GUIDELINES FOR PERIODONTAL SCREENING AND MANAGEMENT OF CHILDREN AND ADOLESCENTS UNDER 18 YEARS OF AGE

Guidelines produced in conjunction with the British Society of Periodontology and Implant Dentistry and British Society of Paediatric Dentistry

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Professor Valerie Clerehugh, Emeritus Professor of Periodontology, Department of Restorative Dentistry, School of Dentistry, University of Leeds, on behalf of British Society of Periodontology and Implant Dentistry; Dr Susan Kindelan, Consultant in Paediatric Dentistry, Leeds Dental Institute, Leeds Teaching Hospitals Trust, on behalf of British Society of Paediatric Dentistry.

Foreword

The Basic Periodontal Examination (BPE) was first rolled out for periodontal screening in General Dental Practice in 1986 by the British Society of Periodontology and Implant Dentistry (BSP) following a recommendation by the Federation Dentaire Internationale (FDI) in 1986, and there have been various updates since then, most recently in 2019 (www.bsperio.org.uk).

It was recognised that the BSP's Policy Statement in 2010 relating to screening and management of periodontal problems in primary dental care, and the BSP's 'Referral Policy and Parameters of Care' and 'Basic Periodontal Examination' documents at that time were principally targeted at adults, so there was a need for similar guidelines pertaining to children and adolescents. Accordingly, guidelines were produced for this younger age group (Clerehugh & Kindelan, 2012).

This present document sets out the updated joint recommendations of the BSP and the British Society of Paediatric Dentistry (BSPD) for the periodontal screening and management of children and adolescents under the age of 18 years in the primary dental care setting. It takes account of the introduction of the new 2017 World Workshop Classification system for periodontal and peri-implant diseases and conditions (Caton *et al*., 2018) and its impact on the younger age groups.

It should most usefully be read alongside guidance from an implementation group convened by the BSP on how the 2017 World Workshop Classification system integrates with existing methods and pathways of periodontal assessment and diagnosis in clinical practice, including BPE, and how it can be pragmatically implemented in clinical practice, in particular in the primary dental care setting (Dietrich *et al*., 2019).

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Introduction

It has been acknowledged that many different forms of periodontal diseases can affect children and adolescents (Clerehugh *et al*., 2004, Clerehugh, 2008) but the 2017 World Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions (Caton *et al*., 2018) reflects that our understanding of them has changed since the previous 1999 International Workshop classification (Armitage, 1999). In addition to the new classification scheme, a new method for Staging and Grading periodontitis was rolled out, which influences our management of patients, whether children, adolescents or adults (Tonetti *et al*., 2018).The BSP has produced guidance on implementation of these new measures in clinical practice (Dietrich *et al*., 2019) plus a series of case reports giving clinical examples of their application (Walter *et al*., 2019 a, b, c, d; Wadia *et al*., 2019).

The 2017 World Workshop was co-sponsored by the European Federation of Periodontology (EFP) and the American Academy of Periodontology (AAP) and included international experts from all around the world. Consensus was reached on a new classification for periodontal diseases and conditions and a new classification for peri-implant diseases and conditions was also developed, comprising peri-implant health, peri-implant mucositis and peri-implantitis.

Based on the 2017 World Workshop Classification, three main categories of periodontal diseases and conditions were agreed (Caton *et al*., 2018):

Periodontal Health, Gingival Diseases/Conditions

- Periodontal health and gingival health
- Gingivitis, dental plaque biofilm-induced
- Gingival diseases, non-dental plaque biofilm-induced

Periodontitis

- Necrotising periodontal diseases
- Periodontitis
- Periodontitis as a manifestation of systemic disease

Other Conditions Affecting the Periodontium

- Systemic diseases or conditions affecting the periodontal supporting tissues
- Periodontal abscesses and endodontic-periodontal lesions
- Mucogingival deformities and conditions
- Traumatic occlusal forces
- Tooth and prosthesis related factors

The focus of these guidelines is on the periodontal diseases and conditions of particular relevance to children and adolescents under 18 years of age.

Dental practitioners have an important role to play in the early recognition and diagnosis of gingival and periodontal diseases. This will ensure the greatest chance for successful

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treatment either in clinical practice within the primary dental care setting or by referral to appropriate specialist services.

Management needs to incorporate effective oral hygiene practices in childhood and adolescence which should extend into early adulthood and beyond as part of an evidence-based but pragmatic treatment approach for the various periodontal diseases diagnosed.

The aims of these guidelines are twofold:

1) To outline a method of screening children and adolescents under 18 years of age for periodontal diseases during the routine clinical dental examination in order to detect the presence of gingivitis or periodontitis or other periodontal problems at the earliest opportunity.

2) To provide guidance on periodontal management and when it is appropriate to treat in practice or refer to specialist services, thus optimizing periodontal outcomes for children and young adolescents.

Features of a healthy periodontium

In children with a healthy gingival and periodontal status the gingival margin is several millimeters coronal to the cemento-enamel junction (CEJ). The gingival sulcus may be 0.5 mm – 3 mm deep on a fully erupted tooth. In teenagers with a healthy periodontium the alveolar crest is situated between 0.4 mm - 1.9 mm apical to the CEJ (Hausmann *et al*., 1991).

A classification for gingival and periodontal health was included for the first time in the 2017 World Workshop Classification Consensus report of Workgroup 1 (Chapple *et al*., 2018 (see Table 1a)). In the 2013 Child Dental Health Survey, over a third of children met the criteria for periodontal health based on an absence of gum inflammation and calculus, and no more than one sextant with plaque (White *et al*., 2015).

Gingivitis

Plaque biofilm-induced gingivitis

As supragingival plaque is allowed to accumulate an inflammatory cell infiltrate develops in the gingival connective tissue and the attachment of the junctional epithelium is disrupted allowing apical migration of the plaque and an increase in the gingival sulcus depth, forming a false gingival pocket. With severe inflammation gingival swelling may occur, creating an even deeper false gingival pocket. At this stage the most apical extent of the junctional epithelium is still at the CEJ with no periodontal loss of attachment. This process is completely reversible with effective plaque biofilm removal.

Various forms of dental plaque biofilm-induced gingivitis were recognised in the 2017 World Workshop Classification (Chapple *et al*., 2018, (see Table 1 a)). Importantly, it was noted that gingivitis can occur on an intact periodontium or on a reduced

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periodontium in either a non-periodontitis patient or a successfully treated periodontitis patient.

Although the dental plaque biofilm is the essential aetiological agent in periodontal diseases, different local and systemic factors (risk factors) can modify the response of the individual to plaque accumulation and influence the development of gingivitis (see Table 1 a) or progression of gingivitis to periodontitis.

Plaque biofilm-induced gingivitis can occur at any age from early childhood through the teenage years and beyond. Epidemiological studies report a low prevalence of gingivitis during preschool age, followed by a gradual increase in prevalence reaching a peak around puberty, perhaps due to changes in the bacterial composition of the dental plaque, the inflammatory cell response and hormonal changes (Bimstein & Matsson, 1999).

The 2013 Child Dental Health Survey, published by the Health and Social Care Information Centre (Pitts *et al*., 2015) involved a representative sample of school children aged 5, 8, 12 and 15 years in the United Kingdom being selected to participate. A total of 13,628 children were sampled; participation rates were 70% for 5-year-olds, 65% for 8-year-olds, 83% for 12-year-olds and 74% for 15-year-olds. The 12- and 15-year-olds who were examined were invited to complete a questionnaire at the same appointment; there was high compliance of 99.6%.

The proportion of 8-year-olds with visible gum inflammation reduced from 64% in the 2003 survey (White *et al*., 2006) to 46% in 2013 but there was no significant difference over time in the other age groups. The highest prevalence was in the 12-year-olds (60%). Only the 15-year-olds had their gingivae probed. Overall, 40% of the 2,418 15-year-olds examined had gingival bleeding (gingivitis) following probing, compared with 45% in 2003. The proportion of children with visible plaque was highest in children age 8 years (71%). Between surveys, the proportion of 12-year-old children with visible plaque had reduced from 74% to 65% and the prevalence in 15-year-olds had reduced from 64% to 50%. In contrast, the proportion of children with visible calculus was greater in all ages in 2013, rising by age, with 46% of those aged 15 years affected.

Necrotising Gingivitis

Necrotising gingivitis was classified within the category of Necrotising Periodontal Diseases in the 2017 World Workshop Classification (Caton *et al*., 2018; Papapanou *et al.*, 2018). Necrotising periodontal diseases have characteristic features and a fusiform-spirochaetal microbial aetiology. They are more usually found in patients in developing countries who typically exhibit various risk factors, including smoking, immunosuppression, stress, malnourishment and poor diet. Local factors include root proximity and tooth malposition. They may be associated with HIV positive status or other underlying undiagnosed pathology in an immunosuppressed host:

- Necrotising Gingivitis (NG) features:
    - pain is a key diagnostic feature

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    - necrosis of the interdental papillae which have a "punched out" appearance, ulceration and spontaneous bleeding
    - secondary foetor oris
    - pseudomembrane may be present
    - possible lymphadenopathy, fever
    - may manifest in teenagers
- May progress to Necrotising Periodontitis (NP)

Non-plaque–induced gingival lesions
Children may also present with some of the non-plaque induced gingival lesions classified in the 2017 World Workshop, (Table 1 b), a number of which are best referred (Table 2, Table 3, Figure 1). Further details of the more unusual forms that may present in children and the younger age groups are provided elsewhere (Chapple, 2004 a).

