

**Screening for and Awareness about Periodontal Diseases in
Children and Adolescents**

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The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

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DEDICATIONS

**To my lovely wife, and beautiful children.
Thank you for always being there for me. I love you.**

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ABSTRACT

Aims: The first study aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners use the Basic Periodontal Examination (BPE) screening system on their patients, and the extent to which they are aware of the guidelines for periodontal screening and management of children and adolescents. The second study aimed to investigate parents' awareness about periodontal disease, and the importance of periodontal screening in children.

Methods: Two questionnaires were developed. The first was mailed to all paediatric dental specialists registered with the British Society of Paediatric Dentistry, and to an equivalent random sample of General Dental Practitioners working in the UK and the Republic of Ireland. The second was handed to one hundred parents who attended the children's dentistry clinic at the Leeds Dental Institute.

Results: Most dentists (74.4%) routinely screened children for periodontal disease and 92.6% of these dentists reported using the Simplified BPE screening system on child patients. Most dentists thought that using the Simplified BPE screening system is an accepted, comfortable, quick and easy system to use in child patients. However, 67% of dentists thought that parents do not expect their children to be screened for periodontal disease.

Most parents (95%) were aware of the importance of their child being checked for periodontal disease. However, 45% of the parents did not know if their child was previously checked for periodontal disease. Most parents were aware of signs of periodontal disease, but not about causes of periodontal disease. Almost half of the parents (44%) did not expect their child to be screened for periodontal disease.

Conclusions: Most dentists screened child patients using the Simplified BPE screening system and were aware of the guidelines. Most parents were aware about signs of periodontal disease, but had insufficient knowledge about causes, and means of preventing periodontal disease.

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LIST OF ABBREVIATIONS

- BPE: Basic Periodontal examination
- BSP: British Society of Periodontology
- BSPD: British Society of Paediatric Dentistry
- CPITN: Community Periodontal Index of Treatment Needs
- DPSI: Dutch Periodontal Screening Index
- DREC: Dental Research Ethics Committee
- EFP: European Federation of Periodontology
- FDI: World Dental Federation
- FGDP: Faculty of General Dental Practice
- GDC: General Dental Council
- LDI: Leeds Dental Institute
- LTHT: Leeds Teaching Hospitals NHS Trust
- NICE: National Institute for Health and Care Excellence
- NRES: National Research Ethics Service
- OHIP: Oral Health Impact Profile
- OIDP: Oral Impacts on Daily Performance
- PSR: Periodontal Screening and Recording
- R&D: Leeds Research and Development Directorate
- SIGN: Scottish Intercollegiate Guidelines Network
- SPSS: Statistical Program for Social Sciences
- UK: The United Kingdom
- WHO: World Health Organisation

Chapter 1

1. 0 LITERATURE REVIEW

1.1 Periodontal diseases:

The two major diseases that affect the oral cavity are dental caries and periodontal disease (Kingman and Albandar, 2002; Newman, 1985). The term 'periodontal disease' can refer to any developmental, neoplastic, traumatic, or metabolic disorders that affect the oral tissues. However, the term 'periodontal disease' usually describes the inflammatory pathologic conditions that affect the gingivae, supporting connective tissue, and alveolar bone (Armitage, 2004; Jordan, 2004; Albandar and Rams, 2002a). The aetiological factors of periodontal diseases are complex, but there is broad agreement that bacteria within the oral flora are the primary aetiological factor in the development of periodontal diseases (Kesic et al., 2008). The actions of these bacteria, combined with the responses of the host to the infection result in the manifestation of periodontal diseases (Baker and Roopenian, 2000). Periodontal diseases include a range of pathological conditions from mild gingivitis to severe periodontitis.

In the 2009 Adult Dental Health Survey conducted in England, Wales and Northern Ireland, only 17% of dentate adults had healthy periodontal tissues and no periodontal disease. That was characterised by no bleeding, no calculus, no periodontal pocketing of 4mm or more. Moreover, only 10% of dentate adults had excellent oral health. That was characterised by having 21

or more teeth, 18 or more sound and untreated teeth, no dental caries, no periodontal pocketing of 4mm or more. Good periodontal health was more common among adults under 45 years of age, than in older age groups. Moreover, dentate women were more likely than men to have very healthy periodontal tissues. Nineteen percent of dentate women had healthy periodontal tissues, compared to 14% of dentate men. Seventy five percent of adults reported that they brushed their teeth at least twice a day and 23% of adults reported brushing once a day. Only 2% of adults brushed their teeth less than once a day and only 1% never brushed their teeth. There was an association between the frequency of tooth brushing and age. Adults between the ages of 35 and 44 years were more likely to report brushing their teeth twice a day or more often, compared to older age groups. Frequency of tooth brushing also varied by gender, 82% of women reported brushing their teeth twice a day or more compared to 67% of men (Chadwick et al., 2009).

1.2 Gingivitis and periodontitis:

Traditionally periodontal diseases have been divided into two general categories based on the occurrence of loss of attachment: gingivitis and periodontitis (Armitage, 2004; Armitage, 1995). Gingivitis can be defined as the presence of gingival inflammation without loss of connective tissue attachment (Armitage, 2004; Armitage, 1995). The first clinical sign of gingivitis is the transudation of the gingival fluid. The redness of the gingiva is a result of the aggregation and enlargement of the blood vessels in the subepithelial connective tissue and loss of keratinisation of the facial part of the gingiva. The swelling and loss of texture of the gingiva happens as a result of the loss of

fibrous connective tissue (Lang et al., 2009; Clerehugh and Tugnait, 2001). In 1965, experimental gingivitis studies concluded that the accumulation of plaque on healthy gingiva resulted in gingivitis. These studies also concluded that practicing oral hygiene measures for seven days would help the gingiva return to its normal state (Loe et al., 1965). However, if oral hygiene measures are not applied this results in the development of chronic gingivitis. Chronic gingivitis is usually painless and as a result most patients would not be aware about the disease (Lang et al., 2009).

Plaque-induced gingivitis can occur from early childhood through the teenage years and in adulthood. Epidemiological studies report a low prevalence of gingivitis during early childhood. However, there is a gradual increase in prevalence of gingivitis reaching a peak around puberty. This is due to the changes in the bacterial composition of the dental plaque, the inflammatory cell response and hormonal changes (Bimstein and Matsson, 1999). Children may also be affected by non-plaque induced gingival lesions. These lesions include the following (Chapple, 2004): 1) Lesions caused by infective organisms, such as Herpangina and Canidosis; 2) Lesions associated with genetic conditions, such as Hereditary Gingival Fibromatosis; 3) Lesions associated with systemic diseases, such as Cyclic Neutropaenia and Crohn's disease; 4) Lesions caused by trauma, such as burns and ulcerations; 5) Lesions caused by medications, such as the one caused by methotrexate and doxycycline.

In the 2013 Child Dental Health Survey (Pitts et al., 2013) conducted in England, Wales and Northern Ireland, the proportion of eight year old children with some gingival inflammation was lower than in 2003, reducing from 64% in 2003 to 46% in 2013. The observed pattern of prevalence for gingival inflammation by age was similar to that observed in 2003. As in 2003, the proportion of children with plaque was highest in eight year olds, where seven in ten (71%) children were affected. The proportion of 12 and 15 year olds with plaque reduced between 2003 and 2013, from 74% to 64% in 12 year olds and 64% to 50% in 15 year olds. However, the percentage of children observed with calculus appeared to be higher in all age groups in 2013. As in 2003, the percentage of children with calculus increased with age, from 9% at 5 years to 28% at 8 years and 39% at 12 years.

A substantial proportion of adolescents begin to manifest loss of attachment of 1mm or more, consistent with the early stages of chronic periodontitis. In a longitudinal study conducted in the UK (Clerehugh et al., 1990), researchers followed 167 teenagers for five years and found that 3% had attachment loss of 1mm or more on at least one of the molars, premolars or incisors when examined at age 14 years rising to a prevalence of 37% at 16 years and to 77% at 19 years of age. Periodontal pathogens found in the subgingival plaque of adults with chronic periodontitis have also been found in the subgingival plaque of adolescents with chronic periodontitis namely *Porphyromonas gingivalis*, *Prevotella intermedia* and *Aggregatibacter actinomycetemcomitans* (Clerehugh et al., 1997). Dentists need to be aware that a small proportion of

adolescents may suffer from aggressive periodontitis, which is detailed in the next section.

Periodontitis can be defined as the presence of gingival inflammation and the loss of connective tissue attachment, which may lead to alveolar bone loss and eventually tooth loss (Kesic et al., 2008; Clerehugh and Tugnait, 2001). The current understanding is that gingivitis is the precursor to periodontitis. However, it is clear that not all gingivitis lesions progress to periodontitis (Kesic et al., 2008). It is not yet clear what proportion of gingivitis lesions progress to periodontitis, or what factors are responsible for this progression. Epidemiological studies have shown that gingivitis and periodontitis can affect children, adolescents, as well adults (Lang et al., 2009).

A series of longitudinal studies have been conducted on a patients' cohort of 565 Norwegian middle class male participants (Schatzle et al., 2004; Heitz-Mayfield et al., 2003; Schatzle et al., 2003). The studies were conducted over a 26 year period on participants between 16 and 34 years of age at the start of the study. The researchers aimed to reveal the natural history of initial periodontitis. All participants had been enrolled in Oslo's City Dental Program during their childhood, reported being seen by their private dentists on a regular basis, and reported practicing oral hygiene measures on a daily basis. As part of the studies, a series of dental examinations were performed between 1971 and 1995. Only 223 participants attended the last dental examination and were included in the analysis. The indices collected during

the studies included plaque index, calculus index, gingival recession and loss of attachment. The researchers concluded that the development of periodontitis was always preceded by long-standing gingivitis. They also concluded that gingivitis was a risk factor of tooth loss. Teeth that were constantly surrounded with inflamed gingiva were significantly at a higher risk of being lost compared to teeth with no or slight inflammation (Schatzle et al., 2004; Heitz-Mayfield et al., 2003; Schatzle et al., 2003).

1.3 Classification of Periodontal diseases:

The first classification system for periodontal diseases was described by Joseph Fox in 1806, since that time a number of classifications for periodontal diseases have been developed. The most recent classification was proposed by 'The International Workshop for the Classification of Periodontal Diseases 1999' (Table 1). It used the current evidence base to develop a system that best fitted the current understanding of disease pathogenesis, and in doing so addressed a number of issues that were lacking in previous classifications (Armitage, 2004; Armitage, 1999).

I. Gingival Diseases

- A. Dental **plaque induced** gingival diseases
- B. **Non-dental plaque** induced gingival lesions

II. Chronic Periodontitis

- A. Localised
- B. Generalised

III. Aggressive Periodontitis

- A. Localised
- B. Generalised

IV. Periodontitis as a Manifestation of Systemic Diseases

- A. Associated with haematological disorders
- B. Associated with genetic disorders
- C. Not otherwise specified

V. Necrotising Periodontal Diseases

- A. Necrotising ulcerative gingivitis
- B. Necrotising ulcerative periodontitis

VI. Abscesses of the Periodontium

- A. Gingival abscess
- B. Periodontal abscess
- C. Pericoronal abscess

VII. Periodontitis Associated with Endodontic Lesions

- A. Combined periodontic-endodontic lesions

VIII. Developmental or Acquired Deformities and Conditions

- A. Localised tooth related factors that modify or predispose to plaque induced gingival diseases/periodontitis
- B. Mucogingival deformities and conditions around teeth
- C. Mucogingival deformities and conditions on edentulous ridges
- D. Occlusal trauma

Table 1: Abbreviated version of the 1999 classification of periodontal diseases and conditions

1.3.1 Gingival diseases:

Gingivitis is characterised by oedema and redness of the gingival margins associated with the presence of deposits of plaque. Gingival hyperplasia is characterised by thickening of the gingival tissues and its aetiology includes physical causes such as irritation by plaque or calculus or repeated trauma. It can also be caused by pharmacological causes such as calcium channel blockers, anti-rejection medication for organ transplant patients and phenytoin, a medication used to treat epilepsy. Hormonal imbalances, such as the ones that occur during puberty and pregnancy can also affect the gingiva, as can viral and fungal infections (Armitage, 2004; Armitage, 1999).

1.3.2 Chronic periodontitis:

Chronic periodontitis is defined as an inflammatory condition characterised by erythema and oedema of the gingival margins, along with destruction of the junctional epithelium and alveolar bone to form periodontal pockets. It is recognised as the most frequently occurring form of periodontitis. Its onset may be at any age but is most commonly detected in adults. The prevalence and severity of chronic periodontitis increase with patient's age. Chronic periodontitis affects a variable number of teeth and has variable rates of progression. As a guide, severity of the disease has traditionally been characterised as being slight or early where bone loss is in the coronal third of the root, moderate where bone loss is in the middle third of the root and advanced when in the apical third of the root length. Signs of inflammation are often variable depending upon the patient's plaque control. As the disease

progresses mobility and migration of teeth, which may be individual or segmental, may occur (Highfield, 2009; Armitage, 1999).

1.3.3 Aggressive periodontitis:

Aggressive periodontitis consists of a group of rapidly progressing forms of periodontal disease that occur in otherwise clinically healthy individuals. Patients with aggressive periodontitis show a more rapid attachment loss and bone destruction that occurs earlier in life, compared to patients with chronic periodontitis. The following three features: 1) Rapid loss of attachment; 2) Bone destruction occurring at an early age; 3) Familial tendency, are considered to be the primary features of aggressive periodontitis. Secondary features of aggressive periodontitis were identified during the Workshop for the Classification of Periodontal Diseases and Conditions. These features were: 1) Relatively low amounts of bacterial deposits despite severe periodontal destruction; 2) Presence of hyper-responsive neutrophil phenotypes; 3) Increased proportions of *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* (Albandar, 2014; Highfield, 2009)

The following are additional specific features that were proposed to differentiate between localised and generalised forms of aggressive periodontitis. For localised aggressive periodontitis, the features are: 1) Circumpubertal onset; 2) Localised first permanent molar/incisor presentation with interproximal attachment loss on at least two permanent teeth and involving no more than two teeth other than first molars and incisors; 3) Robust

serum antibody response to infecting agents. For Generalised aggressive periodontitis, the features are: 1) Usually affects individuals under 30 years of age, but patients can be older; 2) Generalised interproximal attachment loss affecting at least three permanent teeth other than first molars and incisors; 3) Poor serum antibody response to infecting agents (Albandar, 2014; Jenkins and Papapanou, 2001; Armitage, 1999)

1.4 Aetiology of Periodontal diseases:

The primary aetiological factor in periodontal disease is the dental plaque (Socransky and Haffajee, 1994). Most patients who experience an accumulation of plaque will develop gingivitis (Loe et al., 1978). There are a number of reasons for an increase in susceptibility to periodontitis. The differences in patients' susceptibility are attributed to the amount of plaque, the microbial composition of the plaque, and the host response to the presence of dental plaque (Socransky and Haffajee, 1994).

1.5 Microbiology of periodontal diseases:

Dental plaque is a poly-microbial biofilm containing up to 500 species of bacteria. Up to half of these species are yet to be cultured (Paster et al., 2001). Dental plaque begins to form as soon as the teeth erupt. After prophylaxis the teeth are initially colonised by *Streptococci* and *Actinomyces* species. As the biofilm matures the type of bacteria contained within the plaque changes, from one composed primarily of Gram positive aerobic bacteria to one composed of primarily Gram negative motile rods (Kolenbrander et al., 2006).

In a study that was conducted in the UK in 2004 (Gafan et al., 2004), authors estimated the prevalence of *Porphyromonas gingivalis*, *Actinobacillus actinomycetemcomitans*, and *Tannerella forsythensis* in plaque taken from children with and without gingivitis. The study included 118 children divided into two groups. The first group included 65 children without gingivitis, and the second group included 53 children with gingivitis. The authors found that there was no significant difference between the two groups in the prevalence of *Porphyromonas gingivalis*, or *Actinobacillus actinomycetemcomitans*. However, the prevalence of *Tannerella forsythensis* was higher in children without gingivitis. Authors concluded that all three organisms can be detected in the dental plaque of healthy children (Gafan et al., 2004).

In addition to the effect of the dental biofilm in the initiation, the inflammatory response and other host factors must also be involved. These factors may determine whether the inflammatory response will be a protective preventive response, or an inflammatory response leading to tissue destruction (Kinane et al., 2006).

1.6 Risk factors of periodontal diseases:

Periodontal diseases have a multifactorial aetiology and a variety of proven and proposed internal and external risk factors (Baelum and Lopez, 2013; Petersen and Ogawa, 2005; Albandar and Rams, 2002b).

1.6.1 Internal risk factors:

Age:

Studies have shown that there is an increased risk of loss of periodontal connective tissue attachment with age. However, this may be due to an increased exposure to other internal and external risk factors alongside the aging process (Petersen and Ogawa, 2005; Sheiham and Netuveli, 2002). In the 2009 Adult Dental Health Survey conducted in England, Wales and Northern Ireland, good periodontal health was more common among adults under 45 years of age, compared to older age groups. Moreover, there was an association between the frequency of tooth brushing and age. Adults between the ages of 35 and 44 years were more likely to report brushing their teeth twice a day or more often, compared to older age groups (Chadwick et al., 2009).

Gender:

Studies have shown that women have better periodontal health, when compared to men but this may be due to their increased use of health services (Christensen et al., 2003). This could be attributed to their better oral hygiene practices (Yu et al., 2001). In the 2009 Adult Dental Health Survey, dentate women were more likely than men to have very healthy periodontal tissues. Nineteen percent of dentate women had healthy periodontal tissues, compared to 14% of dentate men. It was also found that 68% of women reported attending for regular check-ups compared to 54% of men. Frequency

of tooth brushing also varied by gender, 82% of women reported brushing their teeth twice a day or more compared to 67% of men (Chadwick et al., 2009).

Ethnicity:

The prevalence of periodontal diseases varies from country to country and within ethnic groups in the same country (Albandar et al., 1999). Studies conducted in the United States have shown higher prevalence of periodontal disease in African-Americans compared to Caucasians (Borrell et al., 2002). Ethnicity has also been proved to be a significant factor in the prevalence of periodontal disease in other countries (Kruger et al., 2010).

1.6.2 External risk factors:**Socio-economic status:**

There is an inverse relationship between the percentage of individuals who report problems with their teeth and the income level of the country in which they live (Petersen, 2008). Data collected in the 2009 Adult Dental Health Survey in the UK found that low education status was significantly linked to decreased frequencies of tooth brushing and dental attendance (Chadwick et al., 2009). In a study conducted in Brazil, authors found that periodontal health was significantly associated with years of formal education and low income (Bonfim et al., 2013).

Habits:

In a study conducted in 2012 (Lages et al., 2012), authors found a decreased prevalence of periodontal disease in groups of patients who did not drink alcohol or were occasional users, compared to patients who were moderate alcohol users, or intense alcohol users (Lages et al., 2012). There is evidence that smoking is an important risk factor for destructive periodontal disease. An association between smoking and the prevalence and severity of periodontitis was reported. Moreover, an association was also reported between smoking and the occurrence of necrotising ulcerative periodontitis. Moreover, recent studies reported that smoking may have a causal relationship with periodontitis and may negatively affect the success of periodontal treatment. The impact on periodontal health of smoking cigars and pipes is comparable to that of cigarette smoking (Albandar et al., 2000).

1.7 Periodontal disease and medical conditions:

Periodontitis is a chronic multifactorial inflammatory disease that is common, impairs aesthetics, causes tooth loss, and reduces quality of life. Periodontitis has potentially negative consequences for general health. Epidemiological studies have shown that periodontitis affects glycaemic control in diabetic patients. Periodontitis has also been shown to be associated with cardiovascular disease and adverse pregnancy outcomes. There is also evidence connecting periodontitis to nosocomial pulmonary infections, and rheumatoid arthritis (EFP, 2016).

1.7.1 Periodontitis and Diabetes Mellitus:

Diabetes Mellitus represents a group of metabolic diseases that are characterised by hyperglycaemia as a result of defects in insulin secretion, insulin action or both. Millions of people around the world are affected by diabetes and its complications including blindness, impaired wound healing, and renal dialysis. Studies have shown that periodontal diseases are another complication of diabetes (Kuo et al., 2008; Loe, 1993). Consistent evidence is available that demonstrates that periodontitis has an effect on glycaemic control in patients with diabetes. It also affects glycaemia in non-diabetic patients. There is a direct association between periodontitis severity and diabetes complication. Moreover, there is evidence of a strong bidirectional relationship between periodontal disease and diabetes (EFP, 2016; Kuo et al., 2008).

A systematic review was conducted in 2013 (Borgnakke et al., 2013) that investigated the effect of periodontal disease on diabetic control. Four reviewers evaluated 2246 citations and found only 17 eligible studies to include in the review. The researchers found evidence that there were significant adverse effects of periodontal disease on glycaemic control, diabetes complications, and the development of Type 2 Diabetes Mellitus (Borgnakke et al., 2013).

A systematic review was conducted in 2016 (Abariga and Whitomb, 2016) that investigated the association between periodontal disease and Gestational Diabetes Mellitus. Researchers found only 10 studies out of 114 that were

eligible to be included in this review. Researchers found that there was a significant association between periodontal disease and gestational diabetes mellitus. Women who had periodontal disease were at an increased risk of developing gestational diabetes compared to women without periodontal disease (Abariga and Whitomb, 2016).

1.7.2 Periodontitis and Cardiovascular disease:

Cardiovascular diseases are a large group of diseases including congestive heart failure, cardiac arrhythmias, coronary artery disease, valve heart disease and stroke. Epidemiological studies have shown that periodontitis increases the risk of future cardiovascular diseases. However, there is lack of strong evidence to establish the causal relationship between periodontal disease and cardiovascular diseases. Prevention and management of periodontal diseases can have a significant effect on improving cardiovascular function (EFP, 2016; Kuo et al., 2008).

A systematic review was conducted in 2003 (Scannapieco et al., 2003) that investigated the influence of periodontal disease on atherosclerosis, cardiovascular disease and stroke. Researchers included 31 eligible studies out of 1526 they identified. Authors found an association between periodontal disease and atherosclerosis. However, some studies did not report any association. Authors concluded that there was a modest association between periodontal disease, atherosclerosis and cardiovascular disease (Scannapieco et al., 2003).

1.7.3 Periodontitis and Adverse pregnancy outcomes:

During pregnancy, several physiological changes occur in the mother and developing baby. Some pregnancy related immunological changes occur, that increase the mother's suitability to infections including periodontal disease. Pregnancy associated gingival inflammations are a well-documented phenomenon that is accepted by the scientific community. The effect of periodontal diseases on the course of pregnancy and its outcomes is not clear. In clinical and epidemiological studies, gestational diabetes, low birth weight, and pre-term birth have been associated with periodontitis in the mother. However, some studies show no association between periodontitis and pregnancy outcomes (EFP, 2016; Armitage, 2013).

A systematic review was conducted in 2013 (Ide and Papapanou, 2013) that investigated the association between periodontal disease and pre-term birth, low birth weight. Researchers reviewed 18 eligible studies out of 694 studies they identified. The authors found that maternal periodontitis was modestly but significantly associated with low birth weight and pre-term birth (Ide and Papapanou, 2013).

1.7.4 Periodontitis and other diseases:

There is evidence of associations between periodontitis and chronic obstructive pulmonary disease, rheumatoid arthritis, obesity, and some cancers. However, the only evidence for causality is in relation to respiratory microorganisms that colonise the periodontal biofilm and may cause nosocomial pneumonia in ventilated patients (EFP, 2016).

1.8 Periodontal disease in children and adolescents:

Different forms of periodontal disease can affect children and adolescents ranging from gingivitis to periodontitis (Armitage, 2004; Jordan, 2004; Meyle and Gonzales, 2001). Gingivitis in children and adolescents is mainly caused by supragingival plaque. However, other risk factors can contribute to the development of gingivitis, such as smoking, stress, and poor diet. Dentists need to be aware of aggressive periodontitis that can affect a small portion of adolescents, and should be aware that children with aggressive periodontitis need to be referred to a specialist in periodontology or paediatric dentistry (Clerehugh and Kindelan, 2012).

