the Internet whether it be at work or at home or both. Only a minority mentioned that they used databases such as 'PubMed' or 'Medline'. The majority mentioned using a popular search engine such as 'Google' as their first port of call for attaining clinical information electronically. Dental information found on the Internet is of variable quality and can range from blog sites, patient discussion forums, opinion-led reviews to peer reviewed journal articles and Cochrane reviews. High quality clinical research papers may not be easily accessible. Some of the participants mentioned difficulties with accessing full-text journal articles and had to rely upon abstracts only or abandon their search. Currently, it is difficult to obtain the full online version of many medical and dental articles without prior subscription to the journal, pay per item access or a comprehensive user Athens log in. This would appear to be significantly discouraging to general dental practitioners. Encouragingly, there has been a recent movement to provide 'open access' to some online journal publications. There is a drive for publishers to commit to providing free access and wide dissemination of published research findings where such research has been funded by tax-payers money. Currently, any published research that has been funded by the National Institute of Health, the Wellcome Trust or the Medical Research Council is being made freely available online to all users via PubMed. The limitations in availability of evidence may make evidence-based practice very difficult for general dental practitioners.

## **3) critically appraising the evidence for validity and importance;**

The results of this study demonstrate that few participants had ever received training in critical appraisal. Furthermore, those who had received training still found critical appraisal difficult to carry out. In general, the knowledge and understanding of some of the terms associated with critical appraisal seemed to be deficient. Very few participants carried out formal appraisal when reading

journal articles, although it was perceptible that some participants did look for relevance to their own practice. For example, there was widespread awareness that information, including written information, from sales representatives may be biased and could not necessarily be trusted to inform clinical practice.

Evaluation of research is essential to help the dentist either use the information or disregard it as not applicable to their own practice and patients. Yet, on the other hand, the results of this study strongly suggest that reading research evidence from journals does not influence dentists to change their practice. Few participants claimed to have changed elements of their practice after reading something in a journal. This study therefore calls into question the evidence-base for using evidence-based research to change clinical dental practice. To add to this, time constraints appeared to be a major barrier to appraising research with nearly every participant in this study, in the main, reading only selected parts of journal articles, namely the abstract, summary and conclusions.

There would appear to be significant limitations on training availability in critical appraisal and in particular training relevant to general dental practice. Such training is sometimes provided by postgraduate deaneries or on a private basis. Most often critical appraisal is more evident in hospital or academic training posts and may not cross over to the general practice environment. The disparity between teaching and learning in secondary care environments and general practice for postgraduates appears to be large. Given that the greater proportion of clinical care takes place in general dental practice this educational mismatch would suggest that fundamental changes may be necessary if evidence-based dentistry is to play a greater role.

**4) integrating the appraisal with the patient's perceived needs and applying these results in clinical practice;**

Not many of the participants explicitly mentioned the perceived need of the patients. Taking into account all the interviews, patients and patient preferences were mentioned only a handful of times. This was usually with regards to using evidence from guidelines to explain their decisions and to justify treatment choices. A frequent finding in the literature is that the translation of research findings into practice is a slow and unpredictable process (Walker et al., 2003).

It has been identified that multifaceted complex interventions can be effective in changing the behaviour of clinicians, however specific recommendations for worthwhile interventions are unknown. In fact, NICE has recognised that there are no easy solutions to implement change and have introduced a guide entitled 'How to Change Practice' (National Institute for Health and Clinical Excellence, 2007) which aims to advise health professional on best ways to implement change. It was clear from this study that current educational approaches were generally initiated by practitioners themselves and were not particularly effective in creating change.