Periodontitis
Irrespective of classification, the key features of periodontitis are:

- Loss of attachment of the periodontal connective tissues to cementum
- Apical migration of the junctional epithelium (JE) beyond the cemento-enamel junction and transformation of the JE to pocket epithelium (often thin and ulcerated) with formation of a true periodontal pocket
- Alveolar bone loss

Based on emerging scientific evidence and current knowledge of pathophysiology, according to the 2017 World Workshop Classification (Caton *et al*., 2018), three different forms of periodontitis were agreed (Papapanou *et al*., 2018), all of which can affect children and adolescents:

- Periodontitis
- Necrotising periodontitis
- Periodontitis as a direct manifestation of systemic diseases

Current evidence does not support the distinction between the conditions previously recognised as chronic and aggressive periodontitis in 1999 (Lang *et al*., 1999) which are now grouped under the single category of periodontitis. As part of the revision, a system of Staging and Grading periodontitis was introduced (Tonetti *et al*., 2018). Subsequent guidance on the implementation of the new scheme in clinical practice has since been provided by BSP (Dietrich *et al*., 2019), (Figures 2 a, b).

Periodontitis
Periodontitis is widely acknowledged to occur in adult populations: the UK Adult Dental Health Survey (2009) reported that of the 5622 adults examined, 45% had shallow pockets of 4 mm or more; 9% had deep pockets of 6 mm or more; 65% aged 55 years and over had loss of attachment of at least 4 mm; and 20% had loss of attachment of 6 mm or more.

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But it is important to recognize that a substantial proportion of adolescents begin to manifest loss of attachment of 1mm or more, consistent with the early (incipient) stages of periodontitis. Clerehugh *et al.* (1990) followed 167 teenagers longitudinally for 5 years and found that 3% had attachment loss of 1mm or more on at least one of the molar, premolar or incisor teeth when examined at age 14 years rising to a prevalence of 37 % at 16 years and 77% at 19 years.

Clerehugh *et al.* (1997) noted that in a study involving 15-16-year-olds with a high prevalence of early stage periodontitis, sites with clinical attachment loss of 1 mm or more generally had probing depths of at least 4 mm, indicating formation of true periodontal pockets. In that study group, less frequently, pockets were recorded in the absence of clinical attachment loss; possible reasons in an adolescent population include: marginal gingival inflammation, causing coronal swelling resulting in false gingival pockets; attachment level less than 1 mm apical to the CEJ and therefore not measurable; or possible measurement error as discussed in previous papers (Clerehugh & Lennon, 1984; Clerehugh *et al.*, 1995; Clerehugh & Tugnait, 2001).

For the first time, the presence of pocketing was assessed in the Children's Dental Health Survey in 2013 (Pitts *et al*., 2015). The Simplified Basic Periodontal Examination (sBPE) methodology (Clerehugh & Kindelan, 2012) was used to screen for the presence or absence of shallow pockets (greater than 3.5 mm but less than 5.5 mm), or deep pockets (greater than 5.5 mm) around the six designated index teeth (UR6, UR1, UL6, LL6, LL1, LR6) in 15-year-olds, using a WHO BPE probe (as distinct from a graduated periodontal probe). At least one shallow pocket of 4 mm or 5 mm was found in 3% of the 1,155 boys examined and 5% of the 1,263 girls examined; no deep pockets were reported to have been recorded.

A key finding is that the presence of subgingival calculus is associated with ethnicity, gingival inflammation and the development of clinical attachment loss in adolescents (Albandar *et al*., 1998; Booth & Ashley, 1989, Clerehugh *et al*., 1990, 1995; Ellwood *et al.*, 1997). Periodontal pathogens typical of those found in the subgingival plaque of adults with periodontitis have also been found in the subgingival microflora of adolescents with incipient periodontitis namely *Porphyromonas gingivalis*, *Prevotella intermedia* and *Aggregatibacter actinomycetemcomitans* (Clerehugh *et al.*, 1997). The presence of *Tannerella forsythia* has been associated with subsequent clinical attachment loss in a 3-year longitudinal study in adolescents (Hamlet *et al*., 2004).

Serial bitewing radiographs have been used to measure small changes in crestal bone over 18 months in teenage subjects (Hausmann *et al.*, 1991) and it has been suggested that clinical attachment loss of 1 mm or more precedes these changes (Clerehugh & Lennon, 1986). Hausmann *et al.* (1991) demonstrated that a 'no bone loss' distance of 0.4 mm -1.9 mm between the CEJ and bone crest on bitewing radiographs is consistent with no clinical attachment loss in 13- to 14-year old teenagers. Based on these data Armitage *et al.* (1999) proposed that a distance of 2 mm or more is an appropriate cut-off point for bone loss on bitewing radiographs. The latest guidance from the Faculty of

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General Dental Practice (2018) indicates that the bitewing radiograph offers optimal geometry and the fine detail inherent in intraoral radiographs; a further advantage is that when they have already been indicated for caries diagnosis, the bitewings provide additional information about bone levels without the need for additional radiation dose. So this is particularly applicable to children and adolescents. Likewise, if panoramic radiographs are indicated for orthodontic reasons, they provide an opportunity for bone level assessment and for any other features of potential periodontal significance to be identified and recorded (Tugnait *et al*., 2000).

Evidence from retrospective epidemiological data has even shown radiographic bone loss around the primary dentition in some children reinforcing the notion that periodontitis can develop at an early age (Matsson *et al*., 1995; Matsson *et al*., 1997).

It is important that the practitioner is aware of the potential for false pocketing in the case of partially erupted teeth in the mixed dentition.

Therefore in summary, in determining a diagnosis of periodontitis it is necessary to determine whether there is: clinical attachment loss; true periodontal pocket formation of 4 mm or more where the base of the pocket is apical to the cemento-enamel junction; and alveolar bone loss.

According to the 2017 World Workshop on Classification, the severity and complexity of management of periodontitis are reflected by Staging which also includes a description of extent and distribution (localized ie up to 30% of teeth affected; generalized ie more than 30% of teeth affected; or molar-incisor pattern), while the susceptibility, evidence of risk, or, rate of progression will be reflected in the Grade assigned (Tonetti *et al*., 2018). The BSP has produced excellent guidance on the implementation of the new 2017 World Workshop Classification and the use of Staging and Grading in general dental practice (Dietrich *et al*., 2019), (Figures 2 a, 2 b).

Although current evidence does not support the distinction between the conditions previously recognised as chronic and aggressive periodontitis in 1999 (Lang *et al*., 1999), it is important for the dental practitioner to be able to identify those children and young people at an incipient (early) stage of periodontitis who are amenable to treatment in general dental practice (typically Stage I, Grade A) and those minority of cases who would previously have been classified as aggressive periodontitis with a more severe, rapidly progressing, destructive form of periodontitis who would now be categorized typically as Stage II, III or IV, Grade C and who would benefit from referral to a Specialist (Wadia *et al*., 2019; Walter *et al*., 2019 a, b; BSP Guidelines for Periodontal Patient Referral), (Table 3; Figure 1).

The Staging and Grading system will enable the practitioner to make that distinction (Table 3; Figures 1, 2 a, 2 b). The condition that would previously have been diagnosed as localized aggressive periodontitis, although not deemed in the 2017 World Workshop on Classification to have a sufficiently well-defined aetiology or pathophysiology to have

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its own classification, has in fact been acknowledged to have a well recognised clinical presentation: typically with an onset around puberty, and localised first molar/incisor presentation with interproximal clinical attachment loss which is much more severe and more rapidly destructive than expected and inconsistent with the levels of plaque-biofilm deposits present; and of course, historically it has typically been found in adolescents from Africa/Middle East with *A. actinomycetemcomitans* as the implicated infecting agent (Fine *et al*., 2018, Papapanou *et al*., 2018).

Within the Staging system there is a category for describing the extent and distribution as localized (up to 30% of teeth affected) or molar/incisor (Tonetti *et al*., 2018, Wadia *et al*., 2019, Walter *et al*., 2019 a) for youngsters who would previously have been diagnosed as localised aggressive periodontitis, whilst for adolescents who would previously have been diagnosed as generalized aggressive periodontitis, they would typically be categorized as Stage II, III or IV, Grade C, generalized periodontitis ie 30% or more of teeth affected (Tonetti *et al*., 2018, Walter *et al*., 2019 a). The additional descriptor of periodontitis that is 'currently unstable' may typically also apply to these cases (Wadia *et al*., 2019; Walter *et al*., 2019 a).

Necrotising Periodontitis

Although uncommon in young people in developed countries like the UK, Necrotising Periodontitis (NP) was recognised as a distinct entity in the 2017 World Workshop Classification (Papapanou *et al*., 2018):

- May be an extension of NG
- Features necrosis/ulceration of the interdental papilla, bleeding of the gingival tissues, periodontal ligament loss and rapid bone loss
- As with NG, there may be pseudomembrane formation, lymphadenopathy, fever

Necrotising Stomatitis

This may occur as a severe inflammatory condition in which necrosis extends beyond the gingiva to the soft tissues, possibly leading to bone denudation, typically in severely systemically compromised patients.

Periodontitis as a Direct Manifestation of Systemic Diseases

The 2017 World Workshop on Classification recognised that there are various forms of periodontitis that can manifest directly because of systemic diseases (Caton *et al*., 2018, Jepsen *et al*., 2018). In younger patients these include uncommon genetic diseases associated with immunologic disorders like Papillon-Lefèvre Syndrome, Chediak-Higashi Syndrome, Down Syndrome, Ehlers-Danlos Syndrome (Types IV and VIII), leukocyte adhesion deficiency syndromes, severe neutropenia (congenital or cyclic); there are also metabolic and endocrine disorders like hypophosphatasia, described more fully elsewhere (Chapple, 2004 b; Chapple & Hamburger, 2006; Albandar *et al*., 2018).