1.9 Prevalence of periodontal disease in children and adolescents:

In the 2013 Child Dental Health Survey conducted in England, Wales and Northern Ireland, each of the six sextants of the mouth was examined for the presence of gingival inflammation, plaque and calculus. Then, in 15 year olds only, periodontal pocketing and the presence of bleeding were assessed. The proportion of eight year old children with some gingival inflammation was lower than in 2003, reducing from 64% in 2003 to 46% in 2013. The observed pattern of prevalence for gingival inflammation by age was similar to that observed in 2003. As in 2003, the proportion of children with plaque was highest in eight year olds, where seven in ten (71%) children were affected. The proportion of 12 and 15 year olds with plaque reduced between 2003 and 2013, from 74% to 64% in 12 year olds and 64% to 50% in 15 year olds. However, the

percentage of children observed with calculus appeared to be higher in all age groups in 2013. As in 2003, the percentage of children with calculus increased with age, from 9% at 5 years to 28% at 8 years and 39% at 12 years (Pitts et al., 2013). The 2003 Children's Dental Health Survey that included 10,381 children and adolescents provided important information regarding the prevalence of gingival inflammation in children and adolescents under 18 years. In that survey, authors found that 30-65% of children and adolescents had gingival inflammation. They also found that more than 50% of children and adolescents had deposits of plaque on their teeth (White et al., 2006).

1.10 Periodontal disease and quality of life:

A number of tools have been developed and validated to measure the impact of oral health on the quality of life. In 1994 the Oral Health Impact Profile (OHIP) was developed, which consisted of a series of 49 questions covering seven dimensions of impact of oral health: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and pain. A shortened version of the OHIP questionnaire was developed in 1997 and reduced the number of questions to 14. The OHIP-14 contained questions from each of the theoretical domains in the original (Slade, 1997). In 1995 the Oral Impact on Daily Living Index was developed, which examined the severity of the oral impacts identified by the OHIP. Further development of this index resulted in the Oral Impacts on Daily Performance (OIDP). The OIDP index assesses the severity of impacts with respect to nine daily tasks: eating, speaking, cleaning teeth or dentures, going out, relaxing, including sleeping, smiling, laughing and showing teeth without

embarrassment, carrying out major role or work, emotional instability, for example becoming more easily upset than usual and enjoying contact with other people such as friends, relatives and neighbours (Adulyanon and Sheiham, 1997). However, it is important to point out that using survey questionnaires can result in bias. Although questionnaires are effective in collecting data from a large number of subjects, they may be biased towards high performance. As questionnaires are means of self-reporting, they can be biased and inaccurate. Respondents to these quality of life measures may give responses that are inaccurate to appear knowledgeable or to show positive response when under investigation.

In a study that was conducted in the UK in 2010 (Bernabe and Marcenes, 2010), authors investigated the association between periodontal diseases and quality of life in adults. The study included 3,122 adults who participated in the 1998 Adult Dental Health Survey in the UK. The short form of the OHIP (OHIP-14) was used to assess oral health related quality of life. Authors concluded that periodontal disease was associated with quality of life, independent of socio-demographic characteristics and other conditions present in the mouth (Bernabe and Marcenes, 2010).

The Adult Dental Health Survey conducted in 2009 in England, Wales and Northern Ireland used both the OHIP-14 and OIDP indices to measure the impact of oral health and the severity of those impacts on daily living. Authors found that 46% of individuals presenting with periodontal pocketing of 6mm or more had at least one oral impact as compared to 35% of those without

pocketing. Individuals with poor periodontal health had more oral impacts and more severe impacts on daily performance, compared to individuals with better periodontal health (Nuttal et al., 2011).

In a systematic review conducted in 2015 that included 37 studies (Buset et al., 2016), authors investigated the effect of periodontal disease on oral health related quality of life. Authors found that there was a significant association between periodontal disease and oral health related quality of life in 28 of these studies. Authors concluded that there was increased impairment with greater extent and severity of periodontal diseases (Buset et al., 2016).

1.11 Examination for periodontal diseases:

Every dental patient should be examined for all oral diseases including but not limited to dental caries, periapical lesions, oral cancer, abnormalities, and periodontal diseases (Armitage, 2004). Oral examination to detect periodontal disease involves evaluating the gingiva, underlying connective tissues, and alveolar bone. The gingiva is visually assessed for any change in colour, shape, or any bleeding on gentle probing. Any of these signs may suggest the presence of gingivitis. A full assessment of periodontitis involves using both the periodontal probe and radiographs to measure pocket depths and alveolar bone loss respectively. If the periodontal probe can be inserted apical to the cemento-enamel junction, then this indicates that loss of periodontal connective tissue attachment has occurred and the formation of true periodontal pockets. The formation of periodontal pockets indicates the destruction of the periodontal ligament and resorption of alveolar bone

(Clerehugh and Tugnait, 2001). Conducting of a full periodontal examination can be time consuming and difficult for patients and dental practitioners (Velden, 2009; Landry and Jean, 2002; Khocht et al., 1996). Moreover, it would be difficult to perform full periodontal examinations on children. Periodontal screening systems have been developed to detect periodontal disease in a simple and quick way.

1.12 Periodontal screening:

In 1982, the World Health Organisation (WHO) introduced a periodontal screening system called the Community Periodontal Index of Treatment Needs (CPITN) in order to screen for advanced disease within the population as a whole (Ainamo et al., 1982). It facilitates the identification of risk patients, and dictates that more specific testing be performed for areas of the mouth, where historical attachment loss is evident (Ainamo et al., 1982). In the CPITN, the mouth is divided into six sextants and the recommended instrument is the WHO periodontal probe. Each of the six sextants: upper right (17-14), upper anterior (13-23), upper left (24-27), lower left (37-34), lower anterior (33-43), and lower right (44-47) is examined for bleeding on probing, calculus accumulation, and probing depth. The treatment need in a sextant is scored when two or more teeth are presented in that sextant. If only one tooth remains in the sextant, the tooth is included in the adjoining sextant. For each sextant, only one of the following scores is recorded: score 0 for no bleeding; score 1 for bleeding on gentle probing; score 2 for presence of calculus and plaque retentive factors; score 3 for periodontal pockets that are 4mm or 5mm in

depth; score 4 for periodontal pockets that are 6mm or deeper (Benigeri et al., 2000). In 1986, the British Society of Periodontology (BSP) recommended the introduction of the CPITN into general dental practice and the World Dental Federation (FDI) produced guidelines for its use as a simplified periodontal examination for dental practices (BSP, 1986; FDI, 1986).

A modification of the CPITN has been recommended by the BSP, which is called the Basic Periodontal Examination (BPE). This tool provides a quick, simple means of assessing a patient's periodontal condition and has been widely used in the UK for adults (Clerehugh and Tugnait, 2001). In the BPE screening system, the mouth is divided into six sextants (two anterior and four posterior regions; excluding wisdom teeth). The treatment need in a sextant is scored when two or more teeth are presented in that sextant. If only one tooth remains in the sextant, the tooth is included in the adjoining sextant. The periodontal tissues are examined for bleeding, plaque retentive factors and pocket depths. A WHO BPE probe is used which has a ball end 0.5 mm in diameter, and has a black band from 3.5 to 5.5 mm. Similar to the CPITN, one of the following scores is recorded for each sextant: score 0 for no bleeding; score 1 for bleeding on gentle probing; score 2 for presence of calculus and plaque retentive factors; score 3 for periodontal pockets that are 4mm or 5mm in depth; score 4 for periodontal pockets that are 6mm or deeper. However, in the BPE screening system an additional score is recorded (score *) which indicates the presence of furcation involvement (BSP, 2016).

The BPE should not be considered as replacement of periodontal indices designed to measure periodontal status such as the detailed six-point per tooth measurement of attachment levels, probing depths or bleeding on probing and the recording of recession. However, it can be very important in determining the patients who would benefit from a more detailed periodontal examination and who may require more complex periodontal therapy (Tugnait et al., 2004).

1.13 Periodontal screening in children:

As in adults, it is essential that the routine dental examination of children and adolescents includes an examination of hard and soft tissues, and an evaluation of the condition of periodontal tissues. Whilst the BPE has been widely used in adults, it was recognised that it was not being advocated for children. Accordingly, the BSP and the British Society of Paediatric Dentistry (BSPD) recommended that all children and adolescents should be routinely screened for periodontal disease as a part of their dental clinical examination (Clerehugh and Kindelan, 2012). A simplified version of the BPE screening system, described by Clerehugh and colleagues, was recommended by the BSP, which is appropriate for most children seen in dental practice (Clerehugh et al., 2004; Clerehugh and Tugnait, 2001). The Simplified BPE screening system gives the dental practitioner an easy and quick method of screening children and adolescents for any periodontal problems. This will give the dental practitioner an indication of the need of periodontal treatment or the need of further periodontal examination (Clerehugh and Kindelan, 2012).

The Simplified BPE screening system involves assessing index teeth (16, 11, 26, 36, 31, and 46) using a WHO 621 probe with a 0.5 mm ball end and black band at 3.5 to 5.5 mm (Figure 1). This screening system uses BPE codes 0,1, and 2 in 7 to 11 year old patients, and uses BPE codes 0,1,2,3,4 and * in 12 to 17 year old patients (Tugnait et al., 2004; Clerehugh and Tugnait, 2001). The BPE codes represent the following (Clerehugh and Kindelan, 2012): Code 0: represents healthy periodontal tissue, with no bleeding on probing, calculus, or pocketing more than 3.5 mm; Code 1: represents bleeding on probing, but no calculus or pocketing more than 3.5 mm; Code 2: represents a calculus or plaque retention factor, but no pocketing more than 3.5mm; Code 3: represents a shallow pocket, between 4mm and 5mm; Code 4: represents a deep pocket of more than 6mm; Code *: represents a furcation involvement (Figure 2).



Figure 1: WHO 621 probe.

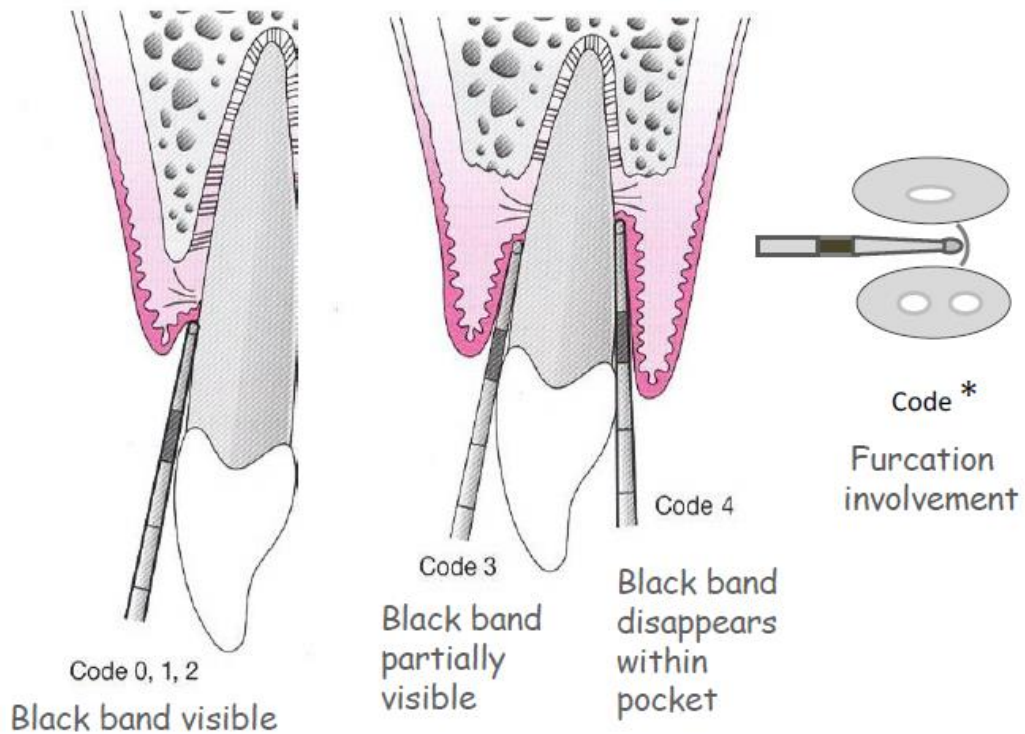


Figure 2: BPE screening system codes.

1.14 Guidelines:

Guidelines are “Systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances” (Institute of Medicine, 1992). They may provide instructions on which diagnostic or screening tests to perform, on how to provide medical or surgical care, or other details of clinical practice. Health professionals, policy makers, and payers see guidelines as means of increasing health care consistency and efficiency. They also see guidelines as means of closing the gap between scientific evidence and clinical practice (Woolf et al., 1999).

1.14.1 Potential benefits of clinical guidelines:

For patients and health care professionals, clinical guidelines can improve health outcomes and the quality of care. Clinical guidelines offer specific recommendations in different areas of clinical practice. They can improve the consistency of care and provide reliable recommendations that reassure practitioners about their interventions. Evidence-based guidelines can encourage the implementation of interventions that have been proven to be effective. Evidence-based guidelines can also discourage interventions that are ineffective, or dangerous to improve quality of life (Woolf et al., 1999; Effective Health Care, 1994; Grimshaw and Russell, 1993).

Clinical guidelines can benefit patients by summarising the benefits and risks of available treatment options, as well as the estimate of possible treatment outcome. As a result, patients can make more informed health care choices and consider their needs before selecting their best treatment option. Guidelines can also help patients by influencing public policy by calling attention to unrecognised health problems. Services that were not available to patients may be made available as a response to clinical guidelines (Woolf et al., 1999; Entwistle et al., 1998). Guidelines can be effective in improving the efficiency of health care by standardising care. They can also optimise value for money by releasing the health system resources needed for other health care services. Publicising adherence may improve public image and send messages of commitment to excellence and quality (Woolf et al., 1999).

1.14.2 Potential problems of clinical guidelines:

The most important limitation of guidelines is that recommendations can be incorrect or at least can be so for an individual patient. This can occur through unintentional oversights by busy or weary members of a guideline developer group, lack of scientific evidence, the poor composition of the guideline developer group or by recommendations influenced by opinions and anecdotal clinical experience. Moreover, patients' needs may not be the only priority when making these recommendations (Woolf et al., 1999).

A flawed clinical guideline can potentially impact patients' care. Incorrect clinical guidelines provide inaccurate recommendations and can encourage suboptimal, ineffective or harmful practices. Even when guidelines are evidence-based, they can be found to be difficult to use, impractical, time consuming or inconvenient (Cabana et al., 1999). Guidelines can adversely affect public policy for patients. Recommendations against particular interventions may force clinical practitioners to drop access to some care services. Guidelines can also harm health care systems by compromising operating efficiency and wasting limited resources (Woolf et al., 1999; Shapiro et al., 1993).

Looking at these mixed consequences, attitudes and perceptions about clinical guidelines would vary from one group to another. It is important to investigate whether clinicians know the information contained within clinical guidelines, and how to improve quality of care. However, it is more important

to identify specific barriers other than knowledge that may prevent behaviour change (Woolf et al., 1999; Shapiro et al., 1993).

1.14.3 Guidelines in Dentistry:

Incorporating evidence-based dental research findings into the care of patients has been found to be central in maximising the benefit and reducing any risks of dental treatment (Clarkson et al., 1999). Steps have been taken to improve the process of preparing, gathering and implementing the best research findings in clinical dental practice (Bader et al., 1999). As a result several guidelines have been developed in the UK in different specialities in dentistry to help achieve an optimal clinical practice. The number of guidelines in different parts of dentistry is growing. Several national guidelines have been published in the last decade. One example is the Guidelines for Periodontal Screening and Management of Children and Adolescents (Clerehugh and Kindelan, 2012).

1.14.4 Guidelines for Periodontal Screening and Management of Children and Adolescents:

Recent guidelines for the periodontal screening and management of children and adolescents (Clerehugh and Kindelan, 2012) have concluded that: 1) Early detection of periodontal disease in children and adolescents is essential for accurate diagnosis of periodontal disease or any underlying medical pathology; 2) A suitable periodontal screening should include the routine use of the Simplified BPE screening system on all index teeth. This should take place on the first visit to a dental practice, at recall, and before orthodontic

treatment; 3) BPE codes 4 and * are unusual in children and adolescents. If these codes are combined with the presence of bleeding and/ or tooth mobility, then a referral should be made to a specialist in periodontology or paediatric dentistry; 4) young children with unexplained premature exfoliation of their teeth, or with gross mobility of their teeth should be referred to a specialist in periodontology or paediatric dentistry. A guide on the frequency of undertaking the Simplified BPE screening system is as follows (Clerehugh and Kindelan, 2012):

If BPE = 0, screen the patient at routine recall visits or within one year, whichever is sooner.

If BPE = 1 or 2, treat and screen again at routine recall or after six months, whichever sooner.

If BPE = 3, record full probing depths (six sites per tooth) on the index tooth and check other teeth in the sextant, treat (oral hygiene instructions and root surface debridement) and review after three months.

If BPE = 4 or *, undertake full periodontal assessment and consider referral.

1.15 Barriers to following guidelines in healthcare:

There are many ways that can be used to communicate change of practice or communicate best practice to healthcare workers. However, it is seen that change is not necessarily implemented or followed. As a result, while in the process of developing a strategy for change, it is essential to understand the types of barriers faced in healthcare.

1.15.1 Awareness and knowledge:

There is evidence that healthcare professionals are often unaware of the latest evidence based guidelines. Healthcare practitioners might be aware about a specific clinical guideline, but do not know how their current practice needs to change to provide the best care for patients (NICE, 2007).

1.15.2 Acceptance and beliefs:

Perceptions of the benefits of any change versus the costs of that change are important. In addition, perceptions of the views of others can also have an impact on accepting change. Practitioners may not believe that new guidelines reflect the evidence, or that following new guidelines will lead to better outcomes. A health practitioner may not believe in their own ability to adopt a new guideline can also impact the implementation of change (NICE, 2007).

1.15.3 Skills and motivation:

Health care practitioners may need additional training to have the skills to deliver the best practice. They may also need time to learn new skills and implement them in their practice. Individual abilities and coping strategies will affect practitioners' ability in learning new skills. Intentions and goals can affect professionals' desire to change. Their priorities and commitments may also affect their ability to change practice (NICE, 2007).

1.15.4 Practicalities and the external environment:

These barriers can involve lack of resources or personnel, or difficulties in establishing service. In some cases new equipment is needed to follow a new guideline. It is also difficult to maintain change for a long term. This will depend on staff's long term availability and their priorities. The political and financial environment can have an effect on a practitioner's ability to make changes in practice. When considering organisations, financial systems may not facilitate payments for new interventions and resources (NICE, 2007).

1.16 Dental practitioners' awareness about guidelines and perceived barriers:

There are a limited number of studies investigating dental practitioners' awareness and compliance with clinical guidelines. There is also limited data on dental practitioner's perceived barriers to complying with guidelines. A study conducted in the UK (Farook et al., 2012) investigated dental trainers' and trainees' awareness and compliance with the NICE guidelines on antibiotic prophylaxis for high risk cardiac patients. The study used a questionnaire that was handed to dental trainers and trainees attending a conference at the London Deanery. Seventy trainers and 85 trainees completed the questionnaire. Most trainers (95.7%) and most trainees (94.1%) were aware about the guidelines. However, only 55.7% of trainers and 77.6% of trainees reported their compliance with the guidelines (Farook et al., 2012).

A study conducted in the UK in 2011 (Drage and Davies, 2013), investigated General Dental Practitioners' adherence to the NICE guidelines on recall intervals, and to the FGDP (UK)'s Selection Criteria for Dental Radiography. Two hundred and fifteen General Dental Practitioners were sent a questionnaire by post. One hundred and thirty three participants returned the questionnaire with a response rate of 61.9%. Most respondents were aware of the NICE recall guidelines (97.7%), and most were aware of the FGDP (UK) Selection Criteria of Dental Radiography guidelines (84.2%). However, only 27.7% of the respondents always followed the NICE recall guidelines. Moreover, only 39.7% of the respondents followed the FGDP (UK) Selection Criteria of Dental Radiography guidelines (Drage and Davies, 2013).

Another study conducted in the UK in 2010 (Berg and Palmer, 2012) also investigated General Dental Practitioners' awareness and compliance with the NICE guidelines on dental recalls. One hundred and ninety five General Dental Practitioners were sent a postal questionnaire. Of the 117 participants who returned the questionnaire (response rate 63%), 94% stated that they were aware of the guidelines. Sixty four percent of the respondents reported that they adhered with these guidelines. However, only 3% of the respondents recalled their patients according to patient need, in line with the NICE recall guidelines. Another finding of that study was that 46% of the respondents reported performing a BPE every six months or annually. Moreover, 35% of the respondents reported updating their patients BPE score at every recall visit (Berg and Palmer, 2012).

A study conducted in the UK in 2003 (Rogers et al., 2005) investigated General Dental Practitioners' awareness about the NICE guidelines for the removal of wisdom teeth. Five hundred and twenty two General Dental Practitioners were sent a postal questionnaire. Three hundred and eighty seven General Dental Practitioners returned that questionnaire with a response rate of 74%. Most respondents reported their awareness of the guidelines (86%). However, only 22% of the respondents reported that they followed the guidelines (Rogers et al., 2005).

A study was conducted in the United States in 2010 (Wilder et al., 2014) that investigated dentists' practice behaviours and perceived barriers regarding incorporating oral systemic evidence into clinical practice. The study included 1,350 licensed dentists working in North Carolina. These dentists were sent a piloted questionnaire by post. Six hundred and sixty seven dentists responded to the survey with a response rate of 48%. Most dentists (83%) reported that they perform periodontal examinations on new patients. However, 48% of these dentists reported delegating periodontal examinations to dental hygienists. The periodontal examinations reported ranged from full mouth probing to partial recording systems such as Periodontal Screening and Recording (PSR). The most reported barriers to incorporating oral systemic evidence were perceptions that patients would object to additional fees (59%), lack of education on systemic health (58%), and lack of reimbursement from third party payers (49%) (Wilder et al., 2014).

In a study conducted in Canada in 2009 (Ghiabi and Weerasinghe, 2011), authors investigated the extent to which general dentists provided periodontal examination and treatment for their patients. A questionnaire was mailed to 443 general dentists practicing in the province of Nova Scotia. Two hundred and seventy nine dentists returned the questionnaire with a response rate of 63%. Most respondents (94.8%) reported performing periodontal examinations for their patients. However, only 37.8% of the respondents reported performing full mouth probing depth measurements. Moreover, only 43.3% of the respondents reported performing partial probing depth measurements (Ghiabi and Weerasinghe, 2011).

In a study conducted in the Netherlands in 2006 (Velden, 2009), authors investigated dentists' use of the Dutch Periodontal Screening Index (DPSI). A questionnaire was sent to 300 dentists by post. One hundred and forty one participants returned the questionnaire with a response rate of 47%. Most dentists (75%) reported using the DPSI, but only 15.1% used it consistently when a regular check was performed. The mean required time to use the DPSI was three minutes (1 to 15 minutes). In general, respondents found the use of DPSI to be easy. However, the financial reimbursement was inadequate. The most common reason for not using the DPSI was lack of patient motivation. Dentists who never used the DPSI (22.2%), mostly reported time constraints as a major barrier (Velden, 2009).

From these studies we can conclude that dentists are aware of clinical guidelines. However, there is limited compliance with clinical guidelines in

dentistry. There were several barriers mentioned that may have prevented dentists from following clinical guidelines including lack of patient motivation, lack of third party reimbursements, and time constraints. Moreover, it is important to point out that the studies mentioned above used survey questionnaires. These questionnaire are means of self-reporting and can result in bias. Although questionnaires are effective in collecting data form a large number of subjects, they may be biased towards high performance. Respondents to these questionnaires may have given responses that are inaccurate to appear knowledgeable or to show positive responses when under investigation.

1.17 Ways to identify barriers to change:

To implement any new guideline or policy it is essential to identify the gap between the recommended practice and current practice. This will help identify barriers to change, and then plan actions needed to implement change. Ways of identifying barriers to change include: 1) Talking to key individuals; 2) Observation of practice; 3) Conducting focus groups; 4) Using questionnaires (NICE, 2007).

Focus groups are a powerful tool in evaluating current practice and testing new ideas. Focus groups usually involve a group of six to ten individuals who discuss their experiences and thoughts. Focus groups can have the following advantages: 1) Enable a representative group of people to share ideas; 2) Get people engaged in the change process; 3) Relatively quick and easy to

perform. However, they can have the following disadvantages: 1) Need a skilled facilitator; 2) Difficult to find a time that is suitable for everyone involved; 3) Analysis can be time consuming. Questionnaires are good for exploring the knowledge, beliefs, attitudes and behaviours of healthcare professionals. Using questionnaires can have the following advantages: 1) Rapid collection of large amounts of data from a large number of individuals; 2) Highlights the need for change through publication of the results; 3) Relatively inexpensive. However, using questionnaires also has some disadvantages, including: 1) The significant time needed for their development; 2) Response rates may be low; 3) The nature of self-reporting and bias (NICE, 2007).