##### **5) evaluating their own performance.**

Some evaluation of the participant's own performance had been carried out. A few participants mentioned assessing their own work on an informal basis by reviewing the success of treatment they had done. The feeling towards audit, in general, were that of 'something which needs to be done'. Most participants, if they had a carried out audit, had examined radiographic practice with the exception being one on record keeping. The results from the audits, in many cases, did in fact lead to a change in practice. There would appear to be potential to explore audit as a tool to influence practitioners to adopt evidence-based practice behaviours. Such a use for audit would be a development of the traditional NHS concept of analysing existing practice, yet setting gold standards, implementing change and re-evaluation are intrinsic to both audit and the practice of evidence-based dentistry. Perception of audit as a chore may limit the use of such a method. Education of the value of audit as a tool to improve practice may make a change in practice a more accessible notion for general dental practitioners and may help to reinforce the value of such change. Evidence-based practice

involves securing the best evidence, using this as a tool to make decisions for individual patients and evaluating the success of techniques. Audit may demonstrate in some cases that change may be detrimental in a particular practice or for a particular patient group. Such a demonstration can be seen as a success for evidence-based practice and the reflective self-evaluating practitioner. To be an effective tool for delivering evidence-based changes in dental practice, adequate funding needs to be available for practitioners to devote precious time and resources. There may be limited availability of such funding under the new dental contract.

From the outset, dental undergraduates have been trained to rely on opinion from different clinical tutors at dental school, amongst other educational approaches. To an extent, undergraduates may search for expert opinion as an educational tool and learn from the clinical experiences they encounter (Ismail and Bader, 2004). This may encourage a tradition-based approach to clinical decision-making. There has been shown to be marked variation in assessment and treatment planning amongst dentists (Elderton and Nuttall, 1983). In medicine, variation in clinical practice has shown to lead to a variation in health outcomes (Marteau and Johnston, 1990).

Scientific enquiry, early on in the undergraduate curriculum, is noted as an important element in the First Five Years (General Dental Council, 2008). Integrating evidence-based dentistry and critical appraisal skills into an already busy undergraduate curriculum may be challenging for dental educators as those doing the teaching may also need to be taught.

It is apparent from the present study that there has been a limited culture of critical appraisal and evidence-based practice from an early stage for general dental practitioners. It is also clear that the scope to train practitioners in critical appraisal and evidence-based skills may be curtailed by time and financial pressures. No evidence exists to suggest that these skills translate into improved patient outcomes (Norman and Shannon, 1998). It could be argued that a dictatorial approach to changing

clinical practice with evidence-based guidelines might represent the most cost effective manner in which to promote good practice. This would of course, as alluded to by general dental practitioners themselves, be a sad loss of independence and self-determination. This would fly in the face of current rhetoric about self-directed learning and decision-making based on best evidence and the patient's perceived needs.

In a survey of UK general medical practitioners (McColl et al., 1998), there was a reluctance amongst this group to acquire critical appraisal skills. In a UK study, a postal survey (O'Donnell, 2004) assessed attitudes and knowledge of primary care professionals towards evidence-based practice, the majority of respondents preferred using either 'evidence-based summaries or professional guidelines and protocols developed by someone else or a combination of these approaches.' None of the respondents felt that the best way to access evidence based research was to appraise the evidence themselves. This feeling is echoed by participants in this study. If this is the case methods need to be sought to ensure that any evidence there is, is delivered to them in an accessible, understandable format. The Evidence-Based Dentistry journal which is devoted to critical appraisal of relevant dental research should theoretically meet these demands. However, even amongst BDA members in this study sample, awareness and readership of this journal appeared to be low.

One of the major challenges for evidence-based dentistry is simply the lack of good, supporting evidence and some of the participants in this study had recognised this fact. Unfortunately, the low number of studies reporting quality clinical trials in dentistry is unlikely to change unless a fundamental shift occurs in the funding of research in dentistry (Coulter, 2001). In reality many of the standard treatments carried out used in dentistry do not have rigorous evidence to support their effectiveness (Bader, Ismail, and Clarkson, 1999). It is pertinent to note that a significant proportion of dental treatment is carried out not necessarily for normative need e.g. treatment of caries and periodontal disease, but instead carried out largely to meet patient demands e.g. cosmetic treatments

such as veneers and minor orthodontic treatment. Such cosmetic treatment is often self-funded by the patient and therefore it may not be deemed appropriate to use limited research funds to investigate such elective procedures. There may never be a strong evidence base in these disciplines to influence treatment decisions and therefore dentists may have to continue to use their own clinical experience or experience of others to guide their practice.