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Diabetes mellitus can also affect younger age groups, mainly Type 1, but a small proportion have Type 2 diabetes or rarely one of the genetically inherited forms of maturity-onset diabetes in the young. There are no characteristic phenotypic features in patients with diabetes, and so it is not at present deemed a distinct disease, albeit there are a number of key pathways implicated in its pathogenesis. However, it is a very important modifying factor for periodontitis when poorly controlled or uncontrolled, or if undiagnosed, as is possible with Type 2 diabetes. Achieving good glycaemic control can be very challenging in the younger age groups, and complications of diabetes can be apparent in these youngsters as evidenced by the National Paediatric Diabetes Audits, published annually by the Royal College of Paediatrics and Child Health, and Healthcare Improvement Quality Partnership (2020). Lalla *et al*. (2006) has highlighted the periodontal breakdown implications in youngster with diabetes. Accordingly, diabetes glycaemic control is an integral part of periodontitis Grading (Tonetti *et al*., 2018, Dietrich *et al*., 2019).

Whilst current cigarette smoking prevalence was low in 12-year-olds (2%) in the Children's Dental Health Survey of 2013, 7% revealed having ever smoked; by 15 years of age, 11% were current cigarette smokers and 29% reported having ever smoked (Tsakos *et al*., 2015). Data from NHS Digital in England showed that in 2018, 5% of 11-15-year-olds overall were current smokers and 16% had ever smoked (down from 19% in 2016); this reflects a downward trend since 1996 (which marked the inception of an anti-smoking campaign in teenagers) when 22% were current smokers and 49% ever smokers (NHS Digital, 2019)). As tobacco smoking is by now a well-documented risk factor for periodontitis it should be incorporated in the Risk Factor assessment when undertaking periodontitis Grading in the younger age groups (Tonetti *et al*., 2018, Dietrich *et al*., 2019).

Diagnosis and Recording

A thorough history, examination and periodontal screening are integral to diagnosis, treatment planning and recording of findings (Figure 2 a, Figure 2 b, Figure 3).

Clinical Periodontal Examination

As in adults, the routine dental examination of children and adolescents should comprise an extra-oral examination and an intra-oral assessment which should include examination of the soft and hard tissues in addition to a general description of the periodontal condition. A note should be made of abnormal gingival colour, contour, swelling, the presence and location of inflammation, recession or suppuration. A qualitative assessment of oral hygiene status should be made and the presence of supragingival calculus deposits recorded. Local periodontal risk factors, e.g. plaque retention factors, location of high fraenal attachments, malocclusion, the presence of mouthbreathing and incompetent lip seal, should be identified. Mouthbreathing, increased lip separation and decreased upper lip coverage have all been associated with higher levels of plaque and gingival inflammation. The influence of mouthbreathing tends to be restricted to palatal sites while decreased lip coverage influences gingival inflammation at both palatal and

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labial sites (Wagaiyu & Ashley, 1991). Radiographs and sensitivity tests may be necessary.

The BSP has produced an excellent algorithm for clinical periodontal assessment of plaque biofilm-induced periodontal diseases (Dietrich et al., 2019) which is translatable for use in children and adolescents but using a Simplified version of the BPE as documented below.

Periodontal screening using a Simplified version of the BPE is appropriate for most children seen in dental practice, community and hospital settings.

Screening for Gingival and Periodontal Diseases in Children and Adolescents

BSP and BSPD recommend that periodontal screening is a routine part of the dental clinical examination in all co-operative children and adolescents, in the same way that a brief extra-oral exam and evaluation of the intra-oral soft tissues should always accompany an examination and charting of the dentition. The system of periodontal screening recommended by the BSP in General Dental Practice for adults is the Basic Periodontal Examination (BPE) which was based on the Community Periodontal Index of Treatment Needs (CPITN), first recommended for use in dental practices by Federation Dentaire International (FDI) back in 1986 (FDI, 1986). The Simplified version of BPE (sBPE) was rolled out by BSP and BSPD for use in children and adolescents in 2012 (Clerehugh & Kindelan, 2012).

The Simplified BPE is performed using the WHO 621 probe with a light probing force of 20-25 g. This has a 0.5mm spherical ball on the tip and a black band at 3.5-5.5mm to delineate healthy sulcus depth (<3.5mm) and periodontal pockets ≥ 3.5 mm but ≤ 5.5 mm or pockets of 6 mm or more.

BPE Codes for Simplified BPE (Figure 3)

0 Healthy (no bleeding on probing, no calculus/overhangs or pocketing ≥ 3.5 mm detected). Black band entirely visible.

1 Bleeding on probing (no calculus/overhangs or pocketing ≥ 3.5 mm detected). Black band entirely visible.

2 Calculus (supragingival and/or subgingival) or plaque retention factor (no pocketing ≥ 3.5 mm detected). Black band entirely visible.

3 Shallow pocket (4 mm or 5 mm) ie probing depth ≥ 3.5 mm but ≤ 5.5 mm. Black band partially visible.

4 Deep pocket (6 mm or more) ie probing depth ≥ 6 mm. Black band disappears.

* Furcation

There are, however, certain considerations that need to be taken into account in adapting this for use in children and adolescents. It needs to be quick, easy, well tolerated, and to avoid false pockets.

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The presence of true and false pockets, with and without gingival bleeding on probing, was investigated by Ainamo *et al.* (1984) in groups of 7-, 12- and 17-year-old children and adolescents. False pockets were common around erupting first molars and incisors at 7 years of age, but significantly reduced by 12 years of age and almost non-existent by age 17 years. False pockets were still problematic around second molars at 17 years of age.

Analysis of full mouth versus partial mouth recordings was undertaken. The study findings are taken into account in recommending the use of a Simplified Basic Periodontal Examination on six index teeth in all co-operative children and adolescents, incorporating the guidelines below (Clerehugh & Tugnait, 2001; Clerehugh *et al*., 2004; Clerehugh, 2008):

Guidelines/Comments on Use of sBPE:

1. A Simplified Basic Periodontal Examination should be carried out on the following six index teeth: UR6, UR1, UL6, LL6, LL1 and LR6 (Figure 3).

2. Assessment of periodontal treatment needs should be started at 7 years of age as it is rare to experience problems below this age and the index teeth are often still unerupted. Identification of periodontal disease in the primary dentition is unusual and young children with unexplained premature exfoliation or gross mobility of primary teeth or red, oedematous gingivae and /or suppuration for which no other dental cause can be seen should be referred for specialist advice.

3. At 7-11 years of age, in the mixed dentition phase, the index teeth should normally only be examined for bleeding of the gingiva, calculus and/or overhangs of fillings ie BPE codes 1 and 2 only, to avoid the problem of false pockets. In this age group both the erupting first permanent molar and later, the exfoliating second primary molar could give the appearance of periodontal pocketing due to the existence of false pockets, as the gingival margin may be situated coronal to the cemento-enamel junction by a number of millimeters. Other clinical signs of pathology e.g. bleeding, suppuration, tooth mobility will be pertinent to an accurate diagnosis in addition to the presence of loss of attachment/radiographic bone loss
    a. *Comment*: it would be uncommon to have any true periodontal pocket at this age. If a true pocket is present, referral is recommended.
    b. *Comment*: bleeding on probing even from a false pocket is indicative of the need for oral hygiene instruction.

4. At 12-17 years of age, the full range of sBPE codes can be used on the six index teeth
    a. *Comment*: it would be uncommon to find periodontal breakdown at other teeth without some of the index teeth being affected.

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b. *Comment*: whenever periodontal pockets are recorded i.e. sBPE code 3 or 4, the alveolar bone level should be checked. Bitewing radiographs are suitable for posterior teeth. Selected periapicals are indicated for the anterior teeth.

5. A Simplified BPE should be undertaken prior to commencing orthodontic treatment in the under 18s.

Whether in the mixed or permanent dentition stage, the examination of these index teeth is quick, easy and well tolerated and is sufficient to identify children who would benefit from a more detailed examination. Ainamo *et al*., (1984) concluded that examination of these teeth would allow detection of cases of the condition which prior to the 2017 World Workshop on classification (Caton *et al.*, 2018) we would have called localized aggressive periodontitis, but which would now simply be called periodontitis, and would be Staged and Graded with the key point being that any cases in young individuals with Stage II, III or IV, Grade C need specialist care and referral to a specialist as appropriate. Although a brief periodontal examination similar to the BPE has been reported to be acceptable for children as young as 3 years of age (Rapp *et al*., 2001), it would not normally need to be undertaken in the primary dentition.

The Simplified BPE provides a quick and simple method of screening patients for periodontal problems, giving the practitioner an indication of the need for periodontal treatment and the level of further periodontal examination required for differing disease levels. Screening using sBPE can be used in the assessment of the periodontal condition of most children and its use is to be encouraged. It may not be appropriate for use in children with extreme dental anxiety or diminished understanding.

Guidelines on the frequency of undertaking periodontal screening are lacking for children and adolescents. Periodontal screening of all new child or adolescent patients is recommended in addition to all cases prior to orthodontic treatment.

Guidance When to do sBPE (see Table 4):

- If sBPE = 0, screen again at routine recall visit or within 1 year, whichever the sooner
- If sBPE = 1 or 2, treat and screen again at routine recall or after 6 months, whichever the sooner
- If sBPE = 3, undertake initial periodontal therapy, including any other affected teeth in the involved sextant(s). After 3 months, do a full periodontal assessment, including 6-point probing depths on the index tooth and other teeth in the involved sextant(s).
- If sBPE = 4 or * on any index tooth, do a full periodontal assessment, including 6-point probing depths, throughout the entire dentition. Consider referral to a Specialist. Undertake initial periodontal therapy as for Code 3 in the meantime.