1.18 Interventions for introducing guidelines in clinical practice:

There are three ways of incorporating evidence-based guidelines into clinical practice. These are "diffusion", "dissemination" and "implementation". Diffusion is a passive concept that is unplanned and uncontrolled, in which untargeted information flows away from its origin. This process depends on its audience's interest, motivation and effort (Lomas, 1993). Dissemination can be defined as the launching of targeted information aimed specifically at a particular audience which raises awareness of new and relevant research knowledge. Dissemination alone is not sufficient enough though to promote changes in practice (Lomas, 1993). Implementation involves identifying and assisting in overcoming the barriers to utilise the knowledge obtained from a message. "It is a more active process still which uses not only the message itself but also organisational and behavioural tools that are sensitive to

limitations and abilities of identified clinicians in identified settings" (Lomas, 1993).

1.19 Guidelines implementation strategies:

Studies have shown that passive dissemination of clinical guidelines alone is rarely effective in changing practice. Therefore, it is important to find effective implementation strategies to increase the implementation of research evidence in clinical practice (Effective Health Care, 1999; Lomas, 1991). The implementation strategies that have been assessed in medical practice include educational materials, educational meetings, educational outreach visits, opinion leaders, audit and feedback, reminder systems, and multi-faceted interventions. However, these implementation strategies are not effective in all situations. Only a few studies have investigated their effectiveness in dentistry (NICE, 2007; Bahrami et al., 2004; Effective Health Care, 1999; Lomas, 1991).

1.19.1 Educational materials:

These include leaflets, booklets, journal supplements, online tools, and computer programs. These educational materials can be used to inform health practitioners about new guidelines and policies in their practice field. Educational materials raise practitioners' awareness about needed change, but it is the responsibility of the practitioner to read these materials and understand the needed change (NICE, 2007).

1.19.2 Educational meetings:

These include conferences, workshops, training courses and lectures that are conducted to educate practitioners about the latest developments in their practice field. Conferences and lectures are effective in raising awareness, but interactive workshops are more effective in changing behaviour (NICE, 2007).

1.19.3 Clinical audit and feedback:

These involve retrospective reports to practitioners or organisations about their current practice. Audit and feedback are conducted to improve the quality of care provided. Audit and feedback are effective in generating change, and are more effective when combined with educational materials and meetings (NICE, 2007).

1.19.4 Reminder systems:

Reminders, such as stickers on medical notes and computer aided decision support systems enable quick access to best practice during a consultation. Reminders are effective in changing behaviour. Computer aided decision support systems can be effective in changing the delivery of preventive services (NICE, 2007).

A cluster randomised controlled trial was published in 2004 (Bahrami et al., 2004) that investigated the effectiveness of different guideline implementation strategies, using the SIGN guideline on the management of unerupted and

impacted third molars. The trial included 63 dental practices across Scotland, and compared a postgraduate education course, audit and feedback, and a computer aided learning package. The researchers concluded that neither computer aided learning packages, nor audit and feedback increased dentists' compliance with the guideline compared to mailing the guideline and the opportunity to attend a postgraduate training course (Bahrami et al., 2004).

1.20 Population awareness about oral health and periodontal disease:

A study conducted in the UK in 2010 (Aggarwal et al., 2010) investigated patients' knowledge about different dental diseases. The study included 105 patients who attended a general dental practice in North West England. Participants were asked to complete a survey questionnaire. Authors found that participants had better knowledge about risk factors of periodontal disease than about risk factors of caries and erosion. However, fewer patients (63.8%) were aware that dental flossing was more effective than mouth rinses in preventing periodontal diseases (Aggarwal et al., 2010).

A study was conducted in the Republic of Ireland (Elkarmi et al., 2015) that investigated the baseline knowledge of parents in regards to oral and dental health of their children. Researchers used questionnaires that were given to school pupils and their parents. They noted deficiencies in parents' knowledge about oral health in their children. The researchers also noted deficiencies in the oral hygiene practices, as very few parents brushed their child's teeth.

Almost half of the parents thought that the information available to them about oral health in young children was insufficient (Elkarmi et al., 2015).

It is of paramount importance that dental specialists and General Dental Practitioners are aware and comply with the recent guidelines for the periodontal screening and management of children and adolescents so that disease can be identified and managed early. However, there is scarcity of data regarding the awareness of dental specialists and General Dental Practitioners of these guidelines. The first study of the present research aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners are aware of and comply with the guidelines for periodontal screening and management of children and adolescents. In addition, it aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners use the BPE screening system for detection of periodontal disease in children, adolescents, and adults.

Moreover, it is of paramount importance that parents are aware about the importance of maintaining their child's oral health. Parents need to be aware about oral health conditions that could affect their children including periodontal disease. Parents also need to be aware about the importance of regular dental examinations including routine periodontal screening for their child. However, there is scarcity of data regarding parents' knowledge and awareness about children's oral health, periodontal disease, and the importance of regular dental examinations including routine periodontal screening. The second study of the present research aimed to investigate the

awareness of parents about periodontal disease, and the importance of periodontal screening in children and adolescents.

Chapter 2

2.0 STUDY ONE DESIGN

“Investigation of the use of the BPE screening system by specialists and General Dental Practitioners in children, adolescents, and adults”

2.1 Aims:

This study aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners use the BPE screening system routinely to detect periodontal disease in children, adolescents, and adults. This study also aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners are aware and comply with the guidelines for periodontal screening and management of children and adolescents. This study also aimed to investigate any barriers that paediatric dental specialists and General Dental Practitioners may perceive while using the BPE screening system on their patients.

2.2 Hypotheses:

1- There is no difference between paediatric dental specialists and General Dental Practitioners in their use of the BPE screening system to detect periodontal disease in children, adolescents, and adults.

2- There is no difference between paediatric dental specialists and General Dental Practitioners in their awareness of the guidelines for periodontal screening and management of children and adolescents.

3- There is no difference between paediatric dental specialists and General Dental Practitioners in perceiving barriers when using the BPE screening system on their patients.

2.3 Impact:

The study is very important as it:

1- Determined the extent to which paediatric dental specialists and General Dental Practitioners screen their patients to detect periodontal disease.

2- Determined the extent to which paediatric dental specialists and General Dental Practitioners are aware of, and comply with the guidelines for periodontal screening and management of children and adolescents.

3- Emphasised the importance of these guidelines and determined how they should best be disseminated to the dental profession.

4- Helped detect barriers that dentists may perceive in using the BPE screening system in their patients.

2.4 Materials and Methods:

For this cross-sectional study, a questionnaire was developed (Appendix 1). A search of the literature was conducted to find studies that published

questionnaires investigating the use of the BPE screening system, and investigating dental practitioners' awareness and adherence to guidelines. A few studies that investigated dental practitioners' awareness and adherence to guidelines with published questionnaires were found (Drage and Davies, 2013; Berg and Palmer, 2012; Rogers et al., 2005). However, no studies that published a questionnaire investigating the use of the BPE screening system could be found. The questionnaire was developed after looking at the published questionnaires found and at the guidelines for periodontal screening and management of children and adolescents (Clerehugh and Kindelan, 2012). The questionnaire consisted of 21 questions divided into four sections. The first section asked participants about background information such as gender and age. It also asked participants about years of experience, country of graduation, additional qualifications, and areas of special interest in dentistry.

The second section asked participants if they routinely screened child patients for periodontal disease, and if they used the Simplified BPE screening system on child patients. It asked participants to indicate which patient groups they used the Simplified BPE screening system on. It also asked participants to report the extent to which they agreed or disagreed with five different statements about using the Simplified BPE screening system on child patients. Participants were asked to express their agreement or disagreement with those statements using a Likert scale. The last question in this section asked participants to report barriers they thought may prevent them (if any) from

using the Simplified BPE screening system on child patients. Participants who only see adult patients were asked to skip this section (Appendix 1).

The third section asked participants if they routinely screened adult patients for periodontal disease. It asked participants if they used the BPE screening on adult patients. It asked participants to indicate which patient groups they used the BPE screening system on. It also asked participants to report the extent to which they agreed or disagreed with five different statements about using the BPE screening system on adult patients. Participants were asked to express their agreement or disagreement with those statements using a Likert scale. The last question in this section asked participants to report barriers they thought may prevent them (if any) from using the BPE screening system on adult patients. Participants who only see child patients were asked to skip this section (Appendix 1).

The fourth and last section asked participants if they were aware of any differences between the BPE screening system and the Simplified BPE screening system. It asked participants if they were aware of any new guidelines for using the Simplified BPE screening system in children and adolescents. It asked participants to report where they found about the guidelines. It also asked participants to report how they thought these guidelines should be disseminated to reach the dental profession (Appendix 1). The questionnaire was piloted by 10 individuals (staff and postgraduate students) to check the questions for clarity and content. The questionnaire was

edited according to the comments received while piloting. Instructions were added to some of the questions indicating that participants choose one or more answer options.

Two invitation letters were prepared, one directed to paediatric dental specialists (Appendix 2) and the other directed to General Dental Practitioners (Appendix 3). The letters explained the purpose and rationale of the study. The letters asked participants to complete the questionnaire and return it using the prepaid postage envelope provided. Participants were asked to return the uncompleted questionnaire in the prepaid envelope, if they did not want to fill it in. We aimed to send the questionnaire along with the invitation letter to all paediatric dental specialists who are registered with the BSPD (n = 233), and an equivalent random sample (n = 233) of General Dental Practitioners who work in the UK and the Republic of Ireland.

2.5 Inclusion criteria:

- 1- Any paediatric dental specialist registered with the BSPD who agreed to participate in the study.

- 2- Any General Dental Practitioner working in the UK or the Republic of Ireland who agreed to participate in the study.

2.6 Exclusion criteria:

1- Any individual who was not a paediatric dental specialist registered with the BSPD.

2- Any individual who was not a General Dental Practitioner working in the UK or the Republic of Ireland.

3- Any dental specialist or General Dental Practitioner who did not agree to participate in this study.

2.7 Ethical approval:

Ethical approval was sought from the Dental Research Ethics Committee (DREC) at the Leeds Dental Institute (LDI). Ethical approval was granted in June 2015 (DREC Ethics application number – 070415/ZA/161). (Appendix 4) This was amended on 25/04/2016 (Appendix 5). The Chief Investigator made certain that the study was carried out in full conformance with the laws and regulations of the country in which the research was conducted and the World Medical Association Declaration of Helsinki (World Medical Association, 2008).

2.8 Recruitment:

All paediatric dental specialists registered with the BSPD (n = 233), along with an equivalent random sample of General Dental Practitioners who work in the UK or the Republic of Ireland (n = 233) were invited to participate in this study. A list of the paediatric dental specialists' names and addresses was obtained

from the administrators at the BSPD. All specialists were given unique identifying numbers ranging from S001 to S233. These unique numbers were noted on the questionnaires sent to the dental specialists, which then replaced their names and addresses on the data set. General Dental Practitioners' information was obtained from the GDC dental register. The register's website allows for searching by name, GDC number, town and postcode.

After consultation with a statistician, a specific randomisation technique was used to search by elements of the postcode unrelated to specific geographic location. This technique generated random lists of dentists within the UK and the Republic of Ireland. Using an online random letter generator (<http://www.dave-reed.com/Nifty/randSeq.html>), we generated random letters that would represent the two letters in the second part of the postcode, such as WD in LS6 1WD. These two letters would then be placed in the postcode search box. This would then result in a random list of dentists, who have these two letters (WD) in the second part of their postcode. This random list of dentists would contain dentists from different parts of the UK and the Republic of Ireland.

In most cases while searching on the GDC website, the two random letters represented the two letters in the second part the postcode. For example, (WD) in LS6 1WD. The search would result in a list of one to 250 dentists from different parts of the UK and the Republic of Ireland. This list of dentists would be suitable for use, as it does not represent a single geographical area. The

search result would be spread over a number of pages ranging from one page to 17 pages, with up to 15 dentists per page. In this case, we would then generate a random number between one and 15 using an online random number generator (<https://www.random.org/>), to randomly choose one dentist from each page. We then repeated this process, randomly choosing one dentist from each page. If there were 17 pages in the search result, then 17 dentists would have been randomly selected. If the last page in the search result contained less than 15 dentists (eight dentists for example), we would overcome this by randomly generating a number between one and eight for that page.

However, there were instances where the two random letters represented the two letters in the first part of the postcode of a city. For example, (LS) in LS6 1WD. The search would result in a list of more than 250 dentists, and the list of dentists would not be displayed due to its size. Even if the list consisted of less than 250 dentists and was displayed, we could not use it as the list represents a single geographical area. To overcome this issue we would generate a random number between zero and nine using an online random number generator (<https://www.random.org/>). We would then add that number in front of the two letters. For example, if we used the letters LS, the search result will be more than 250 dentists from Leeds and no results would be displayed. If we added a random number in front of the two letters as in (8LS), then the search result would consider that these two letters are in the second part of the postcode and give us a shorter list of dentists with the letters (LS) in the second part of their postcode. This would generate a list of dentists from

different parts of the UK and the Republic of Ireland spread over a number of pages ranging from one page to 17 pages, with up to 15 dentists per page. We would then randomly choose one dentist from each page according to the same method we used in the first scenario. This process was repeated until we reached the sample size desired ($n = 233$). After the search was completed, each General Dental Practitioner was given a unique number. These unique numbers ranged from G001 to G233, and replaced General Dental Practitioners' names and addresses on the data set.

Dentists in both groups were mailed the questionnaire along with an invitation letter explaining the purpose and rationale of the study. Each questionnaire had a unique identifying number, which replaced the participant's name and address on the data set. Participants who did not reply received two additional mail reminders, three weeks, and six weeks after sending the original mail post. Due to the low response rate from General Dental Practitioners, we consulted the statistician about the possibility of sending the questionnaire to an additional number of General Dental Practitioners. We then agreed to send the questionnaire to an additional 20 percent of General Dental Practitioners ($n = 46$). These General Dental Practitioners were randomly selected from the GDC register using the same randomisation technique stated above. General Dental Practitioners from this additional group who did not reply also received two additional reminders, three weeks and six weeks after their original mailing. Due to the response rate from the whole sample being low after the second reminder, we sent a third reminder to all participants who did not reply

to the original mail or the two reminders. The questionnaires were sent between January and May of 2016.

2.9 Risks and benefits:

This study posed no risk to the participants over and above those associated with completing the questionnaire. No identifying information was collected in the questionnaires. Unique identifying numbers replaced participants' names and addresses in the data set. While there were no personal benefits to participation in this study, the results from the study may help benefit future patients, as well as provide information to General Dental Practitioners. The results may also indicate how to disseminate guidelines to reach their target audience.

2.10 Confidentiality:

There was no link between questionnaire (answers) and individual respondents' (identifying information). The questionnaires were de-identified using unique identifying numbers. These unique identifying numbers replaced dentists' names and addresses on the data set.

2.11 Data Storage and analysis:

Data was aggregated and stored on a password-protected computer situated at the LDI, University of Leeds. Only members of the research team had

access to the study data. Data was analysed using the Statistical Program for Social Sciences (SPSS). Descriptive statistics were used to report demographic data of respondents. Chi-square tests were used to compare respondents from the two groups for every question in the questionnaire. For questions that had a Likert scale design, each answer option was given a number, and then Mann-Whitney U tests were used to compare respondents from the two groups. Responses for open ended questions were analysed using qualitative analysis.

Chapter 3

3.0 STUDY ONE RESULTS

3.1 Response rate:

In total, 512 participants were sent the survey questionnaire by post. These participants were 233 paediatric dental specialists, 233 General Dental Practitioners, and an additional 46 General Dental Practitioners who were added to increase the response rate. Two hundred and eighty five participants out of 512 (55.7%) returned the survey questionnaire. However, only 254 questionnaires were answered and were included in the analysis. As a result, the overall response rate of this study was 49.6%. One hundred and forty seven out of 233 paediatric dental specialists answered the questionnaire, with a response rate of 63%. One hundred and seven out of 279 General Dental Practitioners answered the questionnaire, with a response rate of 38.4%. It is important to point out that not all respondents answered every question in the survey. As a result, the results reported here are based on the number of respondents who answered each question.

3.2 Background information:

When participants were asked about their gender, 241 respondents out of 254 (94.9%) answered the question. These respondents were 138 out of 147 paediatric dental specialists (93.9%), and 103 out of 107 General Dental Practitioners (96.3%) (Table 2). In total 76 respondents (31.5%) were male,

and 165 respondents (68.5%) were female. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their gender distribution within the sample ($p=0.001$). One hundred and six paediatric dental specialists out of 138 were female (76.8%), compared to 59 out of 103 General Dental Practitioners (57.3%) (Figure 3).

Question		Specialist n (%)	GDP n (%)	Total n (%)	P-value
Gender	Male	32 (23.2)	44 (42.7)	76 (31.5)	0.001*
	Female	106 (76.8)	59 (57.3)	165 (68.5)	
	Total	138	103	241	
Age	Less than 34 years	16 (11)	32 (29.9)	48 (19)	<0.001*
	35 - 44	48 (32.9)	38 (35.5)	86 (34)	
	45 - 54	45 (30.8)	26 (24.3)	71 (28.1)	
	55 - 64	30 (20.5)	9 (8.4)	39 (15.4)	
	65 years or more	7 (4.8)	2 (1.9)	9 (3.6)	
	Total	146	107	253	
Years of experience	10 years or less	15 (10.2)	31 (29)	46 (18.1)	<0.001*
	11 – 20	53 (36.1)	38 (35.5)	91 (35.8)	
	21 – 30	40 (27.2)	29 (27.1)	69 (27.2)	
	31 – 40	30 (20.4)	7 (6.5)	37 (14.6)	
	More than 40 years	9 (6.1)	2 (1.9)	11 (4.3)	
	Total	147	107	254	

Table 2: Demographic characteristics and a comparison between paediatric dental specialists and General Dental Practitioners. Percentages are based on the number of respondents who answered the questions. (*) Significant difference between the two groups.

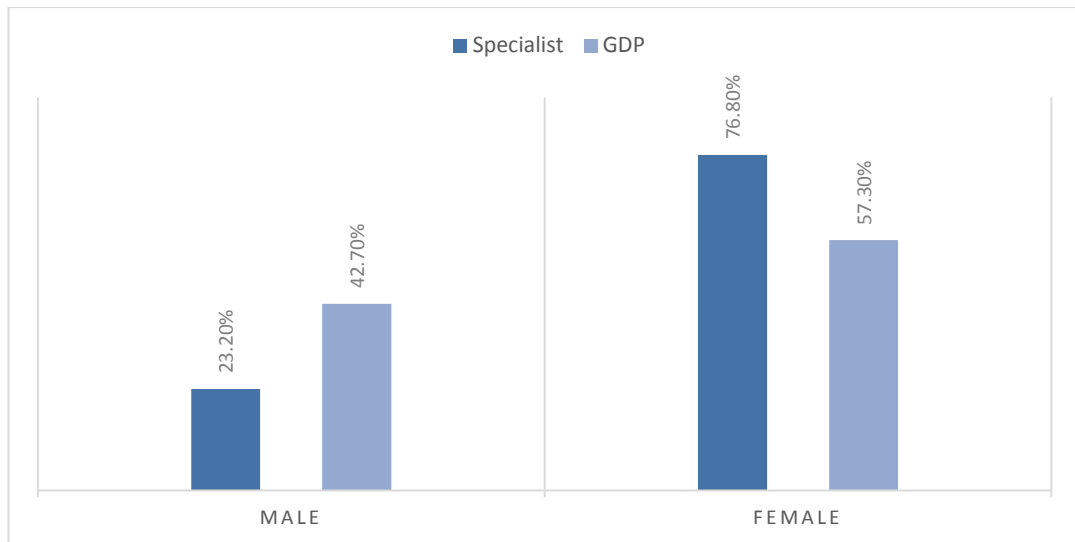


Figure 3: Gender distribution within the sample. Percentages are based on the number of respondents who answered the question.

Two hundred and fifty three respondents out of 254 (99.6%) answered the question asking about their age group. These respondents were 146 out of 147 paediatric dental specialists (99.3%), and all 107 General Dental Practitioners (100%) (Table 2). In total, 48 respondents (19%) were 34 years old or younger. Eighty six respondents (34%) were between 35 and 44 years old. Seventy one respondents (28.1%) were between 45 and 54 years old. Thirty nine respondents (15.4%) were between 55 and 64 years old. Only nine respondents (3.5%) were 65 years old or older.

There was a significant difference between paediatric dental specialists and General Dental Practitioners in their age distribution within the sample ($p < 0.001$). Only 16 out of 146 paediatric dental specialists (11%) were 34 years old or younger, compared to 32 out of 107 General Dental Practitioners (29.9%). Thirty out of 146 paediatric dental specialists (20.5%) were between

55 and 64 years old, compared to only nine out of 107 General Dental Practitioners (8.4%) (Figure 4).

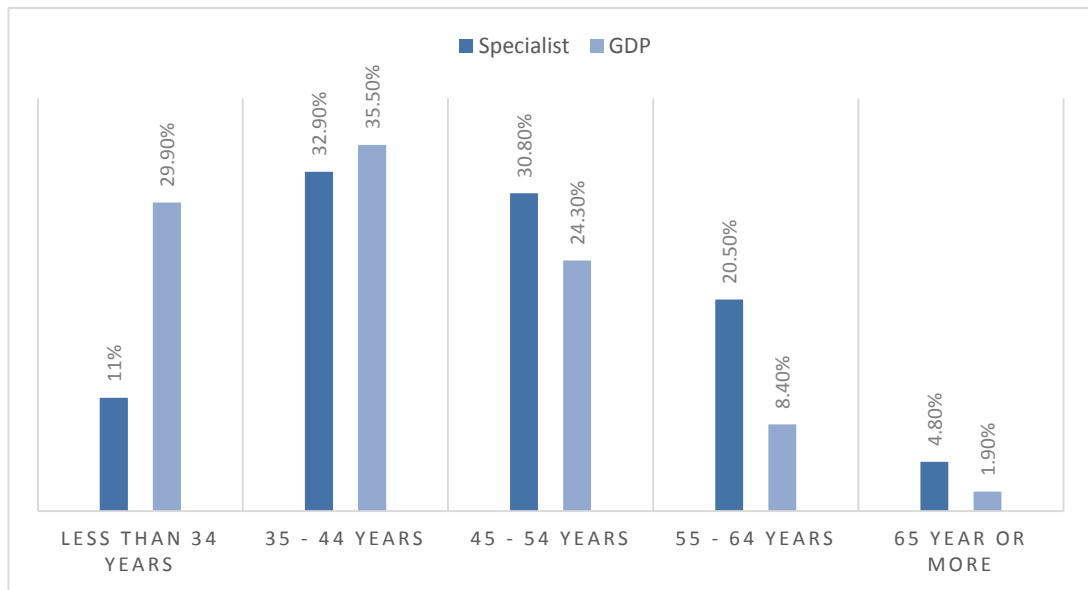


Figure 4: Age group distribution within the sample. Percentages are based on the number of respondents who answered the question.

3.3 Years of experience and country of graduation:

All 254 respondents answered the question asking about the number of years, since they graduated with their primary dental degree (100%). These respondents were all 147 paediatric dental specialists, and all 107 General Dental Practitioners (Table 2). In total, 46 respondents (18.1%) graduated in the last 10 years. Ninety one respondents (35.8%) graduated 11 to 20 years ago. Sixty nine respondents (27.2%) graduated 21 to 30 years ago. Thirty seven respondents (14.6%) graduated 31 to 40 years ago. Only 11 respondents (4.3%) graduated more than 40 years ago. There was a significant difference between paediatric dental specialists and General Dental Practitioners in the number of years since graduation with the primary dental

degree ($p < 0.001$). Only 15 out of 147 paediatric dental specialists (10.2%) graduated in the last 10 years, compared to 31 out of 107 General Dental Practitioners (29%). Thirty out of 147 paediatric dental specialists (20.4%) graduated 31 to 40 years ago, compared to only seven out of 107 General Dental Practitioners (6.5%) (Figure 5).