In comparison to medicine, there is relatively little evidence-based research and one of the reasons for this may be because the majority of dental patients are treated in dental practice whereas the majority of research tends to be carried out in universities. Additionally, the infrastructure for carrying out well-designed clinical trials is less well developed in dentistry as it is in medicine (Coulter, 2007). Randomised controlled trials can be expensive to design and conduct and this may explain their dearth in clinical dentistry. On the other hand, in dentistry there has been a move towards evaluation of new dental materials in a primary care environment by a collaboration of general dental practitioners to report on their suitability for modern dental practice. An example of this is the PREP (Product Research and Evaluation by Practitioners) Panel which consists of a group of general dental practitioners who assess and report on new materials (Burke, 2005). A portion of the research carried out goes on to be published in peer-reviewed journals. Such research is valuable but it would be of greater value to have well designed randomised controlled trials or prospective longitudinal cohort studies investigating clinically relevant interventions measuring clear outcomes. Such studies may be expensive and in reality impractical. Indeed several participants within this study alluded to the fact that much of the current research evidence does not reflect the primary care settings where most clinical care is provided. There may be less resistance to implementing the results of research that has been carried out in the primary care setting by primary dental care professionals.

### **7.2.3 WHAT FACTORS CAUSE DENTISTS TO CHANGE THEIR PRACTICE?**

Traditionally, in dentistry, the emphasis on improving clinical practice has been towards the dentist's accumulated knowledge and experience, adherence to accepted standards, and the opinion of experts and peers (Coulter, 2001). This study suggests this is still the case, with very few dentists appearing to give credence to accessing and utilising current research evidence to influence their clinical decision making. The results strongly indicate that clinical experience is valued by primary dental care practitioners to a much greater extent than changing practice based on research evidence. Experienced practitioners have often developed their expertise in clinical dentistry through repetitive practice, evaluation of their techniques and fine tuning if necessary to achieve an acceptable standard of practice. (Horst et al, 2009). The results of this study suggest that experiential learning is valued highly by dental practitioners as a tool for changing or choosing not to change their clinical practice. Thus for many, it would appear, that case-based learning is a valuable method, however the cases are limited to their own personal experience. One is always more willing to judge one's own work as more successful than a blinded observer. In actual fact, some reviewers have questioned the assumption that treatment decisions should be primarily based upon evidence-based research and instead proposing that clinical experience and judgment provides a more appropriate basis for clinical practice (Levant, 2004).

Anecdotal-based sources of information include colleagues from networking and peer review, professional speakers or opinion leaders on courses, traditional review articles and textbooks. These sources of information are popular to use as they can answer a question rapidly, are usually relatively cheap and convenient and are accessible. As well as supplying the required information or advice, colleagues are said to provide reassurance, guidance and other psychological benefits that a non-

human source may not be able to provide (Tonks and Smith, 1996). It is clear from this study that general dental practitioners do value the opinion of colleagues highly and that this can exert considerable influence in changing practice. Opinions of 'eminent' colleagues and their clinical experience would appear to exert a more powerful influence on clinical decision-making than research evidence from journals or the Internet. However do their brightly coloured bowties bestow true brilliance or do they belie blatant ignorance?