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Use of Radiographs
For a sBPE code of 3, 4 or *, consideration should normally be given to a radiographic examination.

The normal healthy bony crest is 0.4 -1.9 mm from the CEJ around permanent teeth (Hausmann *et al.* 1991) but may be greater than 2 mm in primary teeth. It should also be remembered that this distance may also increase with facial growth and with the loss of an adjacent primary tooth or eruption of a neighbouring permanent tooth. Horizontal bitewing radiographs recommended for the detection of caries can also be very useful in assessing a young patient's periodontal condition (FGDP, 2018). Selected periapical films may be indicated.

The opportunity to assess bone levels on introral or panoramic films should always be taken even if the film was not originally taken to assess the periodontal condition.

Adjuncts to the sBPE
Marginal Gingival Bleeding Chart
It is now generally recognized that gingival inflammation should be estimated by gingival bleeding, as changes in colour and swelling can be somewhat subjective.

If the presence of bleeding (code 1) has been recorded from the Simplified BPE, then it is worth undertaking a full assessment of marginal gingival bleeding (Appendix 1). It should be used in conjunction with a plaque biofilm score. A good motivational tool is to record surfaces free from bleeding and free from plaque so that a higher score reflects improvement. It can accordingly be used with ease in the primary mixed and permanent dentitions. It should be noted that a high percentage of bleeding on probing in relation to a low plaque index may warrant further investigation.

Plaque Chart
Completion of a plaque chart, showing the distribution of plaque adjacent to the gingival margin may be of value in the process of patient motivation using an index such as the O'Leary Index (Appendix 1). As for bleeding, recording plaque free scores can be motivational so that a higher score reflects improvement.

Prevention and Treatment
As in 2003, (White *et al*., 2006), the Children's Dental Health Survey of 2013 has provided us with useful information regarding parental attitudes towards the care of children's teeth and gums, and oral hygiene behaviours in childhood (Tsakos *et al*., 2015). Twice daily toothbrushing was reported in 79% of 12-year-olds (compared with 76% in 2003) and in 84% of 15-year-olds (versus 80% in 2003); between 37% - 49% of children in all age groups reported using an electric toothbrush. The use of dental floss, although small, was evident, with 21% of 15-year-olds reporting its use. Mouthwash use was reported in all age groups, rising from 22% of 5-year-olds up to 67% of 15-year-olds. Oral health messages for the child population should incorporate relevant information about the use of these commonly used oral hygiene adjuncts. Smoking prevalence was

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very low (2%) in 12-year-olds, but as 11% of 15-year-olds reported being a current smoker and 29% reported having ever smoked cigarettes, smoking cessation advice is of paramount importance in these teenage years.

As discussed in the original policy document from the BSP, several studies have demonstrated that, under optimal conditions, the careful and regular removal of dental plaque biofilm can prevent the occurrence and progression of early periodontal diseases (Axelsson & Lindhe, 1977; Badersten *et al*., 1975; Agerbaek *et al*., 1977; Hamp *et al*., 1978; Ashley & Sainsbury, 1981). It is however recognized that attainment and maintenance of optimal oral hygiene requires reinforcement by dentists or professionals complementary to dentistry (Siam *et al*., 1980). There is strong reinforcement of this message in the Public Health England/Department of Health's Delivering Better Oral Health (DBOH) evidence-based toolkit for prevention, now in its third edition (2017); a fourth edition is currently being compiled (Public Health England, 2020).

Oral Care Measures

Motivation

It has been shown that professional support to patients and parents in the form of preventive/ educational programmes improves patient motivation, leading to improved levels of oral health (Hochstetter *et al*., 2007).

A review of the literature suggested that oral health education programmes may reduce plaque and gingival bleeding in the short term only (Watt & Marinho, 2005), however we have an ethical imperative to advise patients with regards to improving oral health (Hausen, 2005). Longer-term studies are needed to evaluate whether the effects of oral health education programmes are sustainable.

More recently, a systematic review with meta-analysis involving adolescents and mothers of young children, as well as adults, showed that mobile applications and text messages compared with conventional oral hygiene instructions were a useful adjunct in improving oral hygiene and oral health knowledge and reducing gingival inflammation (Toniazzo *et al*., 2019).

Toothbrushing

Plaque biofilm-induced chronic gingivitis in children and adolescents can be managed by mechanical removal of plaque and good oral hygiene (Oh *et al*., 2002; Needleman *et al*., 2005) which, additionally, has further benefits in terms of reduction of caries risk. Public Health England/Department of Health Guidelines on Delivering Better Oral Health should be followed (2017). These recommend that toothbrushing commences as soon as the first primary tooth erupts. Children under 3 years of age should use a toothpaste containing no less than 1000ppm fluoride, whilst a family toothpaste (1350-1500ppm fluoride) is indicated for maximum caries control in patients above 3 years of age, with adequate parental supervision as the use of small amounts are stipulated.

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No particular technique of toothbrushing has been shown to be better than any other, rather the need to systematically clean all tooth surfaces should be emphasized by the clinician. The patient's existing toothbrushing technique may need to be modified to achieve this. It is recognized that disclosing tablets can help to indicate areas that are being missed. It is recommended that toothbrushing is carried out twice a day with a fluoridated toothpaste.

Parental support

The 2003 Child Dental Health Survey asked parents of 5- and 8-year-old children who actually brushed their child's teeth. For about 50% of 5-year-olds and 15% of 8-year-olds, an adult either brushed or helped with brushing of their teeth. It was found that a significantly higher proportion of 5-year-old children who brushed their own teeth had plaque compared to those who had parental or other adult aid (White *et al* 2006). This question was not reported to have been asked in the 2013 survey but it did reveal that around a quarter of children started having their teeth brushed when they were less than six months old, (as per evidence-based guidelines from the Public Health England/Department of Health DBOH toolkit (2017) and around 50% between 6 months to a year (Tsakos *et al.*, 2015). This leaves around a quarter of cases where the start of tooth brushing was delayed until the child was over 1 year of age.

Practitioners are encouraged to recommend that adults continue to brush the teeth of children who do not have sufficient manual dexterity to carry out good plaque control for themselves. This will vary from child to child, but it would be regarded as good practice for parents and carers to offer this level of support until children are at least 7 years old (Hinds & Gregory, 1995; Levine & Stillman-Lowe, 2009). This fits with guidance from the DBOH toolkit (2017) that parents/carers should brush/supervise toothbrushing at ages 0-3 years and supervise children 3-6 years of age. In addition, it has been shown that targeted daily supervised toothbrushing results in a significant reduction in caries increment (Curnow *et al*., 2002; Bebermeyer, 2003).

Toothbrush type

An appropriately sized toothbrush should be recommended for children and adolescents; the DBOH toolkit (Public Health England, 2017) has recommended a small-headed toothbrush with medium texture bristles.

The 2013 Child Dental Health Survey has shown that around 40% of children overall used an electric toothbrush (39% of 5-year-olds, 49% of 8-year-olds, 37% of 12-year-olds, 41% of 15-year-olds). While there is evidence that some powered toothbrushes, with a rotation-oscillation action may be more effective for plaque control than manual toothbrushes (Robinson *et al.*, 2003, 2005; Deacon *et al.*, 2010; Yaacob *et al*., 2014), it is probably more important that the toothbrush, whether manual or powered, is used effectively twice daily. The practitioner can thus recommend good effective brushing with a manual or powered toothbrush twice daily using a fluoridated toothpaste. The choice of toothbrush may be influenced by patient preference.

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Fixed orthodontic appliances:
It is essential to assess the periodontal condition of the young person before undertaking orthodontic treatment, and the Simplified BPE provides a suitable screening tool.

High plaque accumulation has been described in patients undergoing therapy with fixed orthodontics (Atack *et al*., 1996; Turkkahraman *et al*., 2005). It is well recognized that plaque in association with fixed appliances can result in clinical problems such as demineralization of the adjacent enamel and gingival inflammation. Indeed it has been proposed that the clinical attachment level (sum of gingival recession and probing pocket depth) is a good parameter for the objective and long term evaluation of oral health status, as it has been shown to have a close correlation with white spot lesion status (Lovrov *et al*., 2007). In a longitudinal prospective study of orthodontic patients, the effect of appliances on gingival and periodontal health was noted to be transient, without irreversible destructive effects on deep periodontal tissues (Ristic *et al*.,2007). Periodontal pathogens associated with gingival inflammation during orthodontic treatment can be significantly reduced by orthodontic appliance removal, professional prophylaxis and appropriate home care (Sallum *et al*., 2004).

It is recommended that patients accepted for orthodontic treatment demonstrate an adequate level of oral hygiene, particularly in the case of those patients requiring fixed appliance therapy. Professional support and education of patients in oral hygiene practices is paramount. Toothbrushing using the Bass technique with supplementary use of approximal brushes is recommended by orthodontic specialists in the UK, although well designed randomized control trials are required to provide evidence for determining clinical practice in this area. The daily use of a 0.05% sodium fluoride mouthwash (225 ppm) should be advised daily at a different time from toothbrushing for patients undergoing fixed appliance therapy (Benson *et al*., 2004; Public Health England, 2017).

The orthodontic specialist is responsible for monitoring the health of both teeth and periodontal structures during the course of treatment and can use treatment visits to re-emphasise the importance of good oral hygiene practices throughout the duration of fixed appliance therapy.

