

BSP implementation of the 2017 classification of periodontal diseases: a practice retrospective

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Key points

The 2017 periodontal classification is implementable in a general practice setting.

The importance of bleeding on probing as a key clinical parameter is emphasised within the new classification.

Highlights the opportunity for clinicians to audit the effectiveness of their current pathways of periodontal care by harnessing the detailed clinical data which implementation of the new classification yields.

Abstract

Introduction The new world classification of periodontal diseases and conditions was developed in 2017. The British Society of Periodontology and Implant Dentistry (BSP) implemented the classification in a series of papers published in the *British Dental Journal* in January 2019.

Aims and objectives This study aimed to investigate if the BSP implementation was workable in general dental practice and to reveal if any lessons were learnt from its regular use two years following its release.

Materials and methods This was a cross-sectional, retrospective, non-intervention analysis of a patient population (n = 891) drawn from a complete list of a private dental surgeon. Diagnostic and demographic data were drawn from the patient records, collated and analysed using SPSS Statistics v26.

Results Diagnoses derived from the new classification were identified for 92% of subjects, indicating a high level of implementation. In total, 20.9% of subjects were diagnosed with periodontitis, and of these, 57% were unstable, 39% stable and 4% in remission. The mean bleeding on probing score across the cohort was 7.7%. Moreover, 76% of the non-periodontitis patients were diagnosed with 'clinical gingival health', 23% with localised gingivitis and 1% with generalised gingivitis.

Conclusion The new classification has been found to be readily implemented in a general practice setting. Use of the new classification allows for close monitoring of periodontal status, and as a result, close monitoring of the effectiveness of pathways of care.

Introduction

The 2017 World Workshop 'Classification for periodontal and peri-implant diseases and conditions' was published to consolidate research and understanding gained since the 1999 international classification.¹ Key drivers included establishing a definition of periodontal health and enabling communication of the

extent, severity and susceptibility of patients to periodontal diseases, while allowing accommodation of future advances in the field of periodontology.² Where periodontitis is identified, the severity, extent and rate of progression of the disease are assessed through staging and grading. Determination of the prevailing health status through the evaluation of bleeding on probing (BOP), periodontal pocket depth (PD) and assessment of alveolar bone levels is further indicated.

When the 2017 World Workshop classification in periodontology was conceived, a main determinant was to adopt a reductionist model that could be implemented in general dental practice, where >95% of periodontal disease is diagnosed and managed.³ The British Society of Periodontology and Implant Dentistry (BSP) adopted the key principles of the classification, published in the *British Dental Journal* in 2019,² for UK implementation in

general and specialist practice. A three-year timeframe for BSP guideline implementation in general dental practice was suggested.

An evidence-based classification of periodontal and peri-implant diseases provides clarity and direction for the care of patients, as well as offering improved means of communication with colleagues.⁴ Two essential principles of the 2017 classification are that, for the first time, clinical gingival health was defined, and that each patient should carry a working diagnosis of their periodontal status. In consequence, the 2017 classification empowers clinician-patient partnerships to direct personalised pathways of oral care towards 'well-defined therapeutic outcomes'.⁴

The primary aim of this retrospective observational cohort study was to determine how effectively the BSP implementation of the 2017 classification can be applied in dental practice. A secondary aim was

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to determine the pattern of periodontal diseases across the cohort. Through repeated application of the diagnostic process, a tertiary aim evaluated the impact of the BSP implementation of the classification on periodontal care in a clinical setting.

Materials and methods

This was a cross-sectional, retrospective, non-intervention analysis of a population drawn from a complete patient list of one independent dental surgeon. All 891 records from the primary investigators list of patients were retrieved from Software of Excellence's EXACT as of 19 January 2020. The patient list was 'complete' and included patients in active periodontal therapy, supportive periodontal therapy and patients with no history of periodontitis. The demographic and diagnostic data including risk factors regarding periodontal status were collated by a co-investigator using Microsoft Excel. The patient records were anonymised using unique random codes throughout the analysis period.

The spreadsheet was mapped (see Appendix 1) to the BSP implementation of the new classification and populated with the most recent data recorded in the clinical notes. Frequency tables, descriptive statistics and graphical methods were used to explore the data. All calculations were carried out using SPSS Statistics v26.