The role and concepts of 'clinical facilitators' in medical education has been previously researched. Harvey G et al, 2002) though the meaning and purpose of facilitation appears to vary within the literature and a wide range of facilitator roles are feasible. These facilitators can play a key role in helping clinicians understand why and how they need to change their practice towards implementing evidence-based knowledge into their practice (Kitson et al, 1998). Clinical facilitators have been used to emphasis research and evidence-based practice. They have been used to help students think critically and reflect upon and learn from experiences and to keep up-to-date with advances in research (Lambert, 2005). Amongst participants, there were mixed feelings towards clinical practice guidelines. Some participants remarked that guidelines represented an infringement of their autonomy. As patients, commissioners and politicians insist upon greater clarity and accountability in making clinical decisions, the choices dentists make may be subject to external scrutiny. Reliance upon experience and anecdotal practice may not be justifiable or defensible where a reliable source of evidence exists.

Worryingly, the results suggest a cynicism and scepticism with regards to clinical guidelines and in particular with the trustworthiness and credibility of guidelines provided by NICE. Participants were wary that there were economic and political motives driving the guidelines. Dentists in this study seemed to be more interested in using evidence-based guidelines to reassure patients, justify treatments and avoid litigation rather than necessarily providing best care. There is a concern that those following guidelines may be doing so slavishly and not exercising their best clinical judgement alongside these.

In the current NHS climate, evidence-based healthcare guidelines are seen as being particularly important in promoting effectiveness and improving quality. It may be challenging to implement relevant research findings and guidelines as it is difficult to change the behaviour of clinicians. Research has shown that implementation of NICE guidelines is more successful when supported by other systems of change such as strong professional support, and a reliable and robust evidence-base and there being adequate resources to fund implementation (Sutherland and Leatherman 2006).

Guidelines may certainly be a force for cost-effective treatment with health service dentistry. The recent NICE guidelines for antibiotic prophylaxis are an example of this. Where evidence is lacking or no robust guidelines are available PCTs may in fact choose to limit or even deny availability of treatment. It would appear that clinical guidelines will continue to grow. There are concerns from this study that general dental practitioners may not be prepared to appraise these or use them as appropriate to effect change in their clinical practice.

It is apparent, from the study, that guidelines on antibiotic prophylaxis for infective endocarditis and management of third molar teeth have been readily accepted. Both guidelines would appear to have simplified decision making and delivery of treatment in general dental practice. This is undoubtedly a reason for their success; practitioners would appear from this study to prefer the path of least resistance. Simplification may also pave the road for more cost effective management and this may also be attractive to general dental practitioners. The guidelines on dental recall, from the results of this study, have met with limited approval and uptake. There is an interesting divide in opinion on different guidelines from the same body. It may be that lower levels of remuneration for less frequent dental attendance, suggested by the guidelines, have proven a significant disincentive to their uptake.

Dental practice in the primary dental care setting is often driven and reinforced by the reimbursement process. The actions of a practitioner may be driven by the need to practice time efficiently and cost-effectively. Systems of remuneration, it would appear, play a significant role in shaping practitioners clinical management. Until such time as evidence-based practice is rewarded financially in primary dental care, it may be that there are limited incentives to drive change.

## CHAPTER 8 – CONCLUSIONS

It was possible to draw a number of conclusions from the current study. It should be noted however, that these conclusions may not be generalisable given that participants were based solely in the West Midlands.

- The ability to translate evidence-based research information into dental practice would appear to be essential to ensure the quality of treatment and health outcome for patients but the results of this study indicate that this translation of information is not being achieved.
- Factors that influence decision making and change in general dental practice are complex and depend upon a multitude of factors some of which include: clinical experience, influence of colleague, traditional teaching, guidelines and time constraints. It is evident from this study that high quality research, its critical appraisal and practice with reference to patients perceived needs seems to have a limited influence on effecting such change and most practitioners in this study reported that research results do not have a major impact on their clinical practice
- It is important to know how and why dental practitioners use information to influence practice so that strategies can be developed to maximise good quality treatment for patients and cost-effectiveness in health care.
- Implementing evidence-based practice can be a complex however the use of an evidence-based approach may decrease the level of uncertainty of certain clinical decisions and improve treatment outcomes.