Whilst there has been interest in adjuncts to manual oral hygiene practices (Paschos *et al.*, 2008) for orthodontic patients, good toothbrushing practices cannot be underestimated (Goh, 2007). Reminder therapy has been shown to be a valuable strategy in contributing to the reduction of plaque and gingival indices and white spot lesions in patients undergoing orthodontic treatment according to a systematic review and meta-analysis of high-quality evidence (Lima *et al*., 2018). A systematic review showed some limited evidence that use of mobile phones can be effective in improving adherence to oral hygiene advice in orthodontic patients (Sharif et al., 2019).

Flossing
Although evidence relating to the effectiveness of flossing in children for the improvement in gingival and periodontal health is sparse, a comprehensive literature

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review has shown that regular flossing of children's teeth by a trained adult can dramatically reduce interproximal caries in those at high risk of caries (Hujoel *et al.*, 2006, Longbottom, 2006).

As for toothbrushing, with a fluoridated toothpaste, there is no doubt that the benefits of interdental flossing include a reduction in the caries experience of children and adolescents. It may be beneficial to recommend supervised flossing of children's teeth for those at high risk of caries.

The Public Health England DBOH toolkit (2017) recommends for children aged 12-17 years to clean daily between the teeth to below the gum line before toothbrushing, using dental floss or tape for small spaces between the teeth, or, for larger spaces, using interdental brushes.

The BSP have produced an infographic for children, 'Let's keep children smiling,' portraying the message that they should be efficient at flossing or using interdental brushes at around the age of 10 years (available at www.bsperio.org.uk).

Mouthrinses

Some mouthwashes have been shown to help control plaque and gingival inflammation (Axelsson & Lindhe, 1987), in particular chlorhexidine, either as the 0.2% or the 0.06% formulation (Sanz *et al*., 2020, West *et al*., 2020); however, chlorhexidine use should be considered only as an adjunct to mechanical oral hygiene measures (0.06% formulation), or in specific short-term situations such as post periodontal surgery (0.2% formulation), and in any case is not recommended in young children who are unable to spit effectively. In addition, ethanol-containing products cannot be recommended for use in children on a long-term basis as a result of long-term safety concerns e.g. carcinogenesis (FDI commission, 2002). Implementation of good toothbrushing supported by professional prophylaxis and scaling is the mainstay for the maintenance of good gingival and periodontal health. However, a systematic review and meta-analysis has shown that adjunctive use of mouth rinses containing the antiseptic cetylpyridinium chloride (CPC) or essential oils provides statistically significant reductions in gingival, bleeding and plaque indices when compared to mechanical plaque control alone (Figuero *et al*., 2020).

S3 Treatment Guidelines for the Treatment of Periodontitis Stages I-III

Following the 2017 World Workshop on Classification (Caton *et al*., 2018), the EFP has developed a stringent evidence-based guideline for the management of Stage I-III periodontitis based on 15 systematic reviews and a moderated consensus process from representative stakeholders (Sanz *et al*., 2020). The BSP has adapted this EFP S3-level guideline for clinical use in the UK healthcare system by evaluation of the formal evidence, grading and synthesis and taking account of clinical expertise from a broad range of stakeholders (West *et al*., 2020). This has been translated into Steps to guide the sequence of treatment of periodontitis, Stages I-III (see Figure 4).

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For the younger age groups, as well as adults, preventive advice, health education and oral hygiene instruction are key to successful management of plaque-induced gingivitis and also prerequisites to the successful management of periodontitis. Patients should also have a diagnosis, and discussion of the causes of their condition, treatments options, risk-benefits and a care plan (Step 0, Figure 4). The following Steps 1 – 4 can then provide a stepwise stairway for successful treatment outcomes of their periodontitis (Figure 4):

Step 1 Building Foundations for Optimal Treatment Outcomes

Aims to lead to behaviour change/motivation to successfully control plaque biofilm (OHI); possible adjunctive therapies for gingival inflammation; supragingival Professional Mechanical Plaque Removal (PMPR) to remove supragingival plaque/calculus; risk factor control.

Step 2 Cause-related Therapy

Aims to control (reduce/eliminate) the subgingival plaque biofilm and calculus by subgingival instrumentation (subgingival PMPR). May also involve use of: adjunctive physical or chemical agents; adjunctive local or systemic host-modulating agents; adjunctive subgingival locally delivered antimicrobials; adjunctive systemic antimicrobials.

Step 3 Management of Non-responding Sites (≥ 4mm with BOP or ≥ 6 mm)

Aims to gain access to further subgingival instrumentation or to achieve regeneration or resection in lesions (infrabony or furcation) that increase complexity in managing periodontitis.

Step 4 Supportive Periodontal Care (Maintenance)

Aims to maintain periodontal stability in all treated periodontitis patients. Combines preventive/therapeutic interventions from Steps 1 and 2. Regular recall intervals are needed, tailored to patient's individual needs. Recurrent disease to be managed with updated diagnosis and treatment plan. Compliance with OHI/ healthy lifestyle are integral.

Gingival Overgrowth

Gingival overgrowth can be related to systemic and metabolic diseases, genetic factors, local factors and side effects produced by some medications (cyclosporin, phenytoin and calcium channel blockers).

A greater incidence of gingival overgrowth is seen in puberty and the severity is more intense in children than in adults with similar amounts of dental plaque (Tiainen *et al*., 1992).

Treatment for gingival overgrowth should begin with rigorous home care and frequent appointments for professional mechanical plaque removal (PMPR) as per Steps 1 and 2 above. Although this often leads to improvement, surgery may be necessary to correct the gingival contour (Step 3, above), especially with respect to drug-induced gingival

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overgrowth, the management of which may require referral to Paediatric dental or Periodontal specialists who will liaise with appropriate medical colleagues (Table 3; Figures 1, 4).

Mucogingival Problems.

During the early years after eruption of the permanent tooth an increase in the width of the attached gingiva takes place (Bimstein & Eidelman, 1988). However, Jepsen et al (2018) concluded that any amount of gingiva, irrespective of width or thickness, is sufficient to maintain periodontal health provided adequate oral hygiene is maintained. A new classification for gingival recession with reference to the interdental clinical attachment loss was proposed at the 2017 World Workshop on Classification (Jepsen et al 2018). Findings from the literature do suggest that mucogingival surgery is not needed before the patient reaches adulthood (Bosnak *et al*., 2002). Referral to a specialist in paediatric dentistry or periodontology should, however, be considered by the dental practitioner (Table 3; Figure 1).

A System of Periodontal Care for the Young in the Primary Dental Care Setting

In summary, all new patients under the age of 18 years and those undertaking orthodontic treatment in the mixed or permanent dentition with full eruption of index teeth (all four first permanent molars plus UR1, LL1) should have the Simplified BPE recorded, where this is deemed to be appropriate, taking into account patient co-operation and level of anxiety.

A recent study showed that all UK Dental Schools were aware of, taught and used the Simplified BPE (Sidon *et al*., 2018). The Simplified BPE has been incorporated into the "Young DEPPA" system based on the DenPlan PreViser Patient Assessment Application, providing a personalized online assessment for young patients as reported in 2017. It uses a red, amber and green traffic light system to highlight what is going well and what needs to be improved on. The Simplified BPE has formed an integral part of the BSP's 'Good Practitioner's Guide to Periodontology' (British Society of Periodontology, 2016) alongside the adult version of the BPE. It is also an integral part of the Public Health England/Department of Health's DBOH evidence-based toolkit for prevention (2017).

Summary Guidance on Interpretation of Simplified BPE Scores (see Table 4):

Code 0: No periodontal treatment required

If sBPE = Code 0, screen again at routine recall visit or within 1 year, whichever the sooner.

Code 1: Oral hygiene instruction (OHI)

If sBPE = Code 1, treat and screen again at routine recall or after 6 months, whichever the sooner.

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Code 2: OHI as for code 1. Supragingival/subgingival Professional Mechanical Plaque Removal (PMPR). Remove/manage plaque retention factors

If sBPE = Code 2, treat and screen again at routine recall or after 6 months, whichever the sooner.

Code 3: OHI as for codes 1 and 2. Supragingival/subgingival PMPR as for code 2, but with particular emphasis on subgingival PMPR in affected 4 mm - 5 mm (shallow) pockets. Remove/manage plaque retention factors ie Steps 1 and 2 of the S3 level treatment guidelines above (see Figure 4).

After 3 months, do a full periodontal assessment, including 6-point probing depths.

Code 4 or *: Unusual in young patients. Do a full periodontal assessment, including 6-point probing depths, throughout the entire dentition. Consider referral to a Specialist Periodontist or Paediatric Dentist (see Table 3, Figure 1). Undertake initial periodontal therapy as for Code 3 in the meantime ie Steps 1 and 2 of the S3 Treatment Guidelines above (see Figure 4).

Conclusions

1) Early detection of periodontal diseases in the child and adolescent population is of paramount importance for accurate diagnosis of dental, periodontal or possible underlying medical pathology and for the optimum outcome of treatment provided.

2) The routine use of the Simplified BPE (sBPE) on index teeth (UR6, UR1, UL6, LL6, LL1 and LR6) for all co-operative child and adolescent patients under 18 years of age provides the basis of a simple, rapid periodontal screening examination suitable for use in the Primary Dental Care Setting when attending for the first time or prior to orthodontic therapy; for patients with sBPE Codes of 0, 1, or 2, it should be performed at every routine recall.

3) In the case of the mixed and young permanent dentition, false pocketing in a dynamically erupting dentition may make accurate diagnosis of periodontal problems challenging. This should be minimized by using the six index teeth. It should however be recognized that sBPE Codes 4 and * are unusual in children and adolescents under 18 years of age, and these codes, particularly in the presence of bleeding, suppuration and/ or tooth mobility should prompt consideration for referral to Specialist Periodontal or Paediatric Dental Services.