Results

In total, 891 patient records were analysed in the study: 40.3% men and 59.7% women. The mean age was 60.4 years old (standard deviation [SD] = 14.8 years; min = 18 and max = 94 years old). The prevalence of risk factors within the cohort is represented in Table 1.

| Table 1 Prevalence of risk factors in our group of 891 subjects that associated with periodontitis | | |
|--|-----|------|
| Risk factor | n | % |
| Smoking | 60 | 6.7 |
| Family history of periodontal disease | 3 | 0.3 |
| Diabetes | 54 | 6.1 |
| Adverse medical history | 401 | 45.0 |
| Denture wearer | 91 | 10.2 |

Diagnoses derived from the new classification were identified for 820 (92%) out of 891 subjects. The remaining 71 (8%) of patients were either missing a diagnostic statement in the clinical notes, edentulous, or were awaiting radiographic examination to arrive at a definitive diagnosis. Furthermore, 186 subjects (20.9%) carried a diagnosis of periodontitis. Further detail of the diagnoses recorded can be seen in Figures 1, 2, 3 and 4.

The most recent BOP percentage (%BOP) was recorded, where the mean across all

subjects was 7.7% (median = 6.3%; SD = 5.4%; min = 0.0% and max = 32.4%).

In the clinical gingival health/gingivitis subjects (those with a diagnosis of clinical gingival health, localised or generalised gingivitis), the mean BOP was 7.2% (median = 6.0%; SD = 5.03; min = 0.0% and max = 29.2%).

This is compared to a mean BOP of 9.3% (median = 7.6%; SD = 6.4; min = 0.0% and max = 32.4%) in the periodontitis subjects (those with a diagnosis of periodontitis).