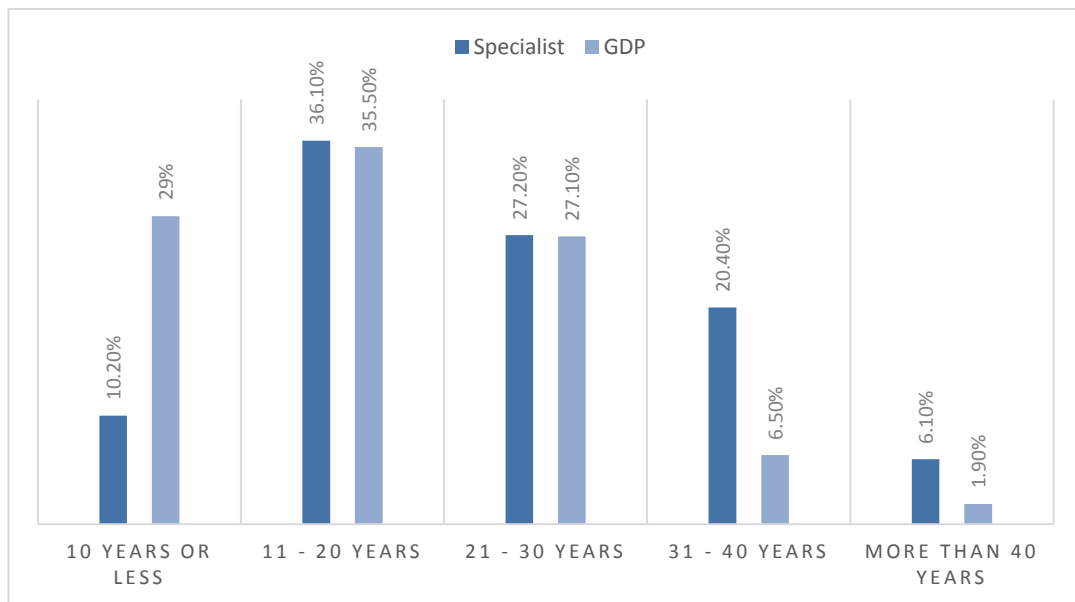


Figure 5: Years of experience in the sample. Percentages are based on the number of respondents who answered the question.

Two hundred and fifty one respondents out of 254 (98.8%) answered the question asking about the country where they received their primary dental degree. These respondents were 146 out of 147 paediatric dental specialists (99.3%), and 105 out of 107 General Dental Practitioners (98.1%). In total, 212 respondents out of 251 (84.5%) graduated in the UK. Nine out of 251 respondents (3.6%) graduated in India. Seven out of 251 respondents (2.8%) graduated in the Republic of Ireland. Four respondents out 251 (1.6%) graduated in Poland. Three respondents out of 251 (1.2%) graduated from

each of Jordan and Portugal. Two respondents out of 251 (0.8%) graduated from each of Greece, Nigeria, and South Africa. One respondent out of 251 (0.4%) graduated from each of Bulgaria, Brazil, Czech Republic, Germany, Hungary, Sweden and Spain. There was no significant difference between paediatric dental specialists and General Dental Practitioners in the countries, where they received their primary dental degree. ($p=0.074$). One hundred and twenty six out of 146 paediatric dental specialists (86.3%) and 86 out of 105 General Dental Practitioners (81.9%) received their primary dental degree from the UK.

3.4 Additional qualifications and specialist lists:

Two hundred and fifty three respondents out of 254 answered the question asking about completing any additional qualifications after completing their primary dental degree (99.6%). These respondents were all 147 paediatric dental specialists (100%), and 106 out of 107 General Dental Practitioners (99.1%). In total, 194 respondents (76.7%) reported that they had completed additional qualifications after their primary dental degree. There was a significant difference between paediatric dental specialists and General Dental Practitioners in completing additional qualifications ($p<0.001$). All 147 paediatric dental specialists (100%) reported completing additional qualifications after their primary dental degree, compared to only 47 out of 106 General Dental Practitioners (44.3%) (Figure 6).

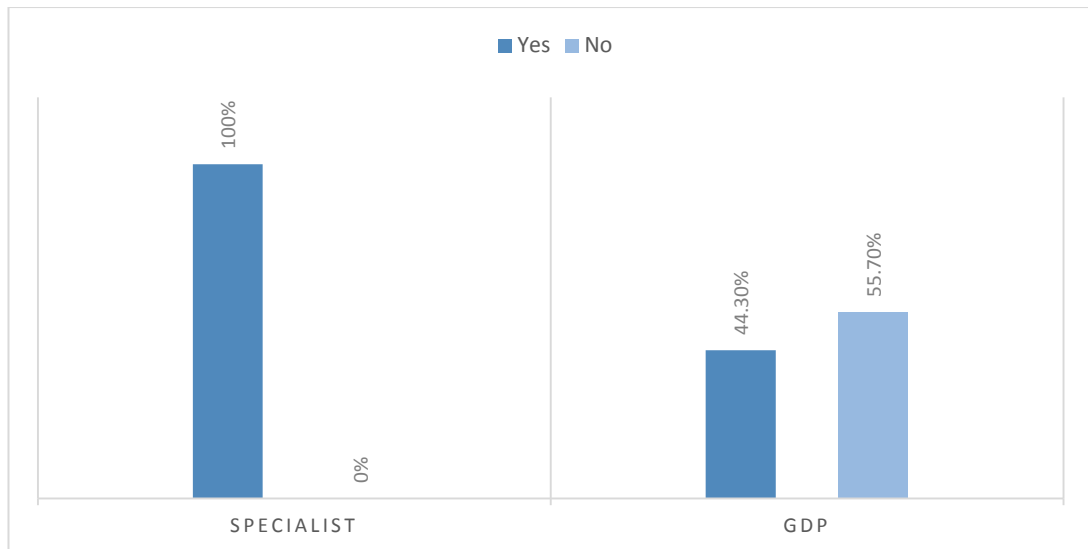


Figure 6: Proportion of respondents who completed additional qualifications. Percentages are based on the number of respondents who answered the question.

A total of 192 respondents out of 254 (75.6%) listed the additional qualifications they completed after they graduated with their primary dental degree. These respondents were 145 out of 147 paediatric dental specialists (98.6%), and 47 out of 107 General Dental Practitioners (43.9%). Fifty out of 192 respondents (26%) reported completing a specialty exam in paediatric dentistry. Forty eight respondents out of 192 (25%) reported completing a Master's degree. Twenty nine respondents out of 192 (15.1%) reported completing a PhD degree. Nineteen respondents out of 192 (9.9%) reported completing a fellowship in dental surgery. Seventeen respondents out of 192 (8.9%) reported completing membership of dental faculty exams. Twelve respondents out of 192 (6.3%) reported completing Diplomas. Eight respondents out of 192 (4.2%) reported completing a clinical certificate. Eight respondents out of 192 (4.2%) reported completing the Intercollegiate

Specialty Fellowship Examination. One respondent out of 192 (0.5%) reported completing a Doctorate degree.

There was a significant difference between paediatric dental specialists and General Dental Practitioners in their reported additional qualifications ($p < 0.001$). Fifty paediatric dental specialists out of 145 (34.5%) reported completing a specialist exam in paediatric dentistry, compared to none of the General Dental Practitioners. Twenty nine out of 145 paediatric dental specialists (20%) reported completing a PhD degree, compared to none of the General Dental Practitioners. Eleven General Dental Practitioners out of 47 (23.4%) reported completing a Diploma, compared to none of the paediatric dental specialists (Figure 7).

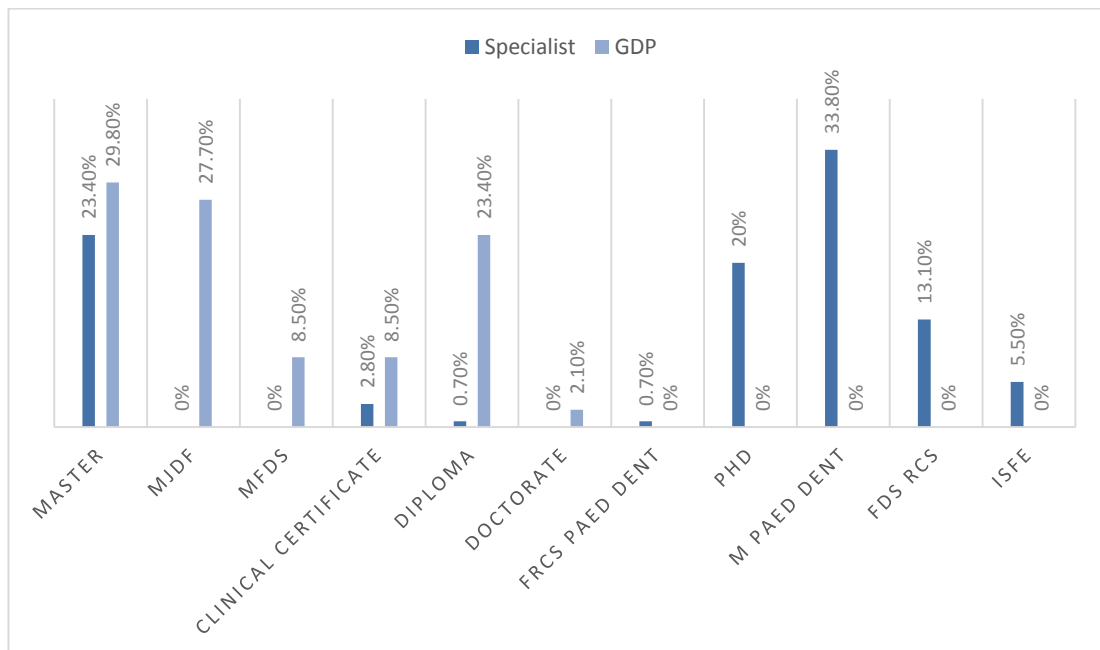


Figure 7: Respondents' listed additional qualifications. Percentages are based on the number of respondents who answered the question.

Two hundred and fifty two respondents out of 254 answered the question asking about being registered on any specialist lists (99.2%). These respondents were all 147 paediatric dental specialists (100%), and 105 out of 107 General Dental Practitioners (98.1%). One hundred and forty six respondents out of 252 (57.9%) reported being listed on one of the specialist lists in the UK. One hundred and twenty eight of these respondents (87.7%) reported being listed on the paediatric dentistry specialist list. Nine of these respondents (6.2%) reported being listed on the special care dentistry specialist list. Three respondents (2.1%) reported being listed on the dental public health specialist list. There was a significant difference between dental specialists and General Dental Practitioners in being listed on any specialist lists ($p < 0.001$). One hundred and forty six out of 147 paediatric dental specialists (99.3%) reported being listed on a specialist list, compared to none of the General Dental Practitioners.

3.5 Areas of special interest in dentistry:

All 254 respondents (100%) answered the question asking about areas of special interest. These respondents were all 147 paediatric dental specialists and, all 107 General Dental Practitioners. In total, 26 respondents (10.2%) reported their interest in Endodontics. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Endodontics ($p = 0.011$). Seventeen out of 107 General Dental Practitioners (15.9%) reported their interest in Endodontics, compared to only nine out of 147 paediatric dental specialists (6.1%). Fifty seven respondents

in total (22.4%) reported their interest in General dentistry. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their interest in General dentistry ($p < 0.001$). Forty nine out of 107 General Dental Practitioners (45.8%) reported their interest in General dentistry, compared only eight out of 147 paediatric dental specialists (5.4%). Twenty two respondents in total (8.7%) reported their interest in Implants. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Implants ($p < 0.001$). Twenty two out of 107 General Dental Practitioners (20.6%) reported their interest in Implants, compared to none of the paediatric dental specialists (Figure 8).

Only seven respondents in total (2.8%) reported their interest in Oral pathology. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Oral pathology ($p = 1.000$). Only three General Dental Practitioners out of 107 (2.8%), and four paediatric dental specialists out of 147 (2.7%) reported their interest in Oral pathology. Twenty one respondents in total (8.3%) reported their interest in Oral surgery. There was a significant difference between dental specialists and General Dental Practitioners in their interest in Oral surgery ($p = 0.017$). Fourteen General Dental Practitioners out of 107 (13.1%) reported their interest in Oral surgery, compared to only seven out of 147 paediatric dental specialists (4.8%). Only eight respondents in total (3.1%) reported their interest in Orthodontics. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Orthodontics ($p = 0.287$). Only five out of 107 General Dental Practitioners

(4.7%) and three out of 147 paediatric dental specialists (2%) reported their interest in Orthodontics (Figure 8).

In total, 142 respondents (55.9%) reported their interest in Paediatric dentistry. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Paediatric dentistry ($p < 0.001$). One hundred and thirty three out of 147 paediatric dental specialists (90.5%) reported their interest in paediatric dentistry, compared to only nine out of 107 General Dental Practitioners (8.4%). Additionally, 12 paediatric dental specialists (8.2%) reported their interest in special care dentistry, compared to none of the General Dental Practitioners. Eleven respondents in total (4.3%) reported their interest in Periodontology. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Periodontology ($p = 0.057$). Only eight out of 107 General Dental Practitioners (7.5%) and only three out of 147 paediatric dental specialists (2%) reported their interest in Periodontology. Only nine respondents in total (3.5%) reported their interest in Prosthodontics. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their interest in Prosthodontics ($p = 0.005$). Only one paediatric dental specialist out of 147 (0.7%) reported being interested in Prosthodontics, compared to eight out of 107 General Dental Practitioners (7.5%) (Figure 8).

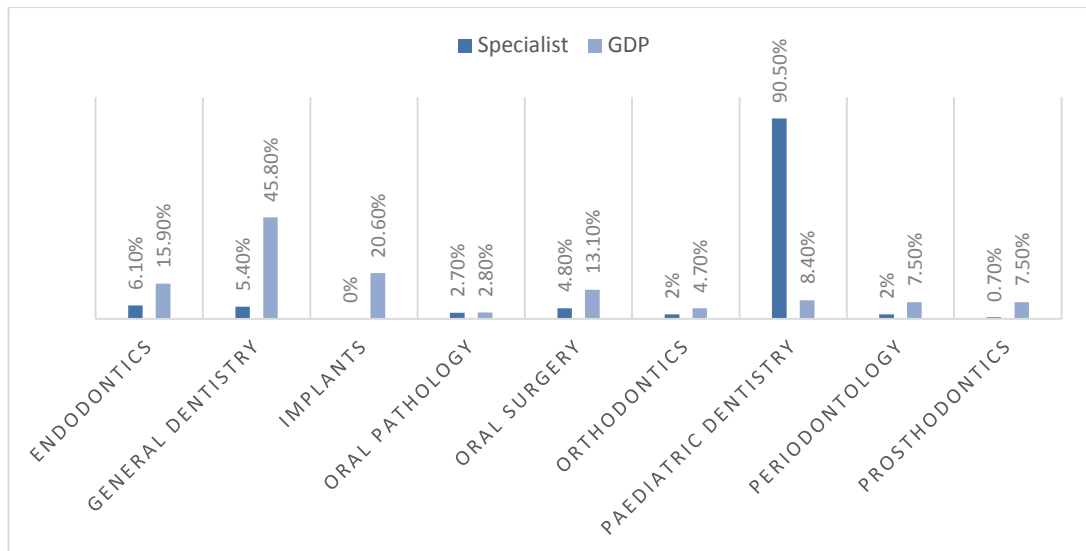


Figure 8: Respondents' areas of special interest. Percentages are based on the number of respondents who answered the question.

3.6 Screening children for periodontal disease:

Two hundred and forty three out of 254 respondents answered the question asking about routinely screening children for periodontal disease (95.7%). These respondents were 142 out of 147 paediatric dental specialists (96.6%), and 101 out of 107 General Dental Practitioners (94.4%). In total, 189 respondents (74.4%) reported that they routinely screen children for periodontal disease. There was a significant difference between paediatric dental specialists and General Dental Practitioners in routinely screening children for periodontal disease ($p=0.018$). One hundred and eighteen out of 142 paediatric dental specialists (83.1%) reported routinely screening children for periodontal disease, compared to 71 out of 101 General Dental Practitioners (70.3%).

One hundred and eighty nine respondents out of 254 (74.4%) answered the question asking about using the Simplified BPE screening system on child patients. In total, 175 respondents (92.6%) who routinely screen children for periodontal disease reported using the Simplified BPE screening system on child patients. These respondents were 118 out of 147 paediatric dental specialists (80.3%), and 71 out of 107 General Dental Practitioners (66.4%). There was a significant difference between paediatric dental specialists and General Dental Practitioners in their use of the Simplified BPE screening system on child patients ($p=0.007$). One hundred and fourteen out of 118 paediatric dental specialists (96.6%) reported using the Simplified BPE screening system on child patients, compared to 61 out of 71 General Dental Practitioners (85.9%).

3.7 Use of the Simplified BPE screening system on child patients:

One hundred and seventy five respondents out of 254 answered the question asking about their use of the Simplified BPE screening system on child patients (92.6%). These respondents were 114 out of 147 paediatric dental specialists (77.6%), and 61 out of 107 General Dental Practitioners (57%). Twenty two respondents out of 175 (12.6%) reported using the Simplified BPE screening system on new child patients up to 7 years of age. There was no significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.111$). Eleven out of 114 paediatric dental specialists (9.6%) and 11 out of 61 General Dental Practitioners (18%) reported using the

Simplified BPE screening system on new child patients up to 7 years old. One hundred and twenty seven respondents out of 175 (72.6%) reported using the Simplified BPE screening system on new child patients 7-11 years old. There was a significant difference between paediatric dental specialists and General Dental Practitioners here ($p<0.001$). Ninety five paediatric dental specialists out of 114 (83.3%) reported using the Simplified BPE screening system on new child patients 7-11 years old, compared to 32 out of 61 General Dental Practitioners (52.5%) (Figure 9).

One hundred and thirty nine respondents out of 175 (79.4%) reported using the Simplified BPE screening system on new child patients 12-17 years old. There was no significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.317$). Eighty eight out of 114 paediatric dental specialists (77.2%) and 51 out of 61 General Dental Practitioners (83.6%) reported using the Simplified BPE screening system on new child patients 12-17 years old. Eighty three respondents out of 175 (47.4%) reported using the Simplified BPE screening system annually for child patients with codes 0, 1 or 2. There was a significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.004$). Only 45 out of 114 paediatric dental specialists (39.5%), reported using the Simplified BPE screening system annually on child patients with codes 0, 1 or 2, compared to 38 out of 61 General Dental Practitioners (62.3%) (Figure 9).

Fifty seven respondents out of 175 (32.6%) reported using the Simplified BPE screening system on child/adolescent patients before starting orthodontic treatment. There was a significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.006$). Twenty nine out of 114 paediatric dental specialists (25.4%) reported using the Simplified BPE screening system on child/adolescent patients before starting orthodontic treatment, compared to 28 out of 61 General Dental Practitioners (45.9%) (Figure 9).

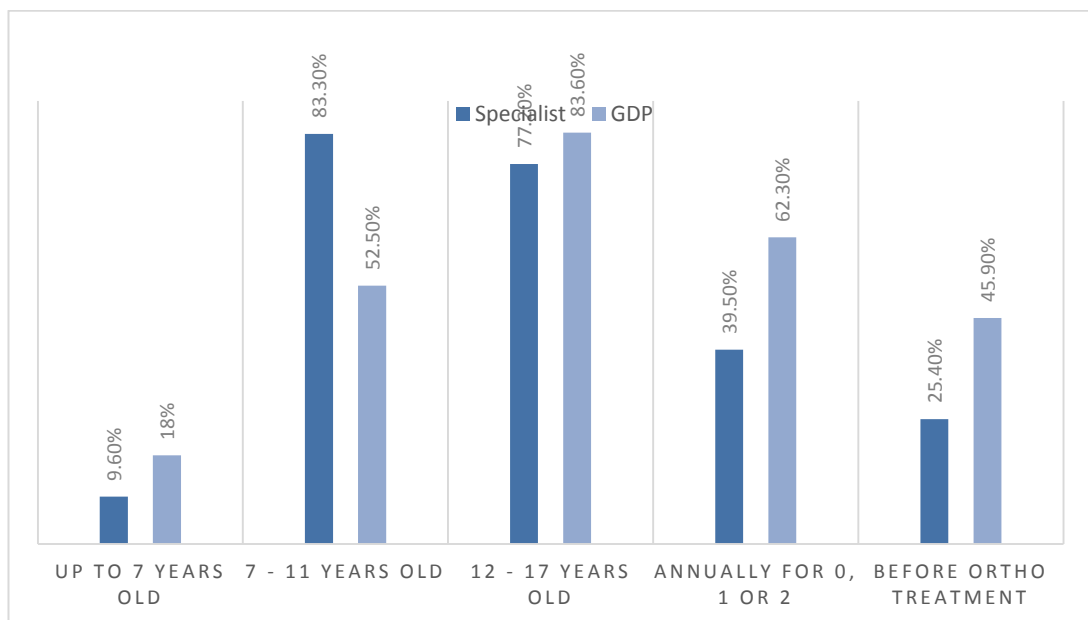


Figure 9: Respondents' use of the BPE screening system on child patients. Percentages are based on the number of respondents who answered the question.

3.8 Opinions regarding the use of the BPE screening system on child patients:

Respondents were asked about the extent to which they agreed or disagreed with several statements regarding their use of the Simplified BPE screening

system on child patients. In total, 173 respondents out of 254 (68.1%) reported their opinions on these statements. These respondents were 113 out of 147 paediatric dental specialists (76.9%) and 60 out of 107 General Dental Practitioners (56%). When respondents were asked about the extent to which they agreed or disagreed with “Parents expect their children to be screened for periodontal disease”, 116 out of 173 (67%) disagreed or strongly disagreed. Only 57 respondents out of 173 (33%) agreed or strongly agreed with this statement. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p < 0.001$). Eighty six paediatric dental specialists out of 113 (76.1%) disagreed or strongly disagreed with this statement, compared to 30 out of 60 General Dental Practitioners (50%) (Table 3).

When respondents were asked about the extent to which they agreed or disagreed with “Using the BPE screening system is accepted by child patients”, 159 out of 173 (92%) agreed or strongly agree with this statement. Only 14 out of 173 respondents (8%) disagreed or strongly disagreed with this statement. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p = 0.530$). One hundred and four out of 113 paediatric dental specialists (92%) and 55 out of 60 General Dental Practitioners (91.7%) agreed or strongly agreed with this statement. When respondents were asked about the extent to which they agreed or disagreed with “The BPE screening system is comfortable for child patients”, 142 out of 173 (82.1%) agreed or strongly agreed with this statement. Only 31 out of 173 respondents (17.9%) disagreed

or strongly disagreed with this statement. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.744$). Ninety two out of 113 paediatric dental specialists (81.4%) and 50 out of 60 General Dental Practitioners (83.4%) agreed or strongly agreed with this statement (Table 3).

When respondents were asked about the extent to which they agreed or disagreed with “Using the BPE screening system on child patients is quick”, 167 out of 173 (96.5%) agreed or strongly agreed with this statement. Only six out 173 respondents (3.5%) disagreed with statement. Moreover, none of the respondents strongly disagreed with this statement. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.834$). One hundred and ten out of 113 paediatric dental specialists (97.3%) and 57 out of 60 General Dental Practitioners (95%) agreed or strongly agreed with this statement.

When respondents were asked about the extent to which they agreed or disagreed with “Using the BPE screening system on child patients is easy”, 159 out of 173 (92%) agreed or strongly agreed with this statement. Only 14 out of 173 respondents (8%) disagreed or strongly disagreed with this statement. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.646$). One hundred and three out of 113 paediatric dental specialists (91.2%) and 56 out of 60 General Dental Practitioners (93.3%) agreed or strongly agreed with this statement (Table 3).

Parents expect their children to be screened for periodontal disease					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	6 (5.3)	21 (18.6)	61 (54)	25 (22.1)	<0.001*
GDP	5 (8.3)	25 (41.7)	26 (43.3)	4 (6.7)	
Total	11 (6.4)	46 (26.6)	87 (50.3)	29 (16.8)	
Using the BPE screening system is accepted by child patients					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	24 (21.2)	80 (70.8)	8 (7.1)	1 (0.9)	0.530
GDP	10 (16.7)	45 (75)	4 (6.7)	1 (1.7)	
Total	34 (19.7)	125 (72.3)	12 (6.9)	2 (1.2)	
The BPE screening system is comfortable for child patients					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	12 (10.6)	80 (70.8)	20 (17.7)	1 (0.9)	0.744
GDP	7 (11.7)	43 (71.7)	9 (15)	1 (1.7)	
Total	19 (11)	123 (71.1)	29 (16.8)	2 (1.2)	
Using the BPE screening system on child patients is quick					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	26 (23)	84 (74.3)	3 (2.7)	0	0.834
GDP	14 (23.3)	43 (71.7)	3 (5)	0	
Total	40 (23.1)	127 (73.4)	6 (3.5)	0	
Using the BPE screening system on child patients is easy					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	23 (20.4)	80 (70.8)	10 (8.8)	0	0.646
GDP	9 (15)	47 (78.3)	3 (5)	1 (1.7)	
Total	32 (18.5)	127 (73.4)	13 (7.5)	1 (0.6)	

Table 3: Respondents' opinions about using the BPE screening system on child patients. Percentages are based on the number of respondents who answered the question. (*) Significant difference between the two groups.