4) Identification of periodontal diseases in the primary dentition is unusual and young children with unexplained premature exfoliation, gross mobility of primary teeth or red, oedematous gingivae and/or suppuration for which no other dental cause can be seen should be referred for Specialist advice/management.

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Table 1 a 2017 World Workshop Classification – Gingival/Periodontal health and Gingivitis – Dental Plaque Biofilm-induced [1]

Gingival/periodontal health:

A. Clinical health on an intact periodontium

B. Clinical gingival health on a reduced periodontium
(i) Stable periodontitis patient
(ii) Non-periodontitis patient

Gingivitis - dental plaque biofilm-induced:
Intact periodontium
Reduced periodontium in non-periodontitis patient
Reduced periodontium in successfully treated periodontitis patient

A. Associated with plaque biofilm alone

B. Mediated by systemic or local risk factors
i. Systemic risk factors (modifying factors)
(a) Smoking
(b) Hyperglycaemia
(c) Nutritional factors
(d) Pharmacological agents (prescription, non-prescription and recreational)
(e) Sex steroid hormones
Puberty
Menstrual cycle
Pregnancy
Oral contraceptives
(f) Haematological conditions

ii. Local risk factors (Predisposing factors)
(a) Dental plaque biofilm retention factors (eg prominent restoration margins)
(b) Oral dryness

C. Drug-influenced gingival enlargement

[1] From: Chapple *et al*., 2018, Table 2

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Table 1 b 2017 World Workshop Classification: Gingival Diseases - Non-dental plaque-induced [1]

Gingival diseases - non-dental plaque-induced:

A. Genetic/developmental disorders
i. Hereditary gingival fibromatosis[a]

B. Specific infections
i. Bacterial origin
(a) *Neisseria gonorrhoeaea*[a]
(b) *Treponema pallidum*[a]
(c) *Mycobacterium tuberculosis*[a]
(d) Streptococcal gingivitis

ii. Viral origin
(a) Coxsackie virus (hand-foot-and-mouth disease) [a]
(b) Herpes simplex I & II (primary or recurrent) [a]
(c) Varicella zoster (chicken pox & shingles – V nerve)[a]
(d) Molluscum contagiosum[a]
(e) Human papilloma virus (squamous cell papilloma; condyloma acuminatum; verruca vulgaris; focal epithelial hyperplasia)

iii. Fungal origin
(a) Candidosis
(b) Other mycoses, e.g., histoplasmosis, aspergillosis

C. Inflammatory and immune conditions
i. Hypersensitivity reactions
(a) Contact allergy[a]
(b) Plasma cell gingivitis[a]
(c) Erythema multiforme[a]

ii. Autoimmune diseases of skin and mucous membranes
(a) Pemphigus vulgaris
(b) Pemphigoid
(c) Lichen planus
(d) Lupus erythematosus
Systemic lupus erythematosis
Discoid lupus erythematosis

iii. Granulomatous inflammatory lesions (orofacial granulomatoses)
(a) Crohn's disease[a]
(b) Sarcoidosis[a]

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D. Reactive processes
i. Epulides
(a) Fibrous epulis
(b) Calcifying fibroblastic granuloma
(c) Vascular epulis (pyogenic granuloma)
(d) Peripheral giant cell granuloma[a]

E. Neoplasms
i. Premalignancy
(a) Leukoplakia
(b) Erythroplakia

ii. Malignancy
(a) Squamous cell carcinoma[a]
(b) Leukemic cell infiltration[a]
(c) Lymphoma[a]
Hodgkin
Non-Hodgkin
(d) Chondrosarcoma

F. Endocrine, nutritional & metabolic diseases

i. Vitamin deficiencies[a]
(a) Vitamin C deficiency (scurvy)

G. Traumatic lesions
i. Physical/mechanical trauma
(a) Frictional keratosis
(b) Mechanically induced gingival ulceration
(c) Factitious injury (self-harm)

ii. Chemical (toxic) burn

iii. Thermal insults
(a) Burns to gingiva

H. Gingival pigmentation
i. Melanoplakia[a]

ii. Smoker's melanosis

iii. Drug-induced pigmentation (antimalarials, minocycline)

i**v.** Amalgam tattoo

[1] From Chapple *et al.*, 2018, Table 2; [a] associated systemic involvement/oral manifestations of systemic conditions - other health care providers may be involved in diagnosis and treatment

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Table 2 Non-Plaque-Induced Gingival Conditions & Lesions in Young Patients Requiring Referral [1]

AETIOLOGY	SPECIFIC CAUSE	NAME OF CONDITION/LESION	GDP/REFER
INFECTIVE LESIONS	VIRAL	Herpangina	GDP – r
		Hand Foot & Mouth	GDP – r
		Herpes Simplex I (primary)	GDP – r
		Herpes Simplex I (secondary)	GDP – r
		Molluscum Contageosum	Refer
	FUNGAL	Candidosis	GDP – r
		Linear Gingival Erythema (Candidosis)	Refer
	DEEP MYCOSES	Aspergillosis	Refer
		Blastomycosis	Refer
		Coccidiomycosis	Refer
		Cryptococcosis	Refer
		Histoplasmosis	Refer
		Geotricosis	Refer
GENETIC CONDITIONS	FIBROMATOSIS	Hereditary Gingival Fibromatosis	GDP – r
	ANATOMICAL VARIATIONS	Delayed Gingival Retreat	GDP
		Coeliac Disease	Refer
SYSTEMIC DISEASES THAT MANIFEST WITHIN THE GINGIVAE	HAEMATOLOGICAL DISEASE		
	Benign conditions	Agranulocytosis	Refer
		Cyclical Neutropenia	GDP - r
		Familial Benign Neutropenia	GDP - r
		Myelodysplastic Syndromes	Refer
	Malignant conditions	Myeloid leukaemia	Refer
		B-cell Lymphoma	Refer
		Hodgkins Lymphoma	Refer
	GRANULOMATOUS INFLAMMATIONS	Crohn's Disease	Refer
		Sarcoidosis	Refer
		Melkersson-Rosenthal syndrome	Refer
		Wegener's Granulomatosis	Refer
		T.B.	Refer
		Disseminated Pyogenic Granulomata	Refer
	IMMUNOLOGICAL CONDITIONS		
		Hypersensitivity Reactions	GDP - r
		Lichen Planus	Refer
		C1-esterase Inhibitor Deficiency/ Dysfunction (angioedema)	Refer
TRAUMA	THERMAL	Burns	GDP
	CHEMICAL	Ulceration	GDP
	PHYSICAL	Gingivitis artefacta	Refer
DRUG-INDUCED	IMMUNE COMPLEX REACTIONS		
		Erythema multiforme	Refer
		Lichenoid drug Reactions	GDP - r
	CYTOTOXIC DRUGS	Methotrexate	Refer
		Hydroxychloroquine	Refer
	PIGMENTING DRUGS	Doxycycline	GDP
		Oral Contraceptive	GDP
		Antimalarials	GDP
	ANTI-RETROVIRAL DRUGS	Anti-HIV Drugs (VII nerve neuropathy)	Refer

GDP = manage in practice; GDP – r = manage in practice but refer if concerned or complications arise.

[1]From ILC Chapple Table 6.1 in Clerehugh V, Tugnait A, Chapple ILC. Periodontal management of children, adolescents and young adults. Quintessence Publishing Co. Ltd., London, 2004.

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Table 3 Referring to Specialist Services [1, 2]

GDP: Consider Specialist Referral in Younger Ages
Stage II, III periodontitis not responding to treatment
Grade C or Stage IV periodontitis
Medical history that significantly affects periodontal treatment or requiring multi-disciplinary care
Periodontitis as a direct manifestation of systemic disease
Systemic/genetic diseases that can affect periodontal supporting tissues
Root morphology/furcation defects adversely affecting prognosis on key teeth
Non-plaque-induced conditions requiring complex or specialist care
Cases requiring diagnosis/management of rare/complex clinical pathology
Drug-induced gingival overgrowth needing surgery
Cases requiring evaluation for periodontal surgery

[1] British Society of Periodontology and Implant Dentistry. Guidelines for Periodontal Patient Referral, updated 2020, available at www.bsperio.org.uk . Accessed April 2021.