Fig. 1 Pie chart to show staging and grading of generalised periodontitis cases

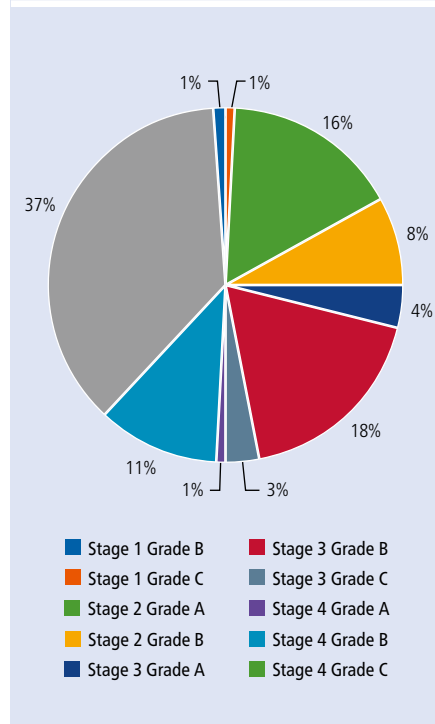


Fig. 2 Pie chart to show staging and grading of localised periodontitis cases

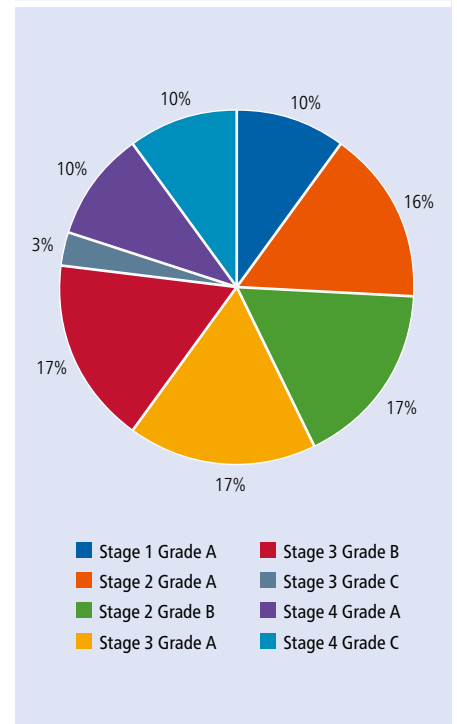


Fig. 3 Pie chart to show stable/unstable/remission in the periodontitis group

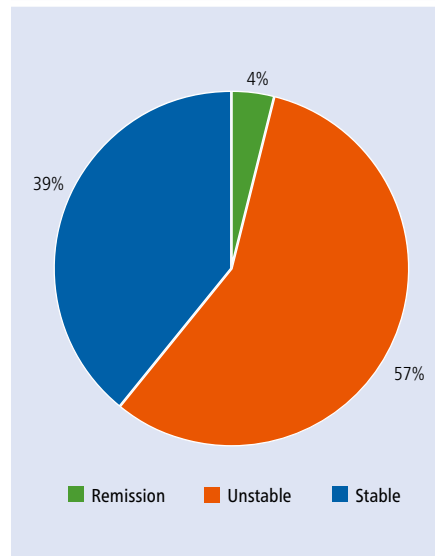
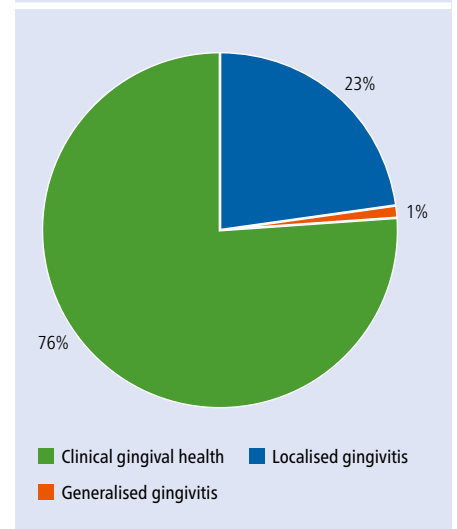


Fig. 4 Pie chart to show diagnoses in the clinical gingival health and gingivitis patient groups



Discussion

The success of the BSP implementation of the 2017 classification in periodontology depends on it being readily applicable in general dental practice. Here, 92% of the patient records assessed contained a diagnostic statement derived from the new classification. The authors consider this to indicate that application of the BSP implementation of the 2017 classification is attainable in the general dental practice operational framework, within a one-year timeframe.

Several factors may have played a role in achieving this degree of conformity. The 891 subjects constitute the complete routine list of a single dental practitioner. Patient care is led by the dentist but devolved to dental health care professionals (DHCPs) who provide regular supportive periodontal care sessions. These visits include supragingival and subgingival professional mechanical plaque removal and provision of oral hygiene advice and behaviour modification. Training and calibration regarding the 2017 classification was provided to all clinical staff at the outset by the principle investigator to ensure everyone was confident and proficient in its use. Continual support was available in the form of regular staff meetings and informal enquiry.

A secondary aim of the study was to determine the pattern of periodontal diseases and health across the patient cohort. In the non-periodontitis patients (those with a diagnosis of localised/generalised gingivitis or clinical gingival health), a significant proportion (76%) of patients were diagnosed with 'clinical gingival health', with very few patients exhibiting generalised gingivitis with >30% BOP.

The 2017 classification defines clinical gingival health for the first time. The World Workshop and BSP define this as a %BOP score of less than 10% without attachment loss and with no radiographic bone loss.¹ Studies have found that 50–90% of the adult population suffer from some degree of gingivitis.^{5,6} In total, 76% of non-periodontitis patients achieved a working diagnosis of clinical gingival health, which suggest an appropriate level of periodontal management to achieve and maintain this status.

The introduction of 'clinical gingival health' as a diagnosis represents a paradigm shift when assessing periodontal tissues. At patient level, it allows well-defined therapeutic outcomes to be established. It also acts as an objective target for clinicians, which empowers patients to contribute to treatment planning and recall

interval. At population level, it allows for surveillance of periodontal status. For both periodontitis and non-periodontitis patients, such an endpoint is key when designing and implementing personalised pathways of care.

In the periodontitis patient group, %BOP was once again low across the cohort. However, this did not translate to most patients exhibiting 'stable' periodontitis, with 57% of periodontitis patients being diagnosed with 'unstable' disease. When determining stability of periodontal disease, PD is assessed in combination with %BOP. Through repeated application of the classification, we found a significant number of patients exhibited BOP of less than 10%, alongside persistent deeper pockets of >5 mm. Following discussion, patients may decide to accept this management strategy - remaining in Step 2 of the S3 Treatment Guidelines for Periodontitis⁷ - rather than pursue advanced periodontal therapy such as surgical interventions (Step 3). 'This less invasive and more cost-effective approach is supported by evidence which suggests deeper pockets remain stable when patients are placed on a supportive periodontal care programme.⁷ Perhaps the classification would benefit from a recognition that many patients with deep pockets (4–6 mm), who would be diagnosed with unstable disease, are in fact relatively stable in purely practical terms.