3.9 Barriers perceived when using the BPE screening system in child patients:

Participants were asked to report barriers they may perceive when using the BPE screening system on child patients. A total of 185 out of 254 participants answered this question (72.8%). These respondents were 114 out of 147 paediatric dental specialists (77.5%), and 71 out of 107 General Dental Practitioners (66.3%). A total of 24 respondents (13%) reported that they perceive no barriers when using the BPE screening system on child patients. These were 11 out of 114 paediatric dental specialists (7.5%), and 13 out of 71 General Dental Practitioners (18.3%).

When paediatric dental specialists' responses were analysed, three major themes emerged as possible barriers to using the BPE screening system on child patients. The first theme was patient anxiety and dental phobia. The following are some of the responses:

- *“Very anxious patients”*
- *“It can provoke anxiety in some patients”*
- *“Very anxious children who struggle even with a basic examination”*
- *“Most of my referred patients are anxious and there is a significant number who would not tolerate a BPE, so I don't even attempt it”*
- *“For a very anxious patient I may postpone BPE until I have acclimatised them further to the dental environment”*

The second theme was patient cooperation and behaviour issues. The following are some of the responses:

- *“None compliance in young children. Can be carried out for teenagers”*
- *“Behaviour difficulties – concerned about safety with unwanted head/hand movement”*
- *“Children I see often have challenging behaviour and poor OH. I will screen children if there are clinical indications, and if I am able to do so, especially if I suspect Juvenile periodontitis”*
- *“I don’t work in 1° care, so all of my patients have compliance issues of one form or another!”*
- *“Poor cooperation generally. Some patients are not even able to show their teeth let alone let you probe”*

The third theme was children with a special need or a medical condition. The following are some of the responses:

- *“Immunosuppressed/ immunocompromised child. Child with bleeding disorders”*
- *“I accept referrals for specific problems. Plus, many SP needs children”*
- *“I work mostly with patients with severe disabilities – such screening is not safely possible with many of them”*
- *“Unable to accept a reasonable exam eg some individuals with additional needs – need to be able to get probe in mouth”*
- *“I spend most of my time with children who have additional needs. Just examining their teeth is often difficult”*

Other barriers that were mentioned by the paediatric dental specialists were:

- Discomfort *“It is essentially an invasive procedure. It is uncomfortable + an unpleasant procedure + can impede gaining confidence and trust especially in the anxious patient”*
- Time *“Time is a factor when seeing NHS patients. NHS work generally gives minimum time to reach optimum standards of care”*
- Probe availability *“BPE probes not routinely put on trays for children examination. Have to ask every time for BPE probe separately”*

A number of paediatric dental specialists mentioned more than one barrier in their responses. These are some examples:

- *“There are issues with some children using a probe especially at 1st visit – Particularly special needs or dental phobic. This may or may not improve on subsequent visits”*
- *“I see a lot of children who are referred in because they are anxious about receiving dental treatment. These are often the ones who find perio probing uncomfortable (certain at the assessment stage). My core group of patients have special needs, so they also may not tolerate perio probing”*

When looking at the General Dental Practitioners’ responses, different main themes emerged. The first theme was patients’ age and anxiety. The following are some of the responses:

- *“Age, young patients who are anxious”*
- *“It is quite difficult to provide it for young children”*
- *“Don’t use it on young children. Use it for 11+”*
- *“Young anxious children may be unable to tolerate the probe”*
- *“Anxious patient make it difficult to do a good BPE”*

The second theme was patients’ age and cooperation. These are some examples:

- *“Partially erupted teeth. Limited compliance for exam with some patients”*
- *“Patients cooperation”*
- *“They are very uncooperative”*
- *“Child patients can be uncooperative. Child patients may have partially erupted teeth 1’s and 6’s due to delayed eruption”*

Other barriers that were mentioned by General Dental Practitioners were:

- Discomfort *“Young patients (and even some adults) find any form of gingival probing uncomfortable. If there are visual signs of inflammation, and/or plaque I will probe if necessary but not routinely”*
- Special needs *“I see a large proportion of special needs children and children with learning difficulties and behavioural problems for who it is inappropriate due to insufficient cooperation”*

- Low disease incidence *“Children do not normally suffer from periodontal problems or gingivitis. Occasionally they collect small amount of calculus”*

3.10 Screening adults for periodontal disease:

One hundred and thirty one respondents out of 254 (51.6%) answered the question asking about routinely screening adult patients for periodontal disease. These respondents were 27 out of 147 paediatric dental specialists (18.4%), and 104 out of 107 General Dental Practitioners (97.2%). In total, 127 respondents out of 131 (96.9%) reported that they routinely screen adult patients for periodontal disease. There was a significant difference between paediatric dental specialists and General Dental Practitioners in routinely screening adult patients for periodontal disease ($p=0.001$). All 104 General Dental Practitioners who answered this question routinely screened adult patients for periodontal disease, compared to only 24 paediatric dental specialists (85.2%).

When participants were asked if they used the BPE screening system on adult patients, 127 out of 254 respondents answered the question (50%). These respondents were 23 out of 147 paediatric dental specialists (15.6%), and 104 out of 107 General Dental Practitioners (97.2%). In total, 125 respondents (98.4%) reported using the BPE screening system on adult patients. There was no significant difference between paediatric dental specialists and General Dental Practitioners in using the BPE screening system on adult

patients ($p=0.331$). One hundred and three out of 104 General Dental Practitioners (99%) and 22 out of 23 paediatric dental specialists (95.7%) reported using the BPE screening system on their adult patients.

3.11 Use of the BPE screening system on adult patients:

One hundred and twenty four out of 254 respondents (48.8%) answered the question about their use of the BPE screening system on adult patients. These respondents were 21 out of 147 paediatric dental specialists (14.3%), and 103 out of 107 General Dental Practitioners (96.3%).

One hundred and nineteen respondents out of 124 (96%) reported using the BPE screening system on all new adult patients. There was no significant difference between paediatric dental specialists and General Dental Practitioners here ($p=1.000$). Ninety nine out of 103 General Dental Practitioners (96.1%) and 20 out of 21 paediatric dental specialists (95.2%) used the BPE screening system on all new adult patients. One hundred and ten respondents out of 124 (88.7%) reported using the BPE screening system annually on patients with codes 0, 1 or 2. There was a significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.014$). Ninety five out of 103 General Dental Practitioners (92.2%) reported using the BPE screening system annually on adult patients with codes 0, 1 or 2, compared to 15 out of 21 paediatric dental specialists (71.4%) (Figure 10).

Eighty three respondents out of 124 (66.9%) reported using the BPE screening system on adult patients to assess the response to periodontal therapy. There was no significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.120$). Seventy two General Dental Practitioners out of 103 (69.9%) and 11 paediatric dental specialists out of 21 (52.4%) used the BPE screening system on adult patients to assess the response to periodontal therapy. Ninety six respondents out of 124 (77.4%) reported using the BPE screening system on adult patients who have undergone periodontal therapy and are in the maintenance phase. There was no significant difference between paediatric dental specialists and General Dental Practitioners here ($p=0.251$). Eighty two out of 103 General Dental Practitioners (79.6%) and 14 out of 21 paediatric dental specialists (66.7%) used the BPE screening system on adult patients who have undergone periodontal therapy, and are in the maintenance phase (Figure 10).

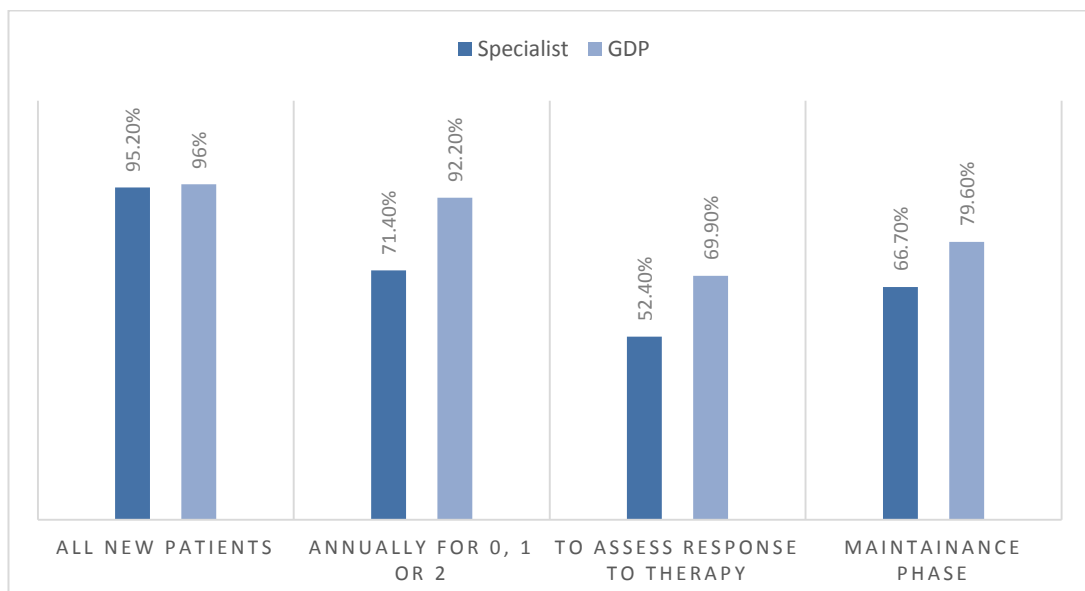


Figure 10: Respondents' use of the BPE screening system in adult patients. Percentages are based on the number of respondents who answered the question.

3.12 Opinions regarding the use of the BPE screening system on adult patients:

Respondents were asked about the extent to which they agreed or disagreed with several statements regarding their use of the BPE screening system on adult patients. One hundred and twenty four respondents out of 254 (48.8%) reported their opinions on these statements. These respondents were 21 out of 147 paediatric dental specialists (14.3%), and 103 out of 107 General Dental Practitioners (96.3%). When respondents were asked about the extent to which they agreed or disagreed with “Adult patients expect to be screened for periodontal disease”, 105 out of 124 (84.7%) agreed or strongly agreed with this statement. Only 19 respondents out of 124 (15.3%) disagreed with this statement. Moreover, none of the respondents strongly disagreed with this statement. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.003$). Ninety one out of 103 General Dental Practitioners (88.4%) agreed or strongly agreed to this statement, compared to 14 out of 21 paediatric dental specialists (66.7%) (Table 4).

When respondents were asked about the extent to which they agreed or disagreed with “Using the BPE screening system is accepted by adult patients”, 121 out of 124 (97.5%) agreed or strongly agreed with this statement. Only three out of 124 respondents (2.4%) disagreed with this statement. Moreover, none of the respondents strongly disagreed with this statement. There was no significant difference between paediatric dental specialists and General Dental

Practitioners in their response to this statement ($p=0.245$). One hundred out of 103 General Dental Practitioners (97.1%) and all 21 paediatric dental specialists (100%) agreed or strongly agreed with this statement. When respondents were asked about the extent to which they agreed or disagreed with “The BPE screening system is comfortable for adult patients”, 109 out of 124 (87.9%) agreed or strongly agreed with this statement. Only 15 out of 124 respondents (12.1%) disagreed with this statement. Moreover, none of the respondents strongly disagreed with this statement. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.268$). Ninety three out of 103 General Dental Practitioners (90.3%) and 16 out of 21 paediatric dental specialists (76.2%) agreed or strongly agreed with this statement (Table 4).

When respondents were asked about the extent to which they agreed or disagreed with “Using the BPE screening system on adult patients is quick”, 119 out of 124 (96%) agreed or strongly agreed with this statement. Only five respondents out of 124 (4%) disagreed with this statement. Moreover, none of the respondents strongly disagreed with this this statement. There was no significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.124$). One hundred and one out of 103 General Dental Practitioners (98.1%) and 18 out of 21 paediatric dental specialists (85.7%) agreed or strongly agreed with this statement. When respondents were asked about the extent to which they agreed or disagreed with “Using the BPE screening system on adult patients is easy”, 120 out of 124 (96.8%) agreed or strongly agreed with this statement.

Only four respondents out of 124 (3.2%) disagreed with this statement. Moreover, none of the respondents strongly disagreed with this statement. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their response to this statement ($p=0.034$). One hundred and two out of 103 General Dental Practitioners (99%) agreed or strongly agreed to this statement, compared to 18 out of 21 paediatric dental specialists (85.7%) (Table 4).

Adult patients expect to be screened for periodontal disease					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	3 (14.3)	11 (52.4)	7 (33.3)	0	0.003*
GDP	45 (43.7)	46 (44.7)	12 (11.7)	0	
Total	48 (38.7)	57 (46)	19 (15.3)	0	
Using the BPE screening system is accepted by adult patients					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	6 (28.6)	15 (71.4)	0	0	0.245
GDP	46 (44.7)	54 (52.4)	3 (2.9)	0	
Total	52 (49.1)	69 (55.6)	3 (2.4)	0	
The BPE screening system is comfortable for adult patients					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	5 (23.8)	11 (52.4)	5 (23.8)	0	0.268
GDP	28 (27.2)	65 (63.1)	10 (9.7)	0	
Total	33 (26.6)	76 (61.3)	15 (12.1)	0	
Using the BPE screening system on adult patients is quick					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	7 (33.3)	11 (52.4)	3 (14.3)	0	0.124
GDP	47 (45.6)	54 (52.4)	2 (1.9)	0	
Total	54 (43.5)	65 (52.4)	5 (4)	0	
Using the BPE screening system on adult patients is easy					
Group n (%)	Strongly agree	Agree	Disagree	Strongly disagree	p-value
Specialists	6 (28.6)	12 (57.1)	3 (14.3)	0	0.034*
GDP	49 (47.6)	53 (51.5)	1 (1)	0	
Total	55 (44.4)	65 (52.4)	4 (3.2)	0	

Table 4: Respondents opinion about using the BPE screening system on adult patients. Percentages are based on the number of respondents who answered the question. (*) Significant difference between the two groups.

3.13 Barriers perceived when using the BPE screening system in adult patients:

Participants were asked to report barriers they may perceive when using the BPE screening system on adult patients. A total of 70 respondents out of 254 answered this question (27.5%). These respondents were 20 out of 147 paediatric dental specialists (13.6%), and 50 out of 107 General Dental Practitioners (46.7%). A total of 22 respondents (31.4%) reported that they perceive no barriers when using the BPE screening system on adult patients. These were two out of 20 paediatric dental specialists (10%), and 20 out of 50 General Dental Practitioners (40%).

Looking at the few responses from paediatric dental specialists for this question, one main theme emerged as a possible barrier to using the BPE screening system on adult patients. That theme was special needs and cooperation. Below are the responses from the specialists:

- *“All my adult patients are ‘special care’ so not really a representative of general population – many I can barely get a mirror in”*
- *“Most of my adult patients have a particular need which can make the screening difficult eg learning disability, physical disability or are medically compromised”*
- *“I screen medically compromised patients and patients who are able to accept BPE. I do not routinely screen others”*
- *“Majority of patients have special needs and therefore compliance is often difficult”*

Two other barriers were mentioned by paediatric dental specialists, anxiety and discomfort:

- *“Appearance of probe and/or sensation of probing to phobic patients”*
- *“Patients with anxiety are not comfortable with BPE screening”*

When looking at the few responses from the General Dental Practitioners, different themes emerged. The first theme was pain and discomfort. The following are the responses:

- *“Some patients find it uncomfortable, especially some perio patients”*
- *“Severe periodontal disease with lots of inflammation. Can be very sore”*

The second theme was special needs and medical conditions. The following are the responses:

- *“In the CDS we see adults with special needs and often using a perio probe is difficult due to lack of cooperation”*
- *“Infective Endocarditis high risk patients”*

Other barriers that were reported by General Dental Practitioners were anxiety, gag reflex, and time. The following are the responses:

- *“Dental anxiety. Specific for fear about having gums probed”*

- *“Small mouths. Gag reflexes”*
- *“Anxious patients sometimes cannot tolerate it, as well as patients with strong gag reflex”*
- *“Some patients do find it uncomfortable but only a small number. It does add on extra few minutes to the exam”*

3.14 Differences between the BPE screening system and the Simplified BPE screening system:

Two hundred and forty eight respondents out of 254 (97.6%) answered the question asking about their awareness of any differences between the BPE screening system and the Simplified BPE screening system. These were 143 out of 147 paediatric dental specialists (97.3%), and 105 out of 107 General Dental Practitioners (98.1%). In total, 173 out of 248 respondents (69.8%) reported that they were aware of the differences between the two screening systems. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their awareness of the differences between the BPE screening system and the Simplified BPE screening system ($p < 0.001$). One hundred and nineteen out of 143 paediatric dental specialists (83.2%) reported their awareness of differences between the two screening systems, compared to 54 out of 105 General Dental Practitioners (51.4%).

3.15 Awareness of new guidelines for the use of the Simplified BPE screening system in children and adolescents:

Two hundred and forty three out of 254 respondents (95.7%) answered the question asking about their awareness of any new guidelines for using the Simplified BPE screening system in Children and adolescents. These respondents were 139 out of 147 paediatric dental specialists (94.6%), and 104 out of 107 General Dental Practitioners (97.2%). In total, 135 out of 243 respondents (55.6%) reported their awareness of new guidelines. There was a significant difference between paediatric dental specialists and General Dental Practitioners in their awareness of new guidelines for using the Simplified BPE screening system in children and adolescents ($p < 0.001$). One hundred and seven out of 139 paediatric dental specialists (77%) reported their awareness of new guidelines, compared to 28 out of 104 General Dental Practitioners (26.9%).

3.16 Where participants found out about the guideline:

Participants were asked to report where they found out about the guidelines for periodontal screening and management of children and adolescents. In total, 130 out of 245 respondents answered the question (51.2%). These respondents were 103 out of 147 paediatric dental specialists (70.1%), and 27 out of 103 General Dental Practitioners (25.2%). When paediatric dental specialists' responses were analysed, three major themes emerged as ways they found about the guidelines.

The first theme was BSPD website, guidelines, lectures, and meetings. The following are some of the responses:

- *“BSPD circulation”*
- *“BSPD meeting”*
- *“BSPD website”*
- *“Joint BSP/BSPD guideline on periodontal management + screening in children and adolescents 2012. Not aware of anything more recent”*
- *“BSPD Teachers Branch Study Day”*

The second theme was education and training. The following are some of the responses:

- *“Through training program / dental hospital”*
- *“As part of postgraduate training info was disseminated”*
- *“Local education meetings”*
- *“Trainees group / consultant group – paediatric dentistry”*

The third theme was research and literature. The following are some of the responses:

- *“Dental update article May 2014”*
- *“Student research protocol”*
- *“Delivering Better Oral Health – Healthy Gums Do Matter”*

Some responses from paediatric dental specialists reported peers and departments as ways to find about the guideline:

- *“Department sharing of info ortho \iff paed”*
- *“Used them in a book chapter I co-authored and teach undergraduates about perio in children. Found on the internet but original copy given to me by colleague in perio department”*

Other responses from paediatric dental specialists reported a combination of ways to find about the guidelines:

- *“BSPD lecture / email at work”*
- *“Online – also through trainees groups”*
- *“Online + through workplace”*
- *“BSPD website – BDJ article”*
- *“BSP and BSPD guidelines for periodontal screening. As part of specialist training, and at BSPD conferences”*

Fewer responses were collected from the General Dental Practitioners. The ways they found about the guideline included education, BSPD/BSP websites and emails. The following are some examples:

- *“British Society of Periodontology; Young Practitioners Guide to Periodontology”*
- *“University – in preparation for finals from BSPD”*

- *“In a clinical induction course and online in certain e-learning websites”*
- *“Email from manager”*

3.17 Ways to disseminate new guidelines to the dental

profession:

Participants were asked to report how they think new guidelines should be disseminated to reach the dental profession. In total, 190 out of 254 respondents answered this question (74.8%). These respondents were 111 out of 147 paediatric dental specialists (75.5%), and 79 out of 107 General Dental Practitioners (73.8%). When paediatric dental specialists' responses were analysed, three major themes emerged as ways to disseminate the guideline to the dental profession.

The first theme was literature. The following are some of the responses:

- *“Published in popular journals, eg BDA and Dental update”*
- *“Delivering better oral health”*
- *“Articles in free dental press. Possibly linked to CPD questions”*
- *“Paper in peer reviewed scientific journal”*

The second theme was specialists groups and societies. The following are some examples:

- *“Through clinical network groups, societies etc”*
- *“Via specialists societies (available via web pages) and via Royal colleges in the UK. (Includes EAPD, IAPD etc)”*

The third theme was sending them through email or post. The following are some of the responses:

- *“New guidelines should be sent to GDC registration address”*
- *“Email with a link to the publication”*

Other ways reported to disseminate the guidelines were:

- Booklet *“Printed booklet. Similar to DOH toolkit”*
- Policy *“It should be made mandatory for all children to have a perio screening.”*

Some responses from the paediatric dental specialists included more than one way for dissemination:

- *“By posting them out. Free CPD lectures about them. Mandatory referral criteria to have on referral forms”*
- *“Letters to journals read by most GDPs – BDJ, Dental update. Various e newsletters exist that will reach a lot of professionals. Emails round relevant specialist groups”*

When analysing responses from General Dental Practitioners. One main theme emerged. This theme was post and email. The following are some of the responses:

- *“Information sent to practice”*
- *“New guidelines should be posted/emailed to the practice”*
- *“Via email or letter with information to find the latest guidelines”*
- *“Through an annual bulletin posted to every GDC registered dentist”*
- *“Printed sheet/email to print off and laminate to each dentist on register please”*

Some responses added other ways to post and email:

- GDC *“Via email from the GDC – Should be available easily for all UK registered professionals”*
- BDA *“Mailer to all dental practices. An article with BDA. Advice from GDC regarding a change in guidelines”*
- Leaflets and other educational materials *“By sending leaflets to each surgery indicating current guidelines”; “Direct contact. As part of compulsory yearly or cyclic CPD cycles. Dental media – General practice publication”; “Through magazine articles, periodontal refresher courses or even leaflets sent to practices. I have actually read about Simplified BPE screening system thanks to this questionnaire”.*

Chapter 4

4.0 STUDY ONE DISCUSSION

4.1 Aims and design:

This is a cross-sectional study that aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners: 1) Use the BPE screening system routinely to detect periodontal disease in children, adolescents and adults; 2) Comply with the guidelines for periodontal screening and management of children and adolescents. This study also investigated barriers that paediatric dental specialists and General Dental Practitioners may perceive while using the BPE screening system on child and adult patients. For this study we developed a survey questionnaire that included 21 questions. The questionnaire was sent to 512 participants in total. These participants were 233 paediatric dental specialists, and 279 General Dental Practitioners.

4.2 Response rate:

Only 254 participants answered the questionnaire. This resulted in the overall response rate being 49.6%. The response rate for General Dental Practitioners was lower (38.4%), compared to the response rate for paediatric dental specialists (63%). A similar difference in response rates between paediatric dental specialists and General Dental Practitioners was found in a study conducted in England in 2004 (Tickle et al., 2007). The study included a

random sample of 500 General Dental Practitioners working in England, and included all 148 registered paediatric dentists who appeared on the GDC specialist register and worked in England. Participants were sent a questionnaire by post, which was followed by two reminders to non-responders. The questionnaire included four clinical scenarios of child patients, and participants were asked to choose one treatment option for each of the case scenarios. The response rate was 64% for General Dental Practitioners and 78% for paediatric dental specialists. The overall response rate was 67.4%, which is higher than the present study's response rate. This could be a result of the shorter length of the questionnaire used for that study (four cases), compared to our 21 item questionnaire. This difference could also be a result of the Dental Practice Board conducting the sampling and distribution of the questionnaires for this study. The Dental Practice Board at that time was the body responsible for dealing with payments claimed by practitioners working for the NHS. This may have resulted in practitioners feeling obliged to respond to this questionnaire, as a result of receiving it from the body that deals with their claimed payments.