[2] British Society of Periodontology and Implant Dentistry. Parameters of Care, updated 2020, available at www.bsperio.org.uk . Accessed April 2021

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Table 4 Summary Guidance on Interpretation of Simplified BPE Codes

sBPE Code	Summary Guidance on Interpretation of the Simplified BPE Codes
0	No periodontal treatment Screen again at routine recall or within 1 year, whichever sooner
1	Oral hygiene instruction (OHI) Screen again at routine recall or within 6 months, whichever sooner
2	OHI as for Code 1. Supragingival/subgingival professional mechanical plaque removal (PMPR). Remove/manage plaque retention factors Screen again at routine recall or within 6 months, whichever sooner
3	OHI as for Codes 1 and 2. Supragingival/subgingival PMPR, with particular emphasis on subgingival PMPR in shallow 4 mm – 5 mm pockets. Remove/manage plaque retention factors After 3 months, do a full periodontal assessment, including 6-point probing pocket depth (PPD) chart, in affected sextants
4 or *	Unusual in young patients. Do a full periodontal assessment, including 6-point PPD chart, throughout the entire dentition Consider referral to a Specialist, while do initial therapy, as Code 3

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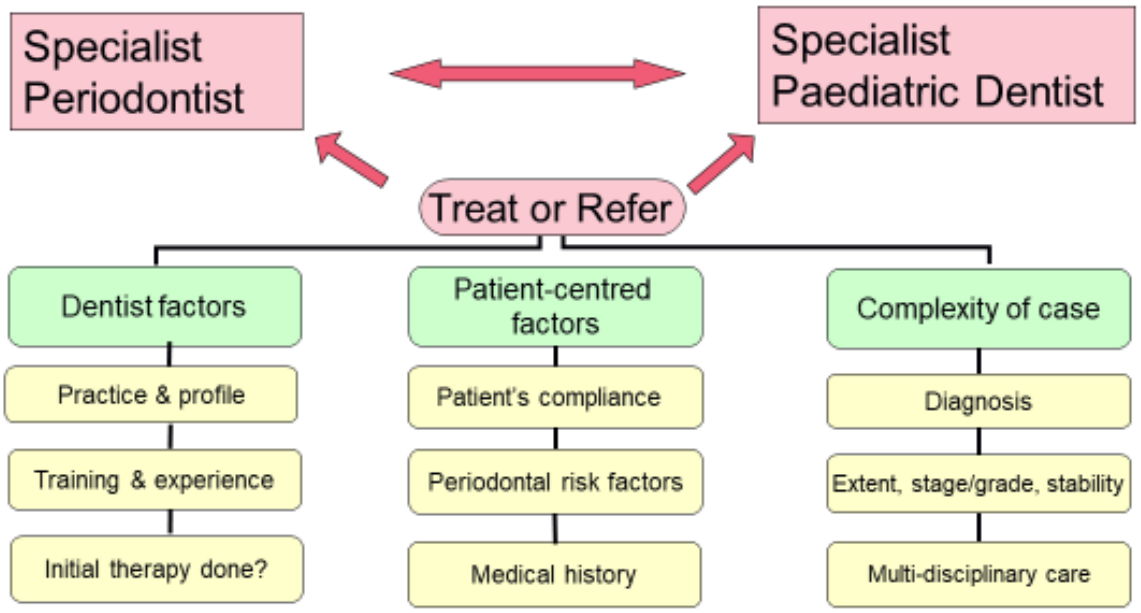
Figure 1: The Decision to Treat or Refer Young Cases in General Dental Practice Depends on a Number of Factors [1, 2]



[1] British Society of Periodontology and Implant Dentistry. Guidelines for Periodontal Patient Referral, updated 2020, available at www.bsperio.org.uk . Accessed April 2021.

[2] British Society of Periodontology and Implant Dentistry. Parameters of Care, updated 2020, available at www.bsperio.org.uk . Accessed April 2021

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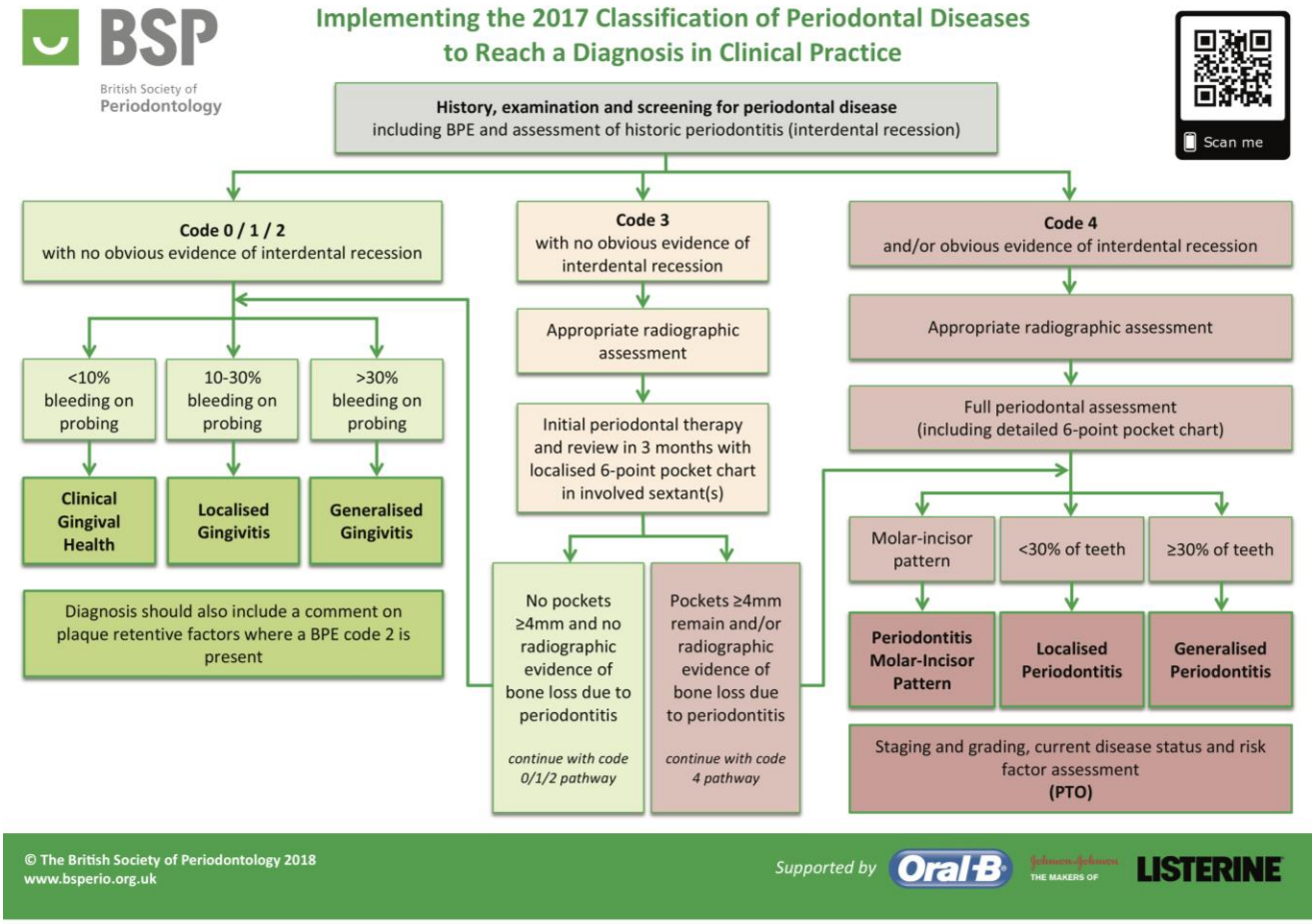
Figure 2 a) BSP's Implementation of the 2017 World Workshop on Classification to Reach a Diagnosis in Clinical Practice: Following BPE or Simplified BPE [1]



[1] Figure by Courtesy of British Society of Periodontology and Implant Dentistry

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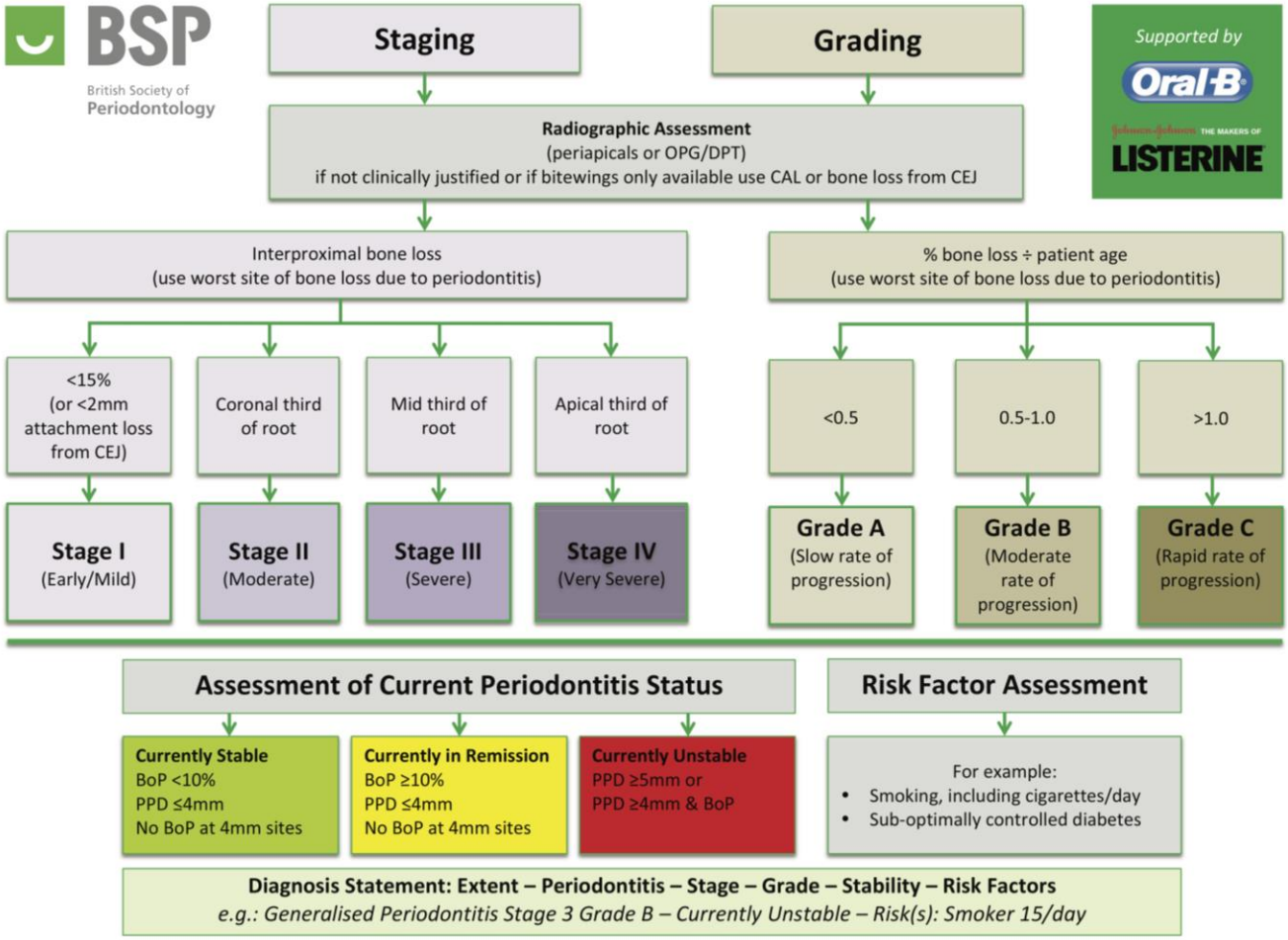
Figure 2 b) BSP's Implementation of the 2017 World Workshop on Classification to Reach a Diagnosis in Clinical Practice: Staging and Grading of Periodontitis [1]