- It is clear that general dental practitioners place a high value and are comfortable with information provided by other ‘respected colleagues’ or ‘trusted suppliers’ of information to satisfy their educational needs. Dentists need to be made aware that it does not suffice to accept evidence at face value merely because it has been published in a peer-reviewed journal or comes from a trustworthy colleague. Information provided by these sources may be neither accurate or current and also prone to bias.
- The findings of this study suggest that getting evidence into clinical practice is a complex process; however it may be useful to employ these ‘trusted suppliers’ of information to help drive evidence-based practice.
- Insight afforded by the results of this study suggest that proficient and practised critical appraisal skills may be lacking for some if not the majority of general dental practitioners. Additionally, practitioners may not have easy access to the relevant information. It therefore may be considered too ambitious for dental practitioners to access and appraise original research.
- Efforts should be refocused upon increasing awareness and encouraging uptake of summaries of evidence such as the Cochrane Reviews, the Evidence-Based Dentistry Journal and the Journal of Evidence-Based Dental Practice. There would appear to be a useful role for secondary sources of evidence-based information that not only summarise the evidence but go a step further and also suggest achievable strategies for implementation in clinical practice. It is clear that delivery of such information to general dental practitioners is currently inadequate.

- The study has implications for primary dental care with regards to policy and practice changes, and for more support with practising evidence-based dentistry.
- The responses from semi-structured interviews of general dental practitioners in the West Midlands would appear to highlight a relative gap between the evangelism of evidence-based dentistry and its impact at a grass-roots level. It appears necessary to change the format and availability of evidence if general practitioners are to maintain contemporary practice with evidence based interventions. The current climate in general dental practice does not appear to favour an evidence-based approach to determining patients' dental care.

## **8.1 LIMITATIONS OF THE STUDY METHODS**

The results of this study are based upon a sample of general dental practitioners based in the West Midlands and therefore may not be wholly applicable outside of this setting. To an extent the responses from NHS general dental practitioners working under the new dental contract in England and Wales might be generalised insofar as the terms and conditions of the contract are similar throughout these countries. Geographical and economic limitations may vary widely and thus might their influence on practitioner behaviour. The study is therefore limited in this respect; nevertheless the results are informative and enlightening.

The participants were chosen to reflect a broad range of characteristics and experiences. In choosing a purposive sample, dentists were selected on the basis of availability and motivation to be interviewed. Such as sample must be biased towards practitioners with an interest in postgraduate learning and time available to take part. The sample may have included an overrepresentation of dentists who had connections with Birmingham Dental Hospital and also a relatively greater number of dentists with post graduate qualifications than the national average.

To ensure methodological quality, a proportion of interviews were validated by an experienced, second researcher (DW). This involved cross checking the coding strategies and the interpretation of the interviews in order to check for bias and to see whether any emerging themes had been overlooked. Another possible mechanism for improving the validity of this of study would have been using the participant to validate the findings by reviewing their own interview transcript and checking that the interpretation of the analysis was correct. It was impractical for this to be carried out in this

study due to time constraints of the researchers and perceived time constraints of the participants. With hindsight, it may have been a good idea to have at least a selection of the transcripts validated by the participants.

A simple one-on-one semi structured interview was used to assess respondents. No attempts were made to utilise a mixed economy of qualitative research tools. A focus group methodology where the researcher could have facilitated discussion groups of dentists in a non-directive fashion may have provided further insight and more information about specific themes. In addition, in group discussions, processes and interactions may allow participants to explore and clarify their views which would be less easy in a face-to-face interview.

One other limitation of this study was the relative inexperience of the interviewer in qualitative methodology. With the benefit of reflection and hindsight, it is possible that the topic guide was too tightly structured thus causing the emerging themes to reflect the topic guide too closely. Consequently this may have lead to a reduction in 'richness' of the data.