The length of questionnaires has been shown to affect response rates. A study that included 1000 participants in the UK, investigated the effect of questionnaire length on response rate (Sahlqvist et al., 2011). Participants were divided into four groups: the first received a personally addressed long questionnaire (24 pages); the second received a personally addressed short questionnaire (15 pages); the third received a non-personally addressed long questionnaire; and the fourth received a non-personally addressed short

questionnaire. The overall response rate was 17%. The response rates were higher for shorter and personalised questionnaires. Authors found that questionnaire length significantly affected the response rate. They also found that personalising the questionnaires had no significant effect on the response rate. Authors concluded that shortening a lengthy questionnaire significantly increases the response rate. A review and meta-analysis of 20 cross-sectional studies was conducted in 2011 (Rolstad et al., 2011). It investigated the association between questionnaire length and response rate. Authors found an association between questionnaire length and response rates. Authors concluded that shorter questionnaires had higher response rates.

A study comparing paediatric dental specialists and General Dental Practitioners in Hong Kong (Lee et al., 2013) also had similar differences in the response rates between dental specialists and General Dental Practitioners. It also had a higher response rate compared to the present study. That study included a random sample of 476 General Dental Practitioners registered in the General Register of the Dental Council of Hong Kong, and all 28 paediatric dentists appearing on the list of the Specialist Register of the Dental Council of Hong Kong. A questionnaire including eight clinical scenarios was sent by post, and was followed by four reminders. The response rate was 85.7% for paediatric dental specialists, and was 60.1% for General Dental Practitioners. The overall response rate was 61.5%. The higher response rate in that study compared to the present study may be a result of sending more mail reminders. Repeated questionnaire mailing has been reported to increase the response rate. A study conducted in the

Netherlands in 2005 (Wensing and Schattenberg, 2005) investigated the effect of two follow up reminders compared to only one reminder on the response rate. The study included 955 adult patients, who were divided into three groups. The first group received a reminder card with no questionnaire. The second group received the questionnaire as a reminder. The third group received a request to explain non-participation. The group with the highest response rate were the one which received the questionnaire as a reminder. Authors concluded that repeated mailings increased the response rate.

A study that compared general dentists and paediatric dentists had a lower response rate compared to the present study (Diercke et al., 2012). The study included paediatric dentists and general dentists working in Germany. A total of 800 hundred questionnaires were sent by email, but were not followed by any reminders. The overall response rate for that study was 28.8%. However, there was no specification of the response rates for paediatric dentists or general dentists. The low response rate for that study can be a result of sending the questionnaires by email and not sending any reminders after the original contact. A lower response rate compared to the present study was also reported in a study conducted in the Netherlands (Velden, 2009). The study included 300 dentists who were sent a questionnaire by post, followed by a reminder letter after two weeks. The response rate for that study was 47%. The lower response in that study could be explained by the low number of reminders, although there was no information about the length of the questionnaire.

A study conducted in the UK reported a much higher response rate compared to the present study (Tugnait et al., 2004). The study included 800 General Dental Practitioners working in England and Wales. Participants were sent a questionnaire that included six clinical scenarios. The questionnaire was distributed by the Dental Practice Board, and two reminders were sent to non-responders four weeks and eight weeks after the original mailing. The response rate for that study was 74%. The higher response rate could be a result of receiving the questionnaire from the Dental Practice Board, which at that time was the body responsible for dealing with payments claimed by practitioners working for the NHS. As with the previous study sent from the Dental Practice Board (Tickle et al., 2007), this may have resulted in General Dental Practitioners feeling obliged to respond to the questionnaire, as a result of receiving it from the body that deals with their claimed payments.

The low response rate in the present study may have been a result of using unique numbers to identify early responders. Respondents may have felt that their responses can be identified with these numbers. However, we sent an invitation letter with the questionnaires, which explained that the questionnaire is anonymous and no respondents will be identified. A study that was conducted in 2011 (Kundig et al., 2011) investigated the effect of numbering questionnaires on response rates. Authors found that numbering the questionnaires had no effect on response rates. This finding may suggest that numbering questionnaires in our study did not affect the response rate. The response rate in the present study might have been improved by enclosing a pen with the questionnaire. A study that was conducted in 2006 (Sharp et al.,

2006) found that enclosing a pen with a postal questionnaire significantly increased the response rate.

4.3 Gender and age distribution in the sample:

In the present study the proportion of female respondents (68.5%) was significantly higher than the proportion of male respondents (31.5%). This finding may be because most of the paediatric dental specialists who answered the questionnaire were female (76.8%), and more than half of the General dental Practitioners who answered the questionnaire were female (57.3%). Moreover, more paediatric dental specialists answered the questionnaire compared to General Dental Practitioners. This finding does not reflect the proportion of male to female dentists registered on the GDC register. The latest annual GDC report (GDC, 2014) showed that the proportion of male dentists (54%) was larger than the proportion of female dentists (46%). This may suggest that our sample does not represent the sample of dentists in the UK. However, it is important to point out that this report did not specify the numbers or the proportions of General Dental Practitioners, or of dental specialists. Two studies have reported similar findings to our study. A study that was conducted in Germany in 2012 included paediatric dentists and general dentists and reported that most respondents were female (65%), compared to 34% male respondents (Diercke et al., 2012). Another study was conducted in Brazil that investigated paediatric dentists' viewpoint on dental pain in children. The study found that most paediatric dental specialists (90.1%) were female (Daher et al., 2015).

In the present study, significantly more General Dental Practitioners were 34 years old or younger, compared to paediatric dental specialists. Moreover, significantly more General Dental Practitioners graduated in the last 10 years, compared to paediatric dental specialists. It is expected that most paediatric dental specialists will belong to an older age group, and would have more years of experience as a result of the required specialty training. These findings could also be a result of our exclusion of any dental specialists from other disciplines, while searching for General Dental Practitioners on the GDC online register.

Most respondents in the present study reported receiving their primary dental degree in the UK. Moreover, there was no significant difference between paediatric dental specialist and General Dental Practitioners. This finding can be explained by the fact that the present study was conducted in the UK, included General Dental Practitioners working in the UK and the Republic of Ireland, and also included paediatric dental specialists registered with the BSPD.

4.4 Qualifications and registration on specialists lists:

All paediatric dental specialists in the present study reported completing additional qualifications after their primary dental degree, compared to less than half of the General Dental Practitioners. Moreover, nearly all paediatric dental specialists reported being listed on a specialist list, compared to none of the General Dental Practitioners. These findings are expected as a result of

our exclusion of any dental specialists during our search for General Dental Practitioners on the GDC online register. Significantly more paediatric dental specialists reported their interest in paediatric dentistry, compared to General Dental Practitioners. Moreover, a significantly smaller proportion of paediatric dental specialists reported their interest in general dentistry, compared to nearly half of the General Dental Practitioners. These differences can be explained by the fact that the dental specialists group consisted of paediatric dentists registered with the BSPD.

4.5 Screening child and adult patients for periodontal disease:

Most respondents reported that they routinely screen children for periodontal disease. This finding is similar to a finding from a study conducted in Canada that found that most respondents (94.8%) screened patients for periodontal disease (Ghiabi and Weerasinghe, 2011). However, that study did not specify screening children for periodontal disease. In the present study, significantly more paediatric dental specialists routinely screened children for periodontal disease compared to General Dental Practitioners. As all of the dental specialists in this study are actually paediatric dentists, it would be expected that they have more experience and would be up to date in regards to diagnostic and treatment modalities for child patients. However, General Dental Practitioners would be expected to have awareness about these modalities and be interested in the welfare of their child patients. Moreover, General Dental Practitioners need to be aware of the importance of screening

children for periodontal disease. They need to be aware that the presence of gingivitis can be a sign of an underlying medical condition, and that the presence of periodontitis can also be associated with medical diseases. They also need to be aware that chronic gingivitis in children can progress to periodontitis and can have general health implications. This finding could also be related to our previous finding, that significantly fewer General Dental Practitioners were interested in paediatric dentistry. A similar finding was found in another UK study (Tugnait et al., 2004), where General Dental Practitioners with postgraduate qualifications were more likely to use the BPE screening system, compared to other General Dental Practitioners.

In the present study, most respondents reported using the Simplified BPE screening system to detect periodontal disease in child patients. This finding agrees with another UK study where most respondents (91%) reported using the BPE screening system (Tugnait et al., 2004). However, that study did not specify using the BPE screening system on child patients. A study conducted in the Netherlands (Velden, 2009) also reported that most respondents (75%) used the DPSI, which is a partial recording system similar to the BPE screening system. In the present study, significantly more paediatric dental specialists reported using the Simplified BPE screening system, compared to General Dental Practitioners. We would expect the specialists group to have more experience in treating child patients and would be up to date in regards to diagnostic and treatment modalities for child patients, because they are paediatric dentists. However, we would also expect General Dental Practitioners to be aware of these modalities and be interested in the welfare

of their child patients. This finding could also be related to our previous finding that significantly fewer General Dental Practitioners were interested in paediatric dentistry, and routinely screened child patients for periodontal disease. It would be interesting to see if this finding is related to General Dental Practitioners' knowledge about the BPE screening system and the Simplified BPE screening system.

A lower percentage of respondents answered the question asking about routinely screening adults for periodontal disease (51.6%). These were 97.2% of General Dental Practitioners, and only 18.4% of paediatric dental specialists. Most of these respondents reported that they routinely screen adults for periodontal disease. This finding is similar to a finding from a study conducted in Canada that found that most respondents screened patients for periodontal disease (Ghiabi and Weerasinghe, 2011). In the present study, significantly more General Dental Practitioners routinely screened adult patients, compared to paediatric dental specialists. This finding would be expected as most of the paediatric dental specialists only see child patients, and only a small percentage of the specialists responded to this question. Most of the respondents who routinely screened adults for periodontal disease in the present study, reported using the BPE screening system on adult patients. A similar finding was seen in another UK study where most respondents reported using the BPE screening system (Tugnait et al., 2004).

4.6 The use of the Simplified BPE screening system in child patients:

Only 12.6% of the respondents reported using the Simplified BPE screening system on new child patients up to the age of 7 years, and there was no significant difference between paediatric dental specialists and General Dental Practitioners in these cases. Using the Simplified BPE screening system for this age group is not in line with the guidelines for periodontal screening and management of children and adolescents. The guidelines recommend that periodontal treatment should be started at the age of 7 years, as it is rare to experience periodontal problems before this age. Moreover, the index teeth UR6, UR1, UL6, LL6, LL1, and LR6 are often still unerupted before that age (Clerehugh and Kindelan, 2012). Most respondents did not use the Simplified BPE screening for this group, and were in line with the guidelines for this patient group.

Most respondents (72.6%) reported using the Simplified BPE screening system on new child patients 7-11 years old. This is in line with the guidelines, as these patients would be in the mixed dentition phase. The guidelines recommend screening this age group using codes 0, 1 and 2 only to avoid the problem of false pockets (Clerehugh and Kindelan, 2012). Most respondents were in line with the guidelines here. However, significantly more paediatric dental specialists used the Simplified BPE screening system on this age group, compared to General Dental Practitioners. Most respondents (79.4%) reported using the Simplified BPE screening system on new child patients 12-

17 years old, and there was no significant difference between paediatric dental specialists and General Dental Practitioners. This is also in line with the guidelines for periodontal screening and management of children and adolescents (Clerehugh and Kindelan, 2012). Most respondents were in line with the guidelines here.

Less than half of the respondents (47.4%) reported using the Simplified BPE screening system annually for child patients with codes 0, 1 or 2. More than half of the respondents were not in line with the guidelines, as the guidelines recommend screening annually for code 0 and after six months for codes 1 or 2 (Clerehugh and Kindelan, 2012). Significantly more General Dental Practitioners used the Simplified BPE screening system in these cases and were in line with the guidelines, compared to paediatric dental specialists. Only about third of the respondents (32.6%) reported using the Simplified BPE screening system on child/adolescent patients before starting orthodontic treatment. Most respondents were not in line with the guidelines, as the guidelines recommend using the Simplified BPE screening system before starting orthodontic treatment in the under 18s (Clerehugh and Kindelan, 2012). Significantly more General Dental Practitioners used the Simplified BPE screening system in these cases and were in line with the guidelines, compared to paediatric dental specialists.

Most respondents were in line with the guidelines regarding the use of the Simplified BPE screening system on new child patients of different age groups.

However, most respondents' responses were not in line with the guidelines concerning recall patients or patients that are about to start orthodontic treatment. These findings suggest that most respondents were not in line with the guidelines for periodontal screening and management of children and adolescents. These findings do not reflect later findings in our study, which show that most respondents were aware of the guidelines for periodontal screening and management of children and adolescents. However, it could be argued that most respondents were aware of the guidelines, but chose not to fully comply with them. It would be interesting to explore dentists' attitudes toward these guidelines in the future.

An interesting finding was that significantly more General Dental Practitioners reported using the Simplified BPE screening system on child patients with codes 0, 1 or 2 and on child patients before starting orthodontic treatment. This could be explained by that General Dental Practitioners may see older children, and that dental specialists may see younger children. A study that was conducted in the Netherlands reported a similar finding (Kuin and Veerkamp, 2012). The study investigated the differences between paediatric dentists and General Dental Practitioners in providing treatment to child patients. Authors found a significant difference between paediatric dentists and General Dental Practitioners. Paediatric dentists mainly treated children who were 8 years old or younger, while General Dental Practitioners mainly treated children who were older.

4.7 The use of the BPE screening system in adult patients:

Only about half of the respondents (48.8%) answered the question about their use of the BPE screening system in adults. Most of these respondents reported using the BPE screening system on all new adult patients, and there was no significant difference between paediatric dental specialists and General Dental Practitioners. Most respondents were in line with the BSP guideline on using the BPE screening system for this patient group (BSP, 2016). Most respondents reported using the BPE screening system annually on adult patients with codes 0, 1 or 2. Most respondents were in line with the guidelines here (BSP, 2016). However, significantly more General Dental Practitioners reported using the BPE screening system on these patients and were in line with the guidelines, compared to paediatric dental specialists.

Most respondents reported using the BPE screening system on adult patients to assess the response to periodontal therapy, and there was no significant difference between paediatric dental specialists and General Dental Practitioners here. Most respondents were not in line with the guidelines, as the BPE screening system cannot be used to monitor the response to periodontal treatment. The BPE screening system does not provide information about how sites within a sextant change after treatment. To assess the response to treatment, a six-point pocket chart should be recorded (BSP, 2016). Most respondents reported using the BPE screening system on adult patients who have undergone periodontal therapy and are in the maintenance phase, and there was no significant difference between paediatric dental

specialists and General Dental Practitioners. Most respondents were not in line with the guidelines here, as once these patients reach the maintenance phase of care, full probing depths throughout the entire dentition should be repeated and recorded at least annually (BSP, 2016).

Most respondents were in line with the BSP guideline on using the BPE screening system (BSP, 2016), regarding all new and recall adult patients. However, most respondents were not in line with the guideline concerning patients who are monitored or are in the maintenance phase. It would be interesting to investigate dentists' awareness of the BSP guideline on using the BPE screening system (BSP, 2016), and their attitudes towards it.

4.8 Opinions about using the BPE screening system in child and adult patients:

Most respondents agreed or strongly agreed that using the BPE screening system is accepted by child patients, is comfortable for child patients, and is quick and easy to use on child patients. There was no significant difference between paediatric dental specialists and General Dental Practitioners for any of these four statements. A study that was conducted in the Netherlands (Velden, 2009) and investigated the use of the DPSI by General Dental Practitioners found that the use of that partial recording system is easy and takes an average of three minutes. However, that study did not mention if these dentists treated child patients or not. Most respondents in the present

study (67%) disagreed or strongly disagreed that parents expect their child to be screened for periodontal disease. Significantly more paediatric dental specialists disagreed or strongly disagreed with this statement compared to General Dental Practitioners.

Generally, it would be expected that parents get involved with the practitioners, ask, and understand why their children have undergone specific diagnostic tests or specific treatment options. It would also be expected that dentists discuss the diagnostic tests and treatment provided and why they were chosen. However, it is interesting that most respondents in our study think that parents do not expect them to screen their children for periodontal disease. Moreover, it is interesting that significantly more dental specialists think this way compared to General Dental Practitioners. This finding could be a result of dental specialists mostly seeing patients with a higher risk of caries, and that parents would expect that dental caries should be treated first. It could also be related to the fact that most child patients seen by General Dental Practitioners are healthy children attending for check-ups. The second study in this research included questions to see what parents think about screening their children for periodontal disease, and if they would expect their children to be examined for periodontal disease, so that this could be explored further.

Half of the respondents in the present study routinely screened adults for periodontal disease, most of which (98.4%) reported using the BPE screening system on adult patients. Only about half of these respondents (48.8%)

reported the extent to which they agreed or disagreed with specific statements regarding the use of the BPE screening system on adult patients. Most of these respondents agreed or strongly agreed that adult patients expect to be screened for periodontal disease. Moreover, most agreed or strongly agreed that using the BPE screening system is accepted by adult patients, is comfortable for adult patients, and is quick and easy to use on adult patients. A Similar finding was seen in a study conducted in the Netherlands (Velden, 2009), where General Dental Practitioners found that the use of the DPSI is easy and takes an average of three minutes.

4.9 Barriers perceived while using the BPE screening

system:

When participants were asked to report barriers they perceive while using the BPE screening system on child patients, 13% reported that they perceive no barriers. Other participants reported barriers that followed a number of themes. The three main themes that emerged from paediatric dental specialists' responses were: 1) patient anxiety and phobia; 2) patient cooperation and behaviour issues; 3) children with special needs or medical conditions. Other barriers that were mentioned by paediatric dental specialists were patient discomfort, time constraints, and probe availability. The two main themes that emerged from General Dental Practitioners' responses were: 1) patient age and anxiety; 2) patient age and cooperation. Other barriers that were mentioned by General Dental Practitioners were patient discomfort, patient with special needs, and low incidence of periodontal disease in children.

Only half of the respondents in the present study saw adult patients and routinely screened adults for periodontal disease. When participants were asked to report barriers they may perceive while using the BPE screening system on adult patients, only about a quarter of the respondents (27.5%) answered the question. About third of these participants (31.4%) reported that they perceive no barriers. Other participants reported barriers that followed a number of themes. The main theme that was mentioned by paediatric dental specialists was special needs and cooperation. Other barriers that the dental specialists mentioned were anxiety, and discomfort. Two main themes emerged from General Dental Practitioners' responses: 1) pain and discomfort; 2) special needs and medical conditions. Other barriers that were mentioned by the General Dental Practitioners were anxiety, gag reflex, and time constraints.

These findings show that a larger percentage of respondents perceived no barriers when using the BPE screening system on adult patients, compared to when using the BPE screening system on child patients. It is not clear why more respondents perceived barriers while using the BPE screening system on child patients. This could be related to the difficulty of dealing with child patients. However, most of the respondents who saw child patients in our study were actually paediatric dentists, so it would be expected that they are experienced in dealing with child patients. It could be argued that the dental specialists mostly see patients who are referred due to their age, behaviour, anxiety, or additional needs. As a result, these patients would need more care, and would be more difficult to treat. A larger proportion of respondents

perceived no barriers when using the BPE screening system on adult patients. This could be explained by that adult patients would be expected to have more experience with undergoing clinical examinations. However, it can be argued that some adult patients can be more anxious as a result of past negative experiences.

Patients with special needs were a main theme for paediatric dental specialists and General Dental Practitioners, as barrier for adult and child patients. This finding shows that dentists may perceive difficulties while using the BPE screening system in patients with special needs. Responses from two of the respondents could emphasise the importance of this barrier *“I spend most of my time with children who have additional needs. Just examining their teeth is often difficult”, “In the CDS we see adults with special needs and often using a perio probe is difficult due to lack of cooperation”*.

There were two other main themes that emerged as barriers for paediatric dental specialists and General Dental Practitioners but only for child patients. These were patient anxiety, and patient behaviour. However, child patients' age emerged as a main theme for General Dental Practitioners only. A study that was conducted in the Netherlands (Kuin and Veerkamp, 2012) investigated the differences between paediatric dentists and General Dental Practitioners in providing diagnostic, preventive and restorative treatment to child patients. The authors found that paediatric dentists provided significantly more diagnostic, preventive, and restorative treatment to child patients,

compared to General Dental Practitioners. Moreover, there was a significant difference in the age of children treated by paediatric dentists and General Dental Practitioners. Children who were 8 years old or younger were mainly seen by paediatric dentists, and older children were more often seen by General Dental Practitioners (Kuin and Veerkamp, 2012). However, that study did not specify if General Dental Practitioners perceived more barriers than paediatric dentists or if paediatric dentists had better skills in treating child patients.

Causing patients pain and discomfort emerged as a main barrier for General Dental Practitioners while using the BPE screening system on adult patients. Moreover, a few dental specialists have also reported patient pain and discomfort as a barrier for child and adult patients. The finding that fewer dental specialists reported patient pain and discomfort as a barrier may be related to their experience in treating patients, especially children. In a study conducted in Brazil that investigated paediatric dentists' viewpoint on pain, authors found that older paediatric dentists and those with more experience were more prepared to recognise dental pain in children (Daher et al., 2015).

In a study conducted in the United States (Al-Ajmi et al., 2005), researchers aimed to assess pain expressed on probing during a periodontal examination. The study included 60 patients divided into three groups, and each group was examined by a different periodontist during initial assessment visits. Most patients showed a low pain response on a visual analogue scale. However,

one of the periodontists was not able to appraise the pain experienced by the patients. A similar study was also conducted in the United States (Hassan et al., 2005) that aimed to compare the pain experienced while probing using periodontal probes with two different tip diameters (0.40 mm and 0.63 mm). The study included 60 patients divided into three groups and each group was examined by a different therapist during recall visits. Most patients showed low pain scores for both probes. These studies show that it is unlikely for patients to experience pain from periodontal probing. Respondents in our study who reported patient pain and discomfort may have perceived this barrier while seeing anxious patients.

A comment reported by one of the General Dental Practitioners about pain as a barrier to using the BPE screening system in adult patients was "*Severe periodontal disease with lots inflammation. Can be very sore*". However, severe periodontal disease is rarely associated with pain. Patients may experience pain while probing but that would not be related to disease severity and would be related to the patient's dental anxiety. Moreover, it is important to point out that this particular patient population would need to be screened using the BPE screening system, and may in fact need full mouth probing as a part of a comprehensive periodontal examination. Time constraints were mentioned by some of the respondents as a barrier to using the BPE screening system for adult and child patients. A similar finding was seen in a study conducted in the Netherlands (Velden, 2009), where the General Dental Practitioners who did not use the DPSI (22.2%) reported that it is time

consuming. However, that same exact study found that the use of that partial recording system is easy and takes an average of three minutes.

Another comment from one of the General Dental Practitioners was “*Children do not normally suffer from periodontal problems or gingivitis. Occasionally they collect small amount of calculus*”. This is an unexpected comment, as this respondent is a General Dental Practitioner who is qualified and is registered on the GDC list. In this current study we explored dentists’ awareness about the BPE screening system and the Simplified BPE screening system. We also explored dentists’ awareness about the guidelines for periodontal screening and management of children and adolescents. It would be interesting to also explore dentists’ attitudes toward periodontal screening in general, and toward using the Simplified BPE screening system in child patients. It is important to refer to the recent Child Dental Health survey which found that nearly half of the eight year old children had some gingival inflammation, and more than 70% had plaque on their teeth. Most of the 12 year olds and half of the 15 year olds had plaque on their teeth. Moreover, the percentage of children with calculus increases with age, from 9% at 5 years to 28% at 8 years and 39% at 12 years of age (Pitts et al., 2013).

4.10 Awareness about the guidelines and the differences between screening systems:

Most respondents answered the questions asking about awareness of new guidelines for using the Simplified BPE screening system in children and

adolescents, and about the differences between the BPE screening system and the Simplified BPE screening system. Most respondents reported their knowledge about the differences between the two screening systems. However, significantly more paediatric dental specialists were aware of the differences, compared to General Dental Practitioners. Most respondents in the present study reported that they were aware of the guidelines. However, significantly more paediatric dental specialists reported their awareness of the guidelines, compared to General Dental Practitioners.

Similar to the present study, previous studies have shown dentists' awareness about guidelines. A previous study conducted in the UK (Farook et al., 2012) investigated trainers and trainees awareness about the NICE guideline for antimicrobial prophylaxis against Infective Endocarditis. Authors found that most respondents were aware of the guidelines. Another UK study (Drage and Davies, 2013) investigated General Dental Practitioners' awareness about the NICE guidelines on recall intervals and the FGDP Selection Criteria for Dental Radiography. Most respondents in that study were aware of both guidelines. Another study that investigated General Dental Practitioners' awareness about the NICE guidelines for recall intervals found that most respondents were aware of those guidelines (Berg and Palmer, 2012). A similar finding was also found in a UK study (Rogers et al., 2005) that investigated General Dental Practitioners' awareness about the NICE guidelines for the removal of wisdom teeth. Most respondents were aware of these guidelines.