[1] Figure by Courtesy of British Society of Periodontology and Implant Dentistry

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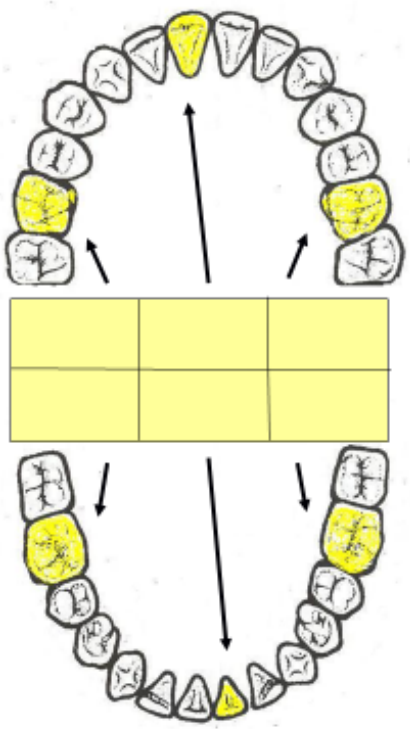
Fig 3 Development and Use of the Simplified BPE

- Simplified BPE (sBPE)
- Based on FDI recommendation in 1986 for a quick, dependable method of periodontal screening in practice
- Assess Index teeth (based on WHO partial recording for adolescents)

  UR6, UR1, UL6

  LR6, LL1, LL6
- Assess 6-points per tooth using WHO probe:

  db, b, mb, dl, l, ml



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7-11 years	Mixed dentition. Use sBPE codes 0, 1, 2 on Index teeth
12-17 years	Permanent dentition. Use sBPE codes 0, 1, 2, 3, 4, * on Index teeth

Code	Simplified BPE (sBPE)
0	Healthy
1	Bleeding after gentle probing. Black band fully visible
2	Calculus or plaque retention factor. Black band fully visible
3	Shallow pocket 4 mm or 5 mm. Black band partly visible
4	Deep pocket 6 mm or more. Black band disappears
*	Furcation

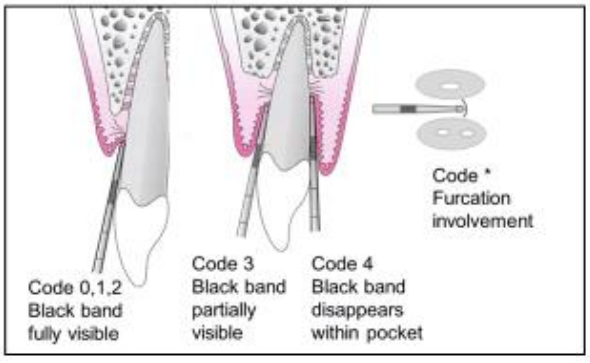

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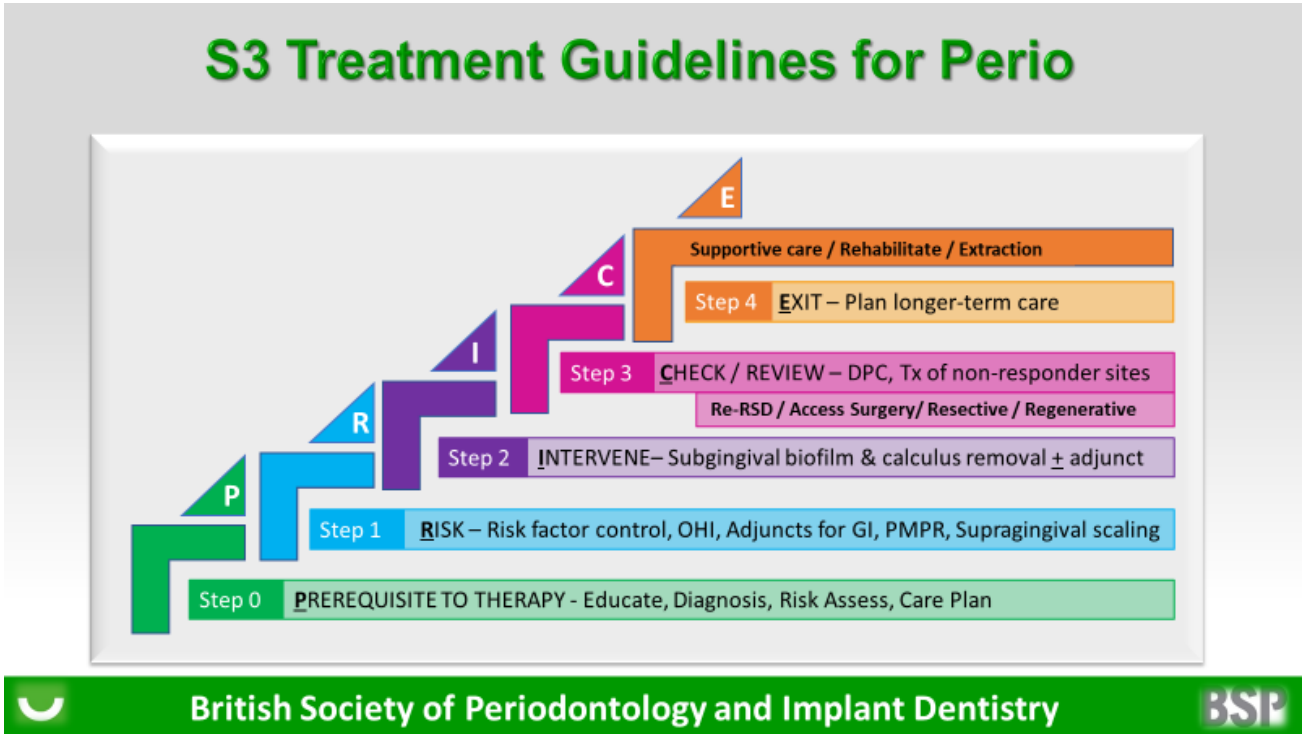
Figure 4 S3 Treatment Guidelines for Periodontitis Steps Stairway[1]



[1] Figure by Courtesy of Professor Iain Chapple

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Appendix 1

MARGINAL GINGIVAL BLEEDING

This is assessed by running a blunt periodontal probe such as the Hu Friedy PCP10 or Williams probe around the gingival margin and noting marginal gingival bleeding up to 20 seconds later. Bleeding indicates marginal gingival inflammation and therefore gingivitis of the gingival units. It is easier to record before disclosing the plaque.

Marginal Bleeding Free Score

The presence of gingival bleeding at the gingival margin is recorded for all teeth at 4 sites - mesio-buccal, buccal, disto-buccal, lingual/palatal, on the Plaque Free and Marginal Bleeding Chart (see chart). The total number of available tooth sites is calculated ie number of teeth present multiplied by 4 (as there are 4 sites / tooth). The number of marginal bleeding free sites is counted and expressed as a percentage of the total number of sites in the mouth allowing the child to get a higher score as the mouth becomes less inflamed.

PLAQUE

Many different plaque indices have been described for assessing a patient's oral hygiene status. The Plaque Free Score is based on the O'Leary Plaque Control Index, which enables an objective assessment of visible disclosed plaque at the gingival margin to be made. This allows the clinician to monitor the patient's level of oral cleanliness and the response to oral hygiene instruction and can be used to educate and motivate the patient.

Disclosing the teeth

A little petroleum jelly is applied to the child's lips with a cotton wool roll. The child is given a plaque disclosing tablet to chew it and then swish around the mouth for 30 seconds, then asked to rinse once. The plaque will be coloured and the patient is given a hand held mirror and shown the presence of the plaque.

Plaque free score

The presence of plaque at the gingival margin is recorded for all teeth at 4 sites: mesio-buccal, buccal, disto-buccal, lingual/palatal. The number of plaque free sites is expressed as a percentage of the total number of sites in the mouth to give a plaque free score. This allows the patient to get a higher score as the mouth becomes cleaner, indicating improved plaque control and tooth cleanliness. An example of a chart is appended.

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Plaque Free and Marginal Bleeding Free charts

Visit

Marginal Bleeding Free Chart														DATE		
																Sites
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Not Bleeding
																%

Plaque Free Chart														DATE		
																Sites
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Plaque Free
																%

Visit

Marginal Bleeding Free Chart														DATE		
																Sites
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Not Bleeding
																%

Plaque Free Chart														DATE		
																Sites
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Plaque Free
																%

Visit

Marginal Bleeding Free Chart														DATE		
																Sites
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Not Bleeding
																%

Plaque Free Chart														DATE		
																Sites
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	Plaque Free
																%

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