## **8.2 FURTHER RESEARCH**

Some of the findings of this study may be useful to support future research in this relatively under researched area within dentistry. Further similar research could be carried out, perhaps taking into account a larger geographical area and sample size to develop this study and assess its external validity. Alternatively, a quantitative approach to assess the extent of these findings could be explored e.g. using questionnaires.

The findings of this research may support further research into the potential of using ‘opinion leaders’ i.e. professional speakers on courses that general dental practitioners regard as respected and credible. Such individuals may have the ability to guide and influence evidence-based decision making in practice. It would be valuable to investigate the ability of these people to pass on the useful results from evidence-based research summaries and see whether it impacts upon change in practice and more importantly improves patient outcomes.

It may be important to further explore why the Evidence Based Dentistry Journal, which publishes easily digestible summaries of the latest evidence-based research within dentistry, and the Cochrane Review Website are, to some extent, being ignored by general dental practitioners. Improving the awareness, availability and accessibility of these may lead to a greater uptake and influence change on current practice.

Investigating whether providing courses on evidence-based dentistry or even making this a mandatory part of dentist core CPD requirements, would increase the knowledge and awareness of this important underlying development in healthcare. Furthermore, research could address what support mechanisms are necessary to enable the knowledge gained by dentists to be acted upon and put into practice.

# APPENDICES

## APPENDIX 1 - RESEARCH PROTOCOL

### **Getting Evidence into Practice: An Investigation of the Use and Understanding of Evidence-Based Practice by Dental Practitioners in the West Midlands**

Supervisors:

Professor A.D. Walmsley,      Dr D. White

#### **1. Project Summary**

In dentistry, the evidence-based movement is at a relatively early stage of development (Richards and Lawrence 1995). There is a need for dentists to change their clinical practice in accordance with the best available scientific evidence. At present very little is known about what factors are most influential in determining dentists' clinical practice and their ability to update practice in line with contemporary evidence (McGlone, Watt, and Sheiham 2001).

This research project will therefore use in-depth interviews to investigate the use and understanding of evidence-based information by general dental practitioners working in primary dental care in the West Midlands.

The study also aims to ascertain the requirements of dental practitioners with regards to evidence-based dentistry and how the available information should be best accessed and to determine what factors cause dental practitioners to change their clinical practice.

#### **2. Justification for Research Project**

Health professionals need timely, valid and relevant evidence-based information available at the point of decision making. This is crucial in an information age where there is a surplus material and the busy practitioner needs to make quick decisions about healthcare.

#### **3. Background**

There is increasing interest in providing evidence based health care. This is care in which healthcare professionals, those who commission health care, the public, and policymakers consistently judge research evidence when making decisions. In the evidence-based approach to clinical decision making, dentists incorporate the best scientific evidence with clinical experience and their patients' preferences for treatment outcomes.

It is felt generally, however, that barriers exist to evidence-based practice in primary care. The literature can be unwieldy, disorganised and biased. Most research published in medical journals is poorly done or insufficiently relevant to be clinically useful (McKenna, Ashton, and Keeney 2004). Good information on important questions may be analysed and presented in ways that make it hard to apply in clinical practice.

Recently, much attention has focussed on clinical governance which is a system for improving the standard of clinical practice. This requires that health professionals regularly review their clinical practice and implement change when necessary. Clinical governance can be defined as a framework through which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care by creating an environment in which clinical care will flourish(Health 1998). The government's clinical governance framework aims to modernise and strengthen professional regulation built upon a culture of lifelong learning. It aims to improve systems for quality control, based on clinical standards and evidence-based practice. The aim of evidence-based dentistry is to encourage the dental practitioner to look for and make sense of the evidence in order to apply it to everyday problems(Sackett et al. 1996).

Health professionals need timely, valid and relevant evidence-based information available at the point of decision making. A number of educational delivery methods exist and include postgraduate courses, conferences, web-based educational tools, journal articles and textbooks. The information gained from these methods can vary in quality and accessibility in different geographic locations. It is important to identify the needs and wants of dental practitioners and how the information should best reach them.