All these studies have findings similar to the present study where most respondents were aware of the guidelines investigated. However, our study and all the above studies have investigated participants' awareness about guidelines by using questionnaires. Although questionnaires are effective in collecting data from a large number of subjects, they may be biased towards high performance. As these questionnaires are means of self-reporting, they can be biased and inaccurate. Participants in these studies may have given positive responses that are inaccurate to appear knowledgeable or to show compliance with the guidelines under investigation. In the present study, the high percentage of respondents reporting their awareness of the guidelines is not reflected in their use of the BPE screening system on child or adult patients. Most respondents' use of these two systems was not in line with guidelines. Another thing to point out is that these studies differ from our study in that they did not include any dental specialists in their samples. They also did not compare dental specialists to General Dental Practitioners. Moreover, there are no studies that investigated dentists' awareness about the differences between the BPE screening system and the Simplified BPE screening system. There are also no studies that investigated dentists' awareness about the guidelines for periodontal screening and management of children and adolescents.

4.11 Where to find the guidelines and how best to disseminate them:

Only 55.6% of respondents in our study reported their awareness of the recent guidelines for periodontal screening and management of children and adolescents. Moreover, only 51.2% of all the respondents in our study answered the question asking where they found about the guidelines. Analysis of the paediatric dental specialists' responses resulted in the emergence of three main themes: 1) BSPD website, guidelines, lecture, and meetings; 2) education and training; 3) research and literature. The specialists also reported peers and departments as ways they found about the guidelines. A lower number of responses were received from General Dental Practitioners, as most of them (73.1%) were not aware of the guidelines. The General Dental Practitioners, who answered this question mentioned BSPD/BSP websites and emails as ways they found about the guidelines.

These findings show that posting the guidelines on the BSPD website was an effective way to help paediatric dental specialists and General Dental Practitioners find them. It is also important to point out that dental specialists might have had a better chance of knowing about these guidelines, as they attend the BSPD lectures and meetings. Moreover, paediatric dental specialists also might have had better exposure to the guidelines through additional training and through conducting research.

One of the answers from General Dental Practitioners was “*Email from manager*”. This is interesting, as it suggests that dentists may expect their managers to distribute any new guidelines. A non-clinical manager may be unlikely to know where to find the guidelines, or which guidelines are relevant to distribute to different clinicians. It could be argued that sending any new guidelines to senior clinicians/consultants, and asking them to distribute them would be easier than sending the guidelines to individual dentists. However, this comment may still emphasise the point that sending new guidelines by email or post may be an effective way to disseminate them. A cluster randomised controlled trial was published in 2004 (Bahrami et al., 2004) investigated the effectiveness of different guideline implementation strategies. Researchers used the SIGN guideline on the management of unerupted and impacted third molars. The trial included 63 dental practices across Scotland, and compared a postgraduate education course, audit and feedback, and a computer aided learning package. The researchers concluded that neither computer aided learning packages, nor audit and feedback increased dentists’ compliance with the guideline compared to mailing the guideline and the opportunity to attend a postgraduate training course.

A larger number of participants answered the question asking about how to disseminate the new guidelines to the dental profession (74.8%). Three main themes emerged when paediatric dental specialists’ responses were analysed: 1) Literature; 2) Specialists groups and societies; 3) Sending by email or post. Other ways to disseminate the guidelines reported by the specialists were booklets and implementing new policies. When General

Dental Practitioners responses were analysed, one main theme emerged which was sending the guidelines by email or post. From these findings we can see that paediatric dental specialists and General Dental Practitioners think that guidelines should be sent by post or email. Two responses emphasised the importance of sending new guidelines by email or post “*New guidelines should be sent to GDC registration address*”, “*New guidelines should be posted/emailed to the practice*”.

An unexpected comment from one of the General Dental Practitioners was “*I have actually read about Simplified BPE screening system thanks to this questionnaire*”. It is important to mention that the questionnaire was sent to the study participants by post, and this has helped this participant know about the guidelines. This may emphasise the finding that mailing guidelines is an effective way to disseminate them. A cluster randomised controlled trial (Bahrami et al., 2004) that investigated the effectiveness of different guideline implementation strategies, concluded that mailing guidelines was more effective in increasing dentists’ compliance than computer aided learning packages, and audit and feedback.

However, disseminating these guidelines alone may not be sufficient enough to promote changes in practice (Lomas, 1993). Therefore, it is important to find effective implementation strategies to increase the implementation of these guidelines in clinical practice (Effective Health Care, 1999; Lomas, 1991). Educational materials, such as leaflets, booklets, journal supplements can be used to inform paediatric dental specialists and General Dental Practitioners

about these guidelines and other new guidelines. Educational meetings including conferences and workshops can be conducted to educate paediatric dental specialists and General Dental Practitioners about these guidelines and about the importance of periodontal screening in children and adolescents. Audit and feedback can also be conducted in clinical centres and dental hospitals to investigate dentists' use of the BPE screening system and the Simplified BPE screening system, and check if their use of these systems is in line with the guidelines. Reminders, such as stickers on medical notes and referral forms may enable best practice during a consultation. Reminders on referral forms may be effective in reminding General Dental Practitioners about screening patients using the BPE screening system.

4.12 Strengths and limitations of the study:

This is the first study that investigated the extent to which paediatric dental specialists screen patients for periodontal disease, and is the first to compare their responses to responses from General Dental Practitioners. This is also the first study to investigate the extent to which paediatric dental specialists and General Dental Practitioners used the BPE screening system on children and adults. Moreover, this is the first study that investigated dentists' awareness of the guidelines for periodontal screening and management of children and adolescents. This study included all the paediatric dental specialists who are registered with the BSPD. This study also included a random sample of General Dental Practitioners working the UK and the Republic of Ireland.

However, this study also has some limitations: 1) The study only included paediatric dental specialists and General Dental Practitioners working in the UK and the Republic of Ireland, so the findings of this study may not necessarily reflect areas outside the UK and the Republic of Ireland; 2) The sample size was not based on a sample size calculation, due to the limited number of published studies that investigated the use of the BPE screening system. We decided to survey all paediatric dental specialists registered with the BSPD and an equivalent random sample of General Dental Practitioners; 3) This study had a low response rate, which was less than 50%.

4.13 Problems encountered during research:

One of the problems encountered before conducting this study was the limited data in the literature about screening children for periodontal disease. There was also limited data about the use of the BPE screening system in adults and children. There was also limited data about dentists' compliance with guidelines regarding the use of periodontal screening systems. There were no studies that published a validated questionnaire that asked about the use of the BPE screening system. We developed the survey questionnaire used for this study and piloted it to check its clarity and content. It was very difficult to conduct a sample size calculation, due to the limited number of published studies that investigated the use of the BPE screening system. We decided to include all paediatric dental specialists registered with the BSPD and an equivalent random sample of General Dental Practitioners.

Another problem we encountered before recruiting the participants was the difficulty of obtaining participants' information from the BSPD and the GDC. There was no list of registered paediatric dental specialists on the BSPD website. Contact was made with one of the administrators at the BSPD by email, but there was no response after several attempts. The list of BSPD specialists was finally obtained after one of the research supervisors contacted the BSPD. There was more difficulty in obtaining General Dental Practitioners' information from the GDC website. The GDC website allows the search for dentists using names, GDC numbers, towns and postcodes. However, there was no single published list of all dentists registered with the GDC. A published list of dentists would facilitate randomly selecting dentists using a computer generated random number table. Contact was made with the GDC by phone to ask for a complete list of dentists registered. The request was denied and we were instructed to use the search boxes available on the GDC website. It was very difficult to randomly choose dentists from the register as it was displayed, so it was decided to randomly select dentists using elements extracted from postcodes.

This study aimed to investigate the extent to which paediatric dental specialists and General Dental Practitioners used the BPE screening system, and complied with the guidelines for periodontal screening and management of children and adolescents. This study also aimed to investigate any barriers dentists may perceive while using the BPE screening system on their patients. Most respondents routinely screened child patients using the BPE screening system and were aware of the guidelines for periodontal screening and

management of children and adolescents. However, most respondents perceived barriers when using the BPE screening system on child patients. Moreover, most respondents thought that parents do not expect them to screen their children for periodontal disease. It was important to investigate parents' perspective regarding periodontal screening and their awareness about periodontal disease and oral health in general. The second study in the present research aimed to investigate parents' awareness about periodontal disease, oral health in general and the importance of periodontal screening in children and adolescents.

Chapter 5

5.0 STUDY TWO DESIGN

“Parents’ Awareness of Periodontal Diseases in Children and Adolescents”

5.1 Aims:

This study aimed to investigate the awareness of child patients' parents about periodontal disease, and the importance of periodontal screening in children and adolescents.

5.2 Hypotheses:

- 1- Parents are aware of the importance of maintaining oral health and are knowledgeable about periodontal disease.
- 2- Parents are aware that periodontal disease may occur in children and are aware of the signs of periodontal disease.

5.3 Impact:

The study is very important as it:

- 1- Determined parents' awareness about periodontal disease, and about the importance of oral health care.
- 2- Determined if there is a lack of awareness among parents in regards to the importance of periodontal screening.

5.4 Materials and methods:

For this cross-sectional study, we developed a questionnaire (Appendix 6) that was handed to parents who attended the new patients' clinic at the children's dentistry department at the LDI. A search of the literature was conducted to find studies that published questionnaires investigating parents' awareness about periodontal disease and parents' awareness about oral health in general (Elkarmi et al., 2015; Aggarwal et al., 2010). After looking at these questionnaires, the questionnaire used for this study was developed. The questionnaire consisted of 14 questions. The questionnaire first asked parents about their child's age, age of other children under their care, and their child's previous dental visits. Then the questionnaire asked parents about the importance for examining their child for dental caries and periodontal disease. Parents were also asked about their knowledge about periodontal disease including, signs that their child has periodontal disease; causes of periodontal disease; and effective measures to prevent periodontal disease. At the end of the questionnaire, parents were asked if they expected their child to be examined for periodontal disease (Appendix 6). The questionnaire was piloted by 10 individuals and questions were checked for clarity and content. After consultation with a statistician, we agreed to survey no more than 100 parents who attend the new patients' clinics at the children's dentistry clinics at the LDI.

5.5 Inclusion Criteria:

1- Any parent whom their child visited the children's dentistry clinic at the LDI and agreed to participate in the study.

5.6 Exclusion Criteria:

1- Any parent whom their child did not visit the children's dentistry clinics at the LDI, or did not agree to participate in the study.

5.7 Ethical approval:

Ethical approval was first sought from the National Research Ethics Service (NRES) committee of Yorkshire and The Humber - Bradford Leeds (REC reference: 15/YH/0511) (Appendix 7). Following this, the study received approval from the Leeds Research and Development Directorate (R&D) in order for it to be performed at the Leeds Teaching Hospital Trust (LTHT). Ethical approval was confirmed in February 2016 (LTHT R&I Number: DT15/371) (Appendix 7). The Chief Investigator made certain that the present study was carried out in full conformance with the laws and regulations of the country in which the research was conducted and the World Medical Association Declaration of Helsinki (World Medical Association, 2008).

5.8 Recruitment:

A sample size of 100 parents was determined after consultation with a statistician. We then agreed to recruit no more than 100 parents over the course of 10 weeks. Parents who visited the children's dentistry clinics at the LDI with their children between February and April of 2016 were approached and handed a questionnaire along with information that explained the purpose and rationale of the study. If they agreed to participate, they were then asked

to complete the questionnaire. Parents were assured that completing the questionnaire was voluntary, and refusing to complete it would not have affected the treatment of their children. The questionnaire did not ask for any identifying information, so no respondents could be identified.

5.9 Risks and benefits:

This study posed no risk to parents over and above those associated with completing the questionnaire. No identifying information was collected in the questionnaires. Participation in this study was voluntary and parents were assured that refusing to participate would not have affected the dental treatment of their children. While there were no personal benefits to participation in this study, the results from the study may help benefit future patients, as well as provide information to General Dental Practitioners. The results of the study determined the level of parents' awareness of the importance of periodontal screening in children and adolescents. The study also determined if parents expect their children to be checked for periodontal disease by dentists.

5.10 Confidentiality:

There was no link between the questionnaire's (answers) and individual respondents' (identifying information). The questionnaire did not ask for any identifying information.

5.11 Data Storage and analysis:

Data was aggregated and stored on a password-protected computer situated at the LDI, University of Leeds. Only members of the research team had access to the study data. Data was analysed using SPSS. Descriptive statistics were used to report demographic data of respondents.

Chapter 6

6.0 STUDY TWO RESULTS

6.1 Background information:

One hundred and nine parents were approached while attending the children's dentistry clinics at the LDI. A total of 100 parents (92%) agreed to participate and answered the survey questionnaire. The mean age of new child patients in the study sample was 7.4 years (2 to 14 years old). Eighty eight parents (88%) reported having three children or less, and 32 parents (32%) reported having only one child.

6.2 Frequency of dental visits and visiting the Leeds Dental

Institute:

Parents were asked how often their child visits the dentist. Thirty four parents (34%) reported that their child visits the dentist four times a year. Fifty four parents (54%) reported that their child visits the dentist twice a year. Only five parents (5%) reported that their child visits the dentist once a year. Only two parents (2%) reported that their child visits the dentist less than once a year. Only 5 parents (5%) reported that their child visits the dentist only when in pain. Parents were asked if they have previously been to the children's clinic at the LDI. Only 23 parents (23%) reported that they have been to the children's clinic at the LDI before (Figure 11).

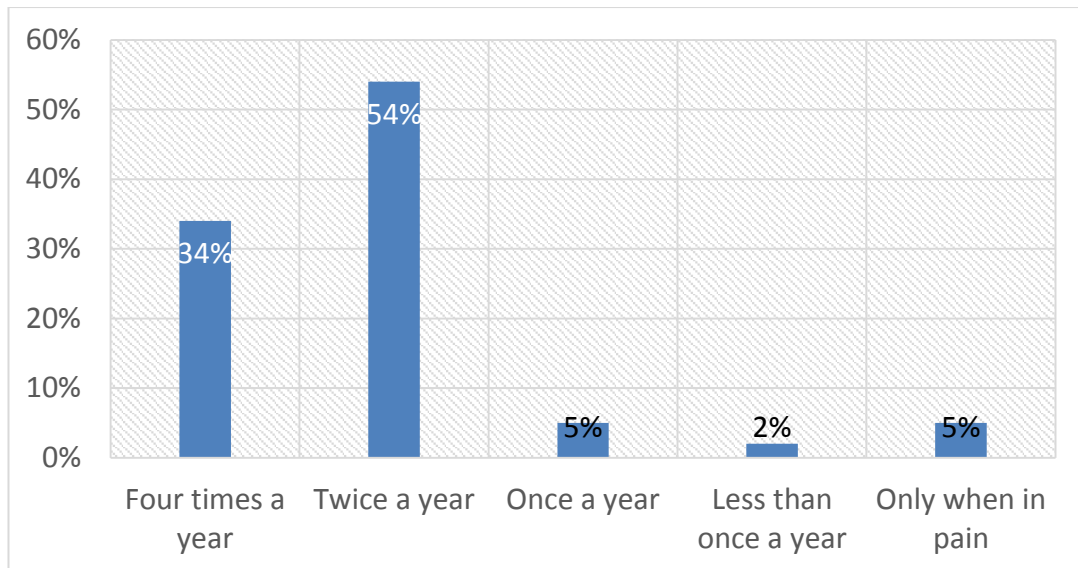


Figure 11: Frequency of children's dental visits.

6.3 Importance of an examination for dental caries and periodontal disease:

Parents were asked if it was important for their child to be checked for dental caries, and for periodontal disease. Ninety seven parents (97%) thought that it was important for their child to be checked for dental caries, and 95 parents (95%) thought it was important for their child to be checked for periodontal disease. Parents were then asked if their child has been previously checked for periodontal disease. Only 29 parents (29%) reported that their child was previously checked for periodontal disease, while 45 parents (45%) did not know if their child was previously checked for periodontal disease (Table 5).

Question	Yes	No	I don't know
Do you think it is important for your child to be checked for tooth decay?	97	1	2
Do you think it is important for your child to be checked for gum disease?	95	1	4
Has your child been previously checked for gum disease?	29	26	45
Can adults get gum disease?	98	0	2
Can children get gum disease?	84	0	16
Can bacterial plaque cause gum disease?	71	0	29
Can frequent sugar intake cause gum disease?	70	5	25

Table 5: Parents responses to the survey questionnaire. Numbers displayed are calculated out of 100, and are percentages.

6.4 Awareness of the occurrence and signs of periodontal disease children:

Parents were asked if adults and children can get periodontal disease. Ninety eight parents (98%) thought that adults can get periodontal disease, and 84 parents (84%) thought that children can get periodontal disease (Table 5). Parents were asked about signs that their child may have periodontal disease. Ninety seven parents (97%) thought that bleeding gums is a sign of periodontal disease. Seventy eight parents (78%) thought that red swollen gums are a sign of periodontal disease. Forty two parents (42%) thought that a bad taste

in the mouth is a sign of periodontal disease. Fifty four parents (54%) thought that bad breath is a sign of periodontal disease (Figure 12).

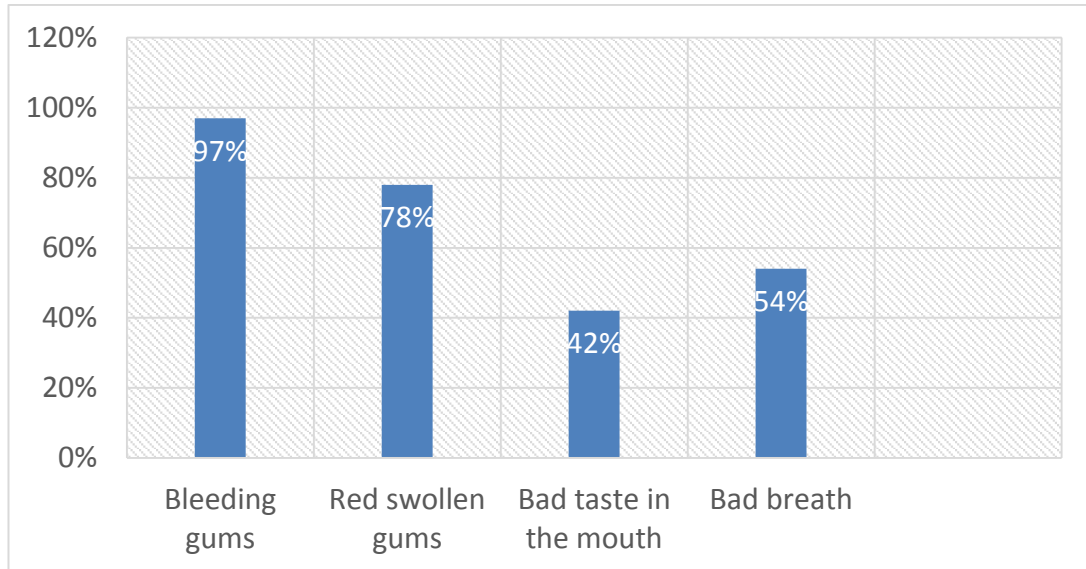


Figure 12: Parents' reported signs of periodontal disease.

6.5 Awareness of possible causes of periodontal disease:

Parents were asked if bacterial plaque and frequent sugar intake can cause periodontal disease. Seventy one parents (71%) thought that bacterial plaque can cause periodontal disease, and 70 parents (70%) thought that frequent sugar intake can cause periodontal disease (Table 5).

6.6 Effective measures in preventing periodontal disease:

Parents were then asked about effective measures in preventing periodontal disease. Ninety three parents (93%) thought that tooth brushing twice a day can be an effective measure in preventing periodontal disease. Seventy one parents (71%) thought that cleaning between teeth regularly can be an

effective measure in preventing periodontal disease. Seventy six parents (76%) thought that reducing the frequency of intake of sugary foods and snacks can be an effective measure in preventing periodontal disease. Sixty three parents (63%) thought that being shown how to clean teeth by the dentist can be an effective measure in preventing periodontal disease (Figure 13).

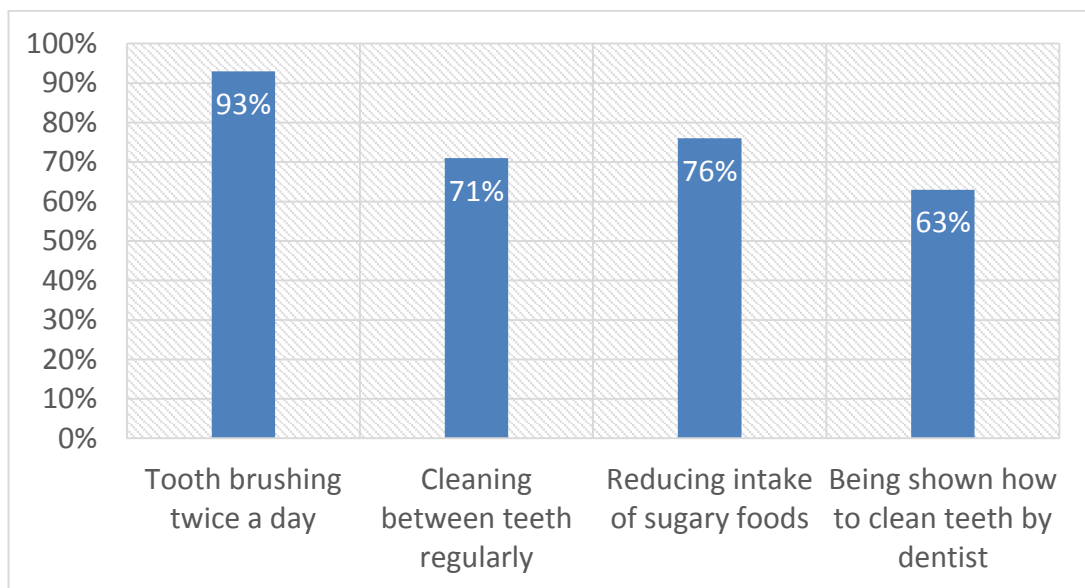


Figure 13: Parents' reported measures of preventing periodontal disease.

6.7 Parents expectations of their children being screened for periodontal disease:

At the end of the survey questionnaire, parents were asked if they expected their child to be examined for periodontal disease. Only 56 parents (56%) expected their child to be examined for periodontal disease.

Chapter 7

7.0 STUDY TWO DISCUSSION

7.1 Background information:

This is a cross-sectional study that aimed to investigate parents' awareness about periodontal disease, and the importance of periodontal screening in children and adolescents. One hundred parents agreed to participate and completed the survey questionnaire. The mean age of new child patients in the sample was 7.4 years.

7.2 Dental visits and periodontal examination:

Most parents in this study reported that their child visits the dentist at least twice a year, indicating a pattern of attendance rather than attending only when in pain. However, 5% of parents reported that their child visits the dentist only when in pain. This finding is not in line with the finding shown in the next paragraph that more than 95% of parents thought that it is important to check for dental caries. It might be that this 5% of parents think that one annual dental visit is enough to check for dental decay. It is also possible that most parents answered the next question positively to appear knowledgeable to the researcher.

Most parents were aware that it is important for their child to be checked for dental caries and for periodontal disease. However, only 29% of parents reported that their child was previously checked for periodontal disease.

Moreover, nearly half of parents did not know if their child was previously checked for periodontal disease. This is an unexpected finding, as we would expect dentists to explain diagnostic, preventive, and treatment measures they provide. We would also expect dentists to explain the reasons behind providing these measures. We would also expect parents to ask dentists and other health professionals about any procedures provided to their children. As parents thought it is important to check for periodontal disease, it might be anticipated that they follow up with the dentist and ask if a periodontal examination has been done. However, this finding may suggest that parents have trusting relationships with their dentists, where they would not ask about what diagnostic or treatment measures have been provided and would just accept them.

7.3 Signs and causes of periodontal disease:

Most parents were aware that periodontal disease can affect adults, and most were aware that it can affect children. Most parents were aware that gingival bleeding (97%) and gingival swelling (78%) are signs of periodontal disease. Most parents (71%) were aware that bacterial plaque can cause periodontal disease. However, most parents (70%) thought that frequent sugar intake can cause periodontal disease. This is an interesting finding, as it suggests that parents do not fully understand causes and risk factors of periodontal disease or may think of all dental disease in one. A different finding was seen in a study conducted in the UK in 2010 (Aggarwal et al., 2010) that investigated patients' knowledge about different dental diseases. Authors found that participants had

better knowledge about risk factors of periodontal disease than about risk factors of caries and erosion (Aggarwal et al., 2010).