Through repeated application of the BSP implementation of the 2017 classification, several conclusions have been drawn regarding its impact on periodontal management in practice. One insight gained is the significance of the %BOP in the routine periodontal monitoring of patients. Both as a primary parameter in setting a threshold for gingivitis, as well as a key indicator of stability in the case of the periodontitis patient, %BOP provides an objective overview of the extent of periodontal inflammation.

An effective approach to periodontal treatment and maintenance is particularly important in the context of emerging and established associations between periodontal inflammation and numerous systemic diseases and conditions.^{8,9,10,11} It must be appreciated that the most common biological mechanism for associations between periodontal diseases and other conditions is the inflammatory burden, which is substantial not only in established periodontitis, but also in gingivitis. Gingivitis is significant because it is the known precursor to periodontitis, a condition characterised by connective tissue

loss alongside gingival inflammation in response to presence of plaque.¹² Monitoring periodontal status with %BOP emphasises the importance of the inflammatory burden of the periodontium and reframes the importance of treating gingivitis with rigour, before it progresses to periodontitis.

BOP is currently utilised in combination with other clinical tools, such as the Basic Periodontal Examination (BPE) in the monitoring of periodontal status. The BPE was designed as a rapid screening tool 'used to indicate the level of further examination needed and provide basic guidance on treatment needed'.¹³ It involves walking a World Health Organisation 620 probe around each individual tooth and recording a code for each sextant. Current guidance suggests the BPE need not be repeated once a patient has been diagnosed with periodontitis, but that it should be repeated at each examination for the non-periodontitis patient.¹³ The BPE is a valuable assessment for providing a rapid estimate of a patient's periodontal status.

However, the BPE has certain limitations. The codes of the BPE are ordinal, with no tangible meaning for the patient. In comparison, %BOP is an objective, nationally accepted clinical assessment which can be easily understood and used as motivation by patients. Additionally, accurate %BOP scores allow more informed choices to be made by patients and clinicians regarding patient recall intervals. This is congruous with the concept of 'patient-centred care'. In our experience, this often leads to patients directing shorter recalls to attain 'clinical gingival health' or periodontal stability. A three-month recall for periodontal therapy with a DHCP was common in the subjects selected.

There is evidence to suggest that behaviour change is elicited more effectively when psychological theories of behaviour are employed compared to non-theory-based interventions.¹⁴ A systematic review¹⁵ established evidence which supported the use of goal setting, planning and self-monitoring (GPS) for improving oral hygiene behaviours in periodontitis patients. Implementation of the new classification introduces elements of GPS into the periodontal maintenance appointments. The presence of a tangible goal to aim for was, in our experience, highly motivating to patients.

This cohort was selected from a private dental clinic. It may be argued that the clinical protocols and recall intervals implemented may not be economically viable within the

constraints of NHS dentistry. According to the NHS *Commissioning standard: dental care for people with diabetes*, if the periodontal care of patients in the UK was improved, this could lead to savings within the NHS of £124 million.¹⁶ Furthermore, a recently published report commissioned by the European Federation of Periodontology assessed the economic impact of effectively treating gingivitis, with projected savings in the billions of pounds in the UK.¹⁷ Studies such as this suggest that effective periodontal care pathways may be economically beneficial in the long term.

Further studies may be useful, looking at long-term economic modelling regarding the implementation of regular, targeted interventions utilising trained DHCPs in the periodontal care of patients. This is even more highly prescient given the accumulating scientific evidence regarding the associations between gingival inflammation and other chronic diseases, such as the well-established bi-directional link with diabetes,⁸ coronary artery disease,⁹ cognitive decline¹⁰ and complications during pregnancy.¹¹

Study limitations

This study has provided snapshot of data directly from patient records, confirming that the BSP adaption of the new classification is implementable in general practice. In the process this has offered insight into the practicalities of its daily use, while providing an overview of periodontal status across the cohort of 