#### **4. Aims and Objectives**

This aim of the research is to investigate the use and understanding of evidence-based information by dental practitioners working in primary dental care in the West Midlands.

The objectives are to:

Determine what factors cause dental practitioners to change their practice

Investigate the barriers to the successful application of research evidence to dental health care.

Identify the educational tools required to help dentists access and understand evidence-based research

#### **5. Methodology**

A detailed literature review will be carried out.

A qualitative approach will be used to carry out the study. Qualitative research aims to “study things in their natural setting, attempting to make sense of, or investigate phenomena in terms of the meanings people bring to them and to use a holistic perspective which preserves the complexities of human behaviour.” Qualitative research begins with an intention to explore a particular area, collects data and generates ideas and hypotheses from these data largely through what is known as inductive reasoning (Pope and Mays 2000).

In-depth interviews using a topic guide will be utilised to identify current levels of knowledge and use of evidence-based dental practice amongst dental practitioners. The participants in the sample population will be qualified primary care dentists including vocational dental practitioners, general dental practitioners and community dental practitioners and interviews will take place in the work places of the dentists to be interviewed. A purposive sample of dental practitioners working in primary dental care will be selected from the West Midlands Strategic Health Authority. The sample population selected will aim to include a variation in types of dental practitioner and will include both

private and salaried practitioners, male and female practitioners, practitioners at varying stages of their careers and practitioners from different locations with the strategic health authority.

Interviews will continue in an iterative manner until the potential approaches for accessing and understanding EBD become apparent and the factors causing dental practitioners to change their clinical practice are revealed and no new information is returned. Three pilot interviews will initially be carried out to help develop the topic guide to conduct interviews.

**6. Participant Recruitment and Consent Process**

Potential participants will be identified from [redacted]. Practitioners will be invited to participate in an interview by letter (Appendix I). This letter will explain the purpose of the research and confirm the confidential nature and anonymity of any interviews. If they are happy to participate, potential participants will be able to use the response card to leave their contact details and will be subsequently contacted by the researcher to arrange a suitable time for the interview. As the onus is upon the dental practitioner to contact the researcher if they are willing to partake in the interview, written consent is not seemed necessary and verbal consent will be obtained by agreement to participate.

**7. Data Analysis**

The interviews will be carried out by one researcher and will be audio taped and transcribed. In the transcription process, all identifiable information, such as participant names will be replaced with allocated research numbers. Following transcription the interviews will be systematically analysed and coded. The content analysis and the coding will be validated by another researcher to confirm that the same meaning is assigned to them. This will help ensure quality control and credibility.

**8. Estimate of Project Costs**

[redacted]	[redacted]

**9. Duration of Project**

[redacted]

The results of the research aim to be published in Medline listed medical and dental journals which will be accessible to dental practitioners.

## **APPENDIX 2 - PREPARATION FOR INTERVIEWS AND DATA ANALYSIS**

1. Introduction to qualitative research.
2. Populations and sampling.
3. Interviews as a method of collecting information.
4. Focus groups as a method of collecting information.
5. An introduction to analysing qualitative data.
6. Analysing qualitative data.
7. NVivo 7. Introductory hands on workshop - 2 day course.

## APPENDIX 3 – TOPIC GUIDE

### Getting Evidence into Dental Practice –Topic Guide

Introduce myself

Explain the purpose of the interview. – to find out what makes dentists change their practice and how they access their information

Assure confidentiality.

Explain participation in the interview is entirely voluntary.

Explain the format of the interview and that it will be transcribed onto audiotape.

Indicate how long the interview usually takes.

Provide contact information of the interviewer.

Allow interviewee to clarify any doubts about the interview.