7.4 Measures of preventing periodontal disease:

Most parents were aware that brushing twice a day and cleaning between teeth are effective measures in preventing periodontal disease. This finding is similar to another UK study that found that most patients were aware that dental flossing is effective in preventing periodontal diseases (Aggarwal et al., 2010). However, most parents in our study thought that reducing sugar intake is an effective measure in preventing periodontal disease. This finding may suggest that parents think about all dental diseases in one. This also may suggest that the positive health messages of how to improve oral health are confusing to parents, as it seems that there is confusion about which disease is being prevented. There are gaps in parents' knowledge, but at least there is awareness of measures to prevent disease. This suggests that part of the health messages is taken by parents.

7.5 Parents' expectations:

In the present study nearly half of the parents did not expect their child to be examined for periodontal disease. This finding is interesting, as most parents had reported that it is important for their child to be examined for periodontal disease. Moreover, most parents also indicated their awareness that periodontal disease can affect children. It could be that parents' expectations are affected by the fact that almost half of them reported that they did not know

if their children have been previously checked for periodontal disease. A coinciding finding from the other study in this research, is that most dentists (67%) did not think that parents expect their child to be screened for periodontal disease. However, it is not clear here if parents' expectations are affected by dentists' expectations, or if it is the other way around. It would be interesting to explore parents' expectations from their dentists' and reasons behind them. Parents need to be aware of the Importance of periodontal screening in children. They need to be aware that the presence of gingivitis can be a sign of an underlying medical condition, and the presence of periodontitis can also be associated with medical diseases. They also need to be aware that chronic gingivitis in children can progress to periodontitis which may have implications on general health.

7.6 Strengths and limitations of the study:

To our knowledge this study is one among a few UK studies that investigated parents' awareness about the importance of maintaining oral health. It is also one of a few UK studies that investigated parents' knowledge about periodontal disease, its signs, causes and measures to prevent it. To our knowledge, this is the first UK study that investigated parents' awareness about the importance of periodontal examinations, and investigated parents' expectations of their children being examined for periodontal disease.

However, this study has a number of limitations: 1) It included parents who attended a clinic at only one centre, thus its results may not reflect other

centres in the UK; 2) It used a survey questionnaire that was handed to parents while they were waiting in the clinic. Parents may have felt obliged to complete the questionnaire to not affect the treatment their child received. However, it was explained to parents that completing the questionnaire was voluntary and not doing so would not have affected the treatment of their children; 3) The study used a questionnaire to collect information from parents, which may have led to parents giving positive responses to be viewed favourably by others.

8.0 CONCLUSIONS AND FUTURE RESEARCH

8.1 Study one conclusions:

Within the limitations of this study, we can conclude that: 1) Most paediatric dental specialists and General Dental Practitioners routinely screened child patients using the BPE screening system; 2) Most paediatric dental specialists and General Dental Practitioners were aware of the guidelines for periodontal screening and management of children and adolescents; 3) Paediatric dental specialists were more likely to screen children using the Simplified BPE screening system and were more aware of the guidelines for periodontal screening and management of children and adolescents, compared to General Dental Practitioners. 4) Most paediatric dental specialists and General Dental Practitioners reported ways they think the guidelines should be disseminated to the dental profession. Different ways of dissemination were reported by both groups, but both groups mentioned sending the guidelines by email or post. 5) Most paediatric dental specialists and General Dental Practitioners perceived barriers when using the BPE screening system on patients. Both groups mentioned patient anxiety and cooperation as barriers.

8.2 Study two conclusions:

Within the limitations of this study, we can conclude that: 1) Parents were aware that periodontal disease can affect children, and were aware about the importance of periodontal examination; 2) Parents had insufficient knowledge about causes of periodontal disease, and about effective measures of

preventing periodontal disease. 3) Half of the parents expected their children to be examined for periodontal disease.

8.3 Clinical relevance:

Although most respondents in the first study were aware about the guidelines for periodontal screening and management of children and adolescents, most respondents did not fully comply with these guidelines while using the BPE screening system. Moreover, most respondents reported ways they think are effective in disseminating guidelines to dental practitioners. It is important to point out that disseminating guidelines alone may not be sufficient enough to promote changes in practice. Therefore, it is important to find effective implementation strategies such as educational materials, educational meetings, audit and feedback, and reminder systems to increase the implementation of guidelines in clinical practice.

Dental practitioners can be informed about new guidelines using educational materials, such as leaflets, booklets, and journal supplements. Educational meetings such as conferences and workshops can be conducted to educate dental practitioners about new guidelines. Audit and feedback can also be conducted in clinical centres and dental hospitals to investigate dentists' compliance with different guidelines. Reminders, such as stickers on medical notes and on referral forms may enable best practice during consultations, as they may be effective in reminding dental practitioners about certain diagnostic tests or treatment measures.

In the second study, most parents were aware that periodontal disease can affect children. Most were aware about signs of periodontal disease, but not about causes of periodontal disease or means to prevent it. These findings may suggest that parents think about all dental diseases in one. This also may suggest that the positive health messages of how to improve oral health are confusing to parents, as it seems that there is confusion about which disease is being prevented. There are gaps in parents' knowledge, but at least there is awareness of measures to prevent disease. Dental practitioners need to be aware of the deficiencies in parents' knowledge and need to take more care in explaining dental diseases, preventive measures and treatment options. Educational materials such as leaflets and booklets can be used to inform parents about dental diseases, preventive measures and treatments.

Moreover, most parents were aware about the importance of periodontal screening, but only half of them expected their child to be screened for periodontal disease. Parents' expectations could be connected to dentists' expectations, as most dentists in the first study did not think that parents expect their child to be screened for periodontal disease. Parents need to be aware of the importance of periodontal screening in children. If parents have sufficient knowledge about periodontal disease, and about the importance of periodontal screening, they may have a better chance of asking dental practitioners about dental diseases affecting their child and about diagnostic tests and treatment measures needed.

8.4 Future research:

Future research can include a larger sample of General Dental Practitioners and a larger sample of dental specialists from other disciplines in dentistry. A future study may be conducted with focus groups of dental specialists and General Dental Practitioners. This may point to other barriers that may prevent dentists from using the BPE screening system. Future studies may be conducted to investigate dentists' attitudes toward screening patients for periodontal disease, and towards using the BPE screening system. A future study may also be conducted where interviews are carried out. Interviews may help increase the response rate. They may also help in collecting more in-depth information from participants. Moreover, they may help get participants' views and explanations for different answers. Future studies may also be conducted where pens are enclosed with shorter questionnaires. This may also help increase the response rate. Future studies could include a larger sample of parents attending different centres in the UK, to make the results more generalizable. Future studies may be conducted to investigate parents' expectations of their dentists, and the reasons behind those expectations. Future studies can also be conducted where parents are included in focus groups rather than just handed questionnaires. This may help explore parents' knowledge and expectations in depth.

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APPENDICES

Appendix 1: Dentists' questionnaire

Version 11 (30 May 2015)

School of Dentistry

University of Leeds Clarendon
Way Leeds LS2 9LU

T +44 (0) 113 343 6199

F +44 (0) 113 343 6165

E dentistry@leeds.sc.uk



UNIVERSITY OF LEEDS

Gingival and periodontal disease in children and adolescents

Unique Identifier: _____

Dear Dr,

This survey is a part of a postgraduate programme research project at the University of Leeds. The survey aims to explore dentists' current clinical practice in the screening and management of periodontal disease in children, adolescents, and adults. The survey will take about 15 minutes to complete. We would be grateful if you can complete this survey and return it in the enclosed freepost envelope. If you feel this survey does not apply to you, or if you are not interested in completing the questionnaire, we would be grateful if you could please return it in the enclosed freepost envelope so we know not to send you any further mailings.

Section A:**1- What is your gender?**

	Male
	Female

2- What is your age?

	Less than 34 years
	35-44 years
	45-54 years
	55-64 years
	65 years or more

3- How long has it been since you graduated with your primary dental degree?

	10 years or less
	11-20 years
	21-30 years
	31-40 years
	More than 40 years

4- In which country did you receive your primary dental degree?

--

5- Have you completed any additional dental qualifications?

	Yes please list them:
	No

6- Are you registered on any specialist lists?

	Yes please list them:
	No

7- Do you have any areas of special interest? Please select all that apply:

	Endodontics
	General dentistry
	Implants
	Oral Pathology
	Oral surgery
	Orthodontics
	Paediatric dentistry
	Periodontology
	Prosthodontics
	Other, please specify:

Section B:

Screening children. If you only see Adult patients, please skip to Section C:

8- Do you routinely screen your child patients for periodontal disease?

	Yes
	No Please skip to question 12
	No; but another member of the dental team does. Please skip to question 12

9- If you answered yes to question 8, do you use the simplified BPE (Basic Periodontal Examination) screening system to detect periodontal disease in your child patients?

	Yes
	No (please list any screening tools you use) Please skip to question 12

10- If you answered yes to question 9, please indicate which group(s) you use the simplified BPE screening system on:

	New child patients up to 7 years old
	New child patients 7-11 years old
	New child patients 12-17 years old
	Annually for patients with codes 0, 1 or 2
	For child/adolescent patients before starting orthodontic treatment

11- Please report the extent to which you agree or disagree with the following statements:

Parents expect their children to be screened for periodontal disease.	Strongly agree	Agree	Disagree	Strongly disagree
Using the BPE screening system is accepted by child patients.	Strongly agree	Agree	Disagree	Strongly disagree
The BPE screening system is comfortable for child patients.	Strongly agree	Agree	Disagree	Strongly disagree
Using the BPE screening system on child patients is quick.	Strongly agree	Agree	Disagree	Strongly disagree
Using the BPE screening system on child patients is easy.	Strongly agree	Agree	Disagree	Strongly disagree

12- What barriers (if any) do you think may prevent you from using the simplified BPE screening system on your child patients? Please list them in the box below:

--

Section C:

Screening adults. If you only see Child patients, please skip to Section D:

13- Do you routinely screen your adult patients for periodontal disease?

	Yes
	No Please skip to question 17
	No; but another member of the dental team does Please skip to question 17

14- If you answered yes to question 13, do you use the BPE screening system to detect periodontal disease in your adult patients?

	Yes
	No (please list any screening tools you use) Please skip to question 17

15- If you answered yes to question 14, please indicate which group(s) you use the BPE screening system on:

	All new adult patients
	Annually on patients with codes 0, 1 or 2
	To assess the response to periodontal therapy
	For patients who have undergone therapy for periodontitis and are in the maintenance phase.

16- Please report the extent to which you agree or disagree with the following statements:

Adult patients expect to be screened for periodontal disease.	Strongly agree	Agree	Disagree	Strongly disagree
Using the BPE screening system is accepted by adult patients.	Strongly agree	Agree	Disagree	Strongly disagree
The BPE screening system is comfortable for adult patients.	Strongly agree	Agree	Disagree	Strongly disagree
Using the BPE screening system on adult patients is quick.	Strongly agree	Agree	Disagree	Strongly disagree
Using the BPE screening system on adult patients is easy.	Strongly agree	Agree	Disagree	Strongly disagree

17- What barriers (if any) do you think may prevent you from using the BPE screening system on your adult patients? Please list them in the box below:

Section D:

18- Are you aware of any differences between the BPE screening system and the simplified BPE screening system?

	Yes
	No

19- Are you aware of any new guidelines for using the simplified BPE screening system in children and adolescents?

	Yes please go to question 20
	No please go to question 21

20- If you answered yes to question 19, where did you find out about the guidelines?

--

21- How do you feel new guidelines should be disseminated to reach the dental profession?

--

**Thank you for taking this survey
Please return the survey in the enclosed freepost envelope.**

Appendix 2: Paediatric dental specialists' invitation letter Version 4 (30 May 2015)**School of Dentistry**

University of Leeds
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T +44 (0) 113 343 6199
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E dentistry@leeds.sc.uk

**UNIVERSITY OF LEEDS****Letter of invitation**

Dear BSPD member,

We are hoping that you will consider taking part in a project undertaken as a part of a Professional Doctorate degree at the University of Leeds. This project aims to explore your perspective and clinical experience in periodontal screening and management of children, adolescents, and adults. Ethical approval for this project has been obtained from the University of Leeds Dental Research Ethics Committee.

What will you need to do?

- Complete the enclosed questionnaire and return it in the enclosed freepost envelope. Even if you are not interested in completing the questionnaire, we would be grateful if you could please return it in the enclosed freepost envelope.

What will happen to the data?

- All addresses associated with returned questionnaires will be removed from the data before analysis is undertaken. All results will be aggregated and individual respondents will not be identified.
- The number on the questionnaire and envelope will be used to track returns only.
- Information that you submit will contribute to a report on the clinical experience of dental specialists in the screening and management of periodontal disease in children, adolescents, and adults.

What is in it for you?

- The work could help identify how best to inform colleagues about guidelines for practice.

We hope that you will take part in this survey. If you have any questions, please feel free to contact Zuhair (dnzma@leeds.ac.uk), who will be happy to answer any questions.

Many thanks,

Appendix 3: General Dental Practitioners' invitation letter Version 4 (30 May 2015)**School of Dentistry**

University of Leeds
Clarendon Way
Leeds LS2 9LU

T +44 (0) 113 343 6199
F +44 (0) 113 343 6165
E dentistry@leeds.sc.uk

**UNIVERSITY OF LEEDS****Letter of invitation**

Dear colleague,

We are hoping that you will consider taking part in a project undertaken as a part of a Professional Doctorate degree at the University of Leeds. This project aims to explore general dental practitioners' current clinical practice in the screening and management of periodontal disease in children, adolescents, and adults. Ethical approval for this project has been obtained from the University of Leeds Dental Research Ethics Committee.

What will you need to do?

- Complete the enclosed questionnaire and return it in the enclosed freepost envelope. Even if you are not interested in completing the questionnaire, we would be grateful if you could please return it in the enclosed freepost envelope.

What will happen to the data?

- All addresses associated with returned questionnaires will be removed from the data before analysis is undertaken. All results will be aggregated and individual respondents will not be identified.
- The number on the questionnaire and envelope will be used to track returns only.
- Information that you submit will contribute to a report on the current clinical practice of general dental practitioners in the screening and management of periodontal disease in children, adolescents, and adults.

What is in it for you?

- The work could help identify how best to inform colleagues about guidelines for practice.

We hope that you will take part in this survey. If you have any questions, please feel free to contact Zuhair (dnzma@leeds.ac.uk), who will be happy to answer any questions.

Many thanks,

Appendix 4: Study One Ethics Approval

DREC Ethics application number - 070415/ZA/161

Dear Zuhair

Title: Investigation of the use of the BPE screening system by dental specialists and general dental practitioners in children, adolescents, and adults

Thank you for re-submitting the above Ethics application to the Dental Research Ethics Committee. Your application has been re-reviewed and I am pleased to inform you that your application has been accepted.

Documents reviewed by the Committee

Document name	Version number and date
Protocol	Version 9 25/06/2015
Letter of invitation (BSPD members)	Version 4 30/06/2015
Letter of invitation (GDP's)	Version 4 30/06/2015
Questionnaire	Version 11 30/06/2015

With best wishes for the success of your project.

Please note: You are expected to keep a record of all your approved documentation, as well as documents such as sample consent forms, signed consent forms, participant information sheets and all other documents relating to the study. This should be kept in your study file, and may be subject to an audit inspection. If your project is to be audited, you will be given at least 2 weeks' notice.

It is our policy to remind everyone that it is your responsibility to comply with Health and Safety, Data Protection and any other legal and/or professional guidelines there may be.

Kind regards,

For an on behalf of
Dr Julia Csikar
Deputy DREC Chair

Appendix 5: Study One Ethics Amendment

DREC reference: 070415/ZA/161

Dear Zuhair

DREC reference: 070415/ZA/161

Project title: Investigation of the use of the BPE screening system by dental specialists and general dental practitioners in children, adolescents and adults

Thank you for submitting the amendment for the above ethics application. I am pleased to inform you that the amendment has been accepted by the Dental Research Ethics Committee.

Documents reviewed:

Document name	Version number and date
Study protocol	Version 10 25/04/2016

With best wishes for the success of your project.

For and on behalf of
Dr Jinous Tahmassebi
DREC Deputy Chair

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**UNIVERSITY OF LEEDS**

Gum disease in children and adolescents

Date of taking the survey: ___/___/2015

Dear parent,

You are being invited to take part in a research study, which aims to explore parents' awareness and knowledge about gum disease in children. If you are happy to participate in this study, we will ask you to complete a questionnaire. You will need to complete the questionnaire only once, which would take you about 10 minutes. This questionnaire is anonymous, as no identifying information will be collected. Your participation is voluntary. We would like you to participate in this study, as we believe that you can make an important contribution to this research. If you do not wish to participate, you do not have to do anything in response to this request. Please be assured that refusing to participate will not affect the treatment of your child. While there may be no personal benefits to your participation in this study, the information you provide can contribute to the future development of gum disease screening guidelines. All information you provide to us will be kept confidential, and only members of the research team will have access to it. All information provided by you will be stored anonymously on a password protected computer. The analysis of the information obtained will be undertaken by the research team based at the School of dentistry, University of Leeds. The results from this analysis may be available in one or more of the following forms: 1) scientific papers in peer reviewed academic journals; 2) presentations at a conference; 3) local seminars. This study has been reviewed by the NHS Ethics Committee. The study is being conducted by Zuhair Alkahtani under the supervision of his research supervisors, as a part of a Professional Doctorate Degree at the University of Leeds. If you wish to contact us for further information related to this survey, please contact Zuhair on dnzma@leeds.ac.uk

1- What is the age of your child attending the children's clinic today?

--

2- Please give the ages of any other children under your care:

--

3- How regularly does your child visit the dentist? (Please tick one option)

<input type="checkbox"/>	4 times a year
<input type="checkbox"/>	Twice a year
<input type="checkbox"/>	Once a year
<input type="checkbox"/>	Less than once a year
<input type="checkbox"/>	Only when in pain

4- Have you been in the Children's clinic at the LDI before? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

5- Do you think it is important for your child to be checked for tooth decay? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

6- Do you think it is important for your child to be checked for gum disease? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

7- Has your child been previously checked for gum disease? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

8- Can adults get gum disease? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

9- Can children get gum disease? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

10- Which of the following are signs that your child may have gum disease? (Please tick all that apply)

<input type="checkbox"/>	Bleeding gums
<input type="checkbox"/>	Red swollen gums
<input type="checkbox"/>	Bad taste in the mouth
<input type="checkbox"/>	Bad breath

11- Can bacterial plaque cause gum disease? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

12- Can frequent sugar intake cause gum disease? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

**13- What do you think might be an effective measure in preventing gum disease?
(Please tick all that apply)**

<input type="checkbox"/>	Tooth brushing twice a day
<input type="checkbox"/>	Cleaning between teeth regularly
<input type="checkbox"/>	Reducing frequency of intake of sugary foods and snacks
<input type="checkbox"/>	Being shown how to clean teeth by the dentist

14- Do you expect your child to be examined for gum disease today? (Please tick one option)

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No
<input type="checkbox"/>	I do not know

Thank you for taking this survey

Appendix 7: Study Two Ethics Approval



Health Research Authority
Yorkshire & The Humber - Bradford Leeds Research Ethics Committee

Room 001
 Jarrow Business Centre
 Viking Industrial Park
 Rolling Mill Road
 Jarrow
 NE32 3DT

24 December 2015

Mr Zuhair Alkahtani
 School of Dentistry
 University of Leeds
 Clarendon Way
 LS2 9LU

Dear Mr Alkahtani

Study title: Parents Knowledge about Gingival and Periodontal Disease in Children and Adolescents
REC reference: 15/YH/0511
IRAS project ID: 169506

Thank you for your letter of 14th December, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to make a request to postpone publication, please contact the REC Manager, Katy Cassidy, nrescommittee.yorkandhumber-bradfordleeds@nhs.net.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission must be obtained from each host organisation prior to the start of the

A Research Ethics Committee established by the Health Research Authority

study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for NHS permission for research is available in the Integrated Research Application System, www.hra.nhs.uk or at <http://www.rdforum.nhs.uk>.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to contest the need for registration they should contact Catherine Blewett (catherineblewett@nhs.net), the HRA does not, however, expect exceptions to be made. Guidance on where to register is provided within IRAS.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only)		14 July 2015
IRAS Checklist XML [Checklist_28102015]		28 October 2015
Other [Supervisor 2 CV]		09 October 2015
Other [Supervisor 3 CV]		22 September 2015
Participant information sheet (PIS) [Participant information sheet]	Version 8	13 July 2015
REC Application Form [REC_Form_28102015]		28 October 2015
Research protocol or project proposal [Study protocol]	Version 8	19 June 2015
Summary CV for Chief Investigator (CI)		23 September 2015
Summary CV for student		23 September 2015
Summary CV for supervisor (student research) [Supervisor 1 CV]		22 September 2015
Validated questionnaire [Questionnaire]	Version 11	09 December 2015

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form

available on the HRA website:
<http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/>

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at
<http://www.hra.nhs.uk/hra-training/>

15/YH/0511	Please quote this number on all correspondence
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With the Committee's best wishes for the success of this project.

Yours sincerely

pp



Dr Janet Holt
Chair

Email: nrescommittee.yorkandhumber-bradfordleeds@nhs.net

Enclosures: "After ethical review – guidance for
researchers" [SL-AR2]

Copy to: Mrs Anne Gowing, R&I Research Governance Manager. LTH.

The Leeds Teaching Hospitals **NHS**
NHS Trust

Date: 12/02/2016

Our Ref: Mobeen Fazal

Mr Zuhair Alkahtani
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School of Dentistry
University of Leeds
Clarendon Way
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LS2 9LN

Tel: 0113 392 0162
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www.leedsth.nhs.uk/research

Dear Mr Zuhair Alkahtani

Re: **NHS Permission at LTHT for: Parents Knowledge about Gingival and Periodontal Disease in Children and Adolescents**
LTHT R&I Number: DT15/371
REC: 15/YH/0511

I confirm that *NHS Permission for research* has been granted for this project at The Leeds Teaching Hospitals NHS Trust (LTHT). NHS Permission is granted based on the information provided in the documents listed below. All amendments (including changes to the research team) must be submitted in accordance with guidance in IRAS. Any change to the status of the project must be notified to the R&I Department.

The study must be conducted in accordance with the *Research Governance Framework for Health and Social Care*, ICH GCP (if applicable), the terms of the Research Ethics Committee favourable opinion (if applicable) and NHS Trust policies and procedures (see <http://www.leedsth.nhs.uk/research/>) including the requirements for research governance and clinical trials performance management listed in appendix 1 and 2 . NHS permission may be withdrawn if the above criteria are not met including the requirements for clinical trials performance

The Leeds Teaching Hospitals NHS Trust participates in the NHS risk pooling scheme administered by the NHS Litigation Authority ""Clinical Negligence Scheme for NHS Trusts"" for: (i) medical professional and/or medical malpractice liability; and (ii) general liability. NHS Indemnity for negligent harm is extended to researchers with an employment contract (substantive or honorary) with the Trust. The Trust only accepts liability for research activity with NHS Permission

The Trust therefore accepts liability for the above research project and extends indemnity for negligent harm. Should there be any changes to the research team please ensure that you inform the R&I Department and that s/he obtains an appropriate contract, or letter of access, with the Trust if required.

Yours sincerely



Anne Gowing
Research Governance Manager

Chair Dr Linda Pollard CBE DL Chief Executive Julian Hartley

The Leeds Teaching Hospitals NHS Trust incorporating: Chapel Allerton Hospital, Leeds Cancer Centre, Leeds Children's Hospital, Leeds Dental Institute, Leeds General Infirmary, Seacroft Hospital, St James's University Hospital, Wharfedale Hospital.

Approved documents

The documents reviewed and approved are listed as follows:-

<i>Document</i>	<i>Version</i>	<i>Date of document</i>
NHS R&D Form	5.1.0	21 October 2015
SSI Form	5.2.1	12 February 2016
CSU Approval		08 February 2015
REC Letter Confirming Favourable Opinion		24 December 2015
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only)		22 September 2015
Participant information sheet	Version 8	13 July 2015
Study protocol	Version 8	19 June 2015
Questionnaire	Version 11	09 December 2015

Chair Dr Linda Pollard CBE DL Chief Executive Julian Hartley

The Leeds Teaching Hospitals NHS Trust incorporating: Chapel Allerton Hospital, Leeds Cancer Centre, Leeds Children's Hospital, Leeds Dental Institute, Leeds General Infirmary, Seacroft Hospital, St James's University Hospital, Wharfedale Hospital.