### **Guide Questions**

- Ask starter questions of demographic basics
  - When did you graduate
  - Where did you graduate
  - Where do you work
  - How long have you worked there
  - What is your sphere of Practise (e.g. NHS, Salaried, PDS)
  - How many other dentists do you work with
  - Any post-grad qualifications
  - Are you a member of the BDA
  
- Post-graduate education/CPD
  - **How do you keep up-to date with new changes in dentistry**
  - Do you subscribe to any journals
  - What was the last dental journal you read
  - Do you feel confident in evaluating the quality of research papers/journal articles
  - What did you think about it
  - Do you think research results are useful to you
  - **What was the last post-graduate course you attended**
  - How often do you attend courses
  - Did you find it helpful
  
- **If you had a clinical query, how would you go about finding the answer**
- Reasons for using that method
- Which is the easiest method for you to source information
  
- **What were the last 2-3 things that you changed in your practice**
- What made you change

- What other things make you change you practice
  
- **What do you understand about the term evidence-based practice**
- Do you feel that your practice is based upon the best available evidence
  
- **Do you know how to access any evidence-based material – EBD journal prompt**
- Do you know what a Cochrane review is?
- Have you received training on critical appraisal
- Do you know what a systematic review is?
- Are you aware of different levels of evidence
- What do you think of evidence- based dentistry
- Do you feel that implementing evidence-based practice is beneficial
  
- In your day to day work, how accessible is current scientific information
- What would make it more accessible
- What type of knowledge sources do you want/need?
  
- **Are you aware of any clinical practice guidelines**
- Do you follow them
- Do you like having guidelines

Peer Review

Clinical governance

Behaviours -what a person has done or is doing.

Opinions/values -what a person thinks about the topic.

Feelings -what a person feels rather than what a person thinks.

Knowledge -to get facts about the topic.

Sensory -what people have seen, touched, heard, tasted or smelled.

Background/demographics -standard background questions, such as age, education, etc.

## **APPENDIX 4 – PARTICIPANT INFORMATION SHEET**

### **Participant Information Sheet – Getting Evidence into Practice - An Investigation of the Use and Understanding of Evidence-Based Practice by Dental Practitioners in the West Midlands**

Dear

I am a researcher at the University of Birmingham. I am conducting research to investigate the use and understanding of evidence-based information by dental practitioners in the West Midlands and I would like you to invite you to participate.

The study aims to ascertain the requirements of dental practitioners with regards to evidence-based dentistry and how the available information should be best accessed. It also aims to determine what factors cause dental practitioners to change their clinical practice. You are being invited to participate as your opinions and the information you give will be helpful because at the moment very little is known about what factors are most influential in determining dentists' clinical practice.

The study is important because health professionals need timely, valid and relevant evidence-based information available at the point of decision making.

#### **What participation in the interview will involve**

If you are interested to take part in this study, we will be asking you to take part in a single interview (an open-ended discussion) in the next few weeks. The interview will be held at a time, date and place convenient to you and will last for approximately 30-60 minutes. Taking part is entirely voluntary and you may withdraw at any time. The interview will be audio taped and transcribed for later analysis.

#### **Confidentiality**

Any information that is shared during the study will be treated in strict confidence and once the study is completed, it will not be possible to identify individuals' responses.

All the information that we collect from you will be kept private. All identifiable information, such as names will be replaced with allocated research numbers. The interview recording will be erased once transcribed copies of the interview have been checked. You are free to request a copy of your own interview transcript. The data collected from the interview will be stored in a confidential database.

**Request for Further Information**

You are welcome to discuss any queries regarding the study with the interviewer at any time. You can write to myself at Birmingham Dental Hospital or email []

If you are interested in taking part in this research project please complete the following form and return it to Birmingham Dental Hospital in the reply paid envelope enclosed.

Thank you for your time.

Kind Regards

Miss Shuva Saha

Specialist Registrar in Restorative Dentistry

Birmingham Dental Hospital

If you would like to participate, please complete your contact details below and send to Birmingham Dental Hospital in the pre-paid envelope enclosed.

Name

Address

Email

Telephone

Thank you for your help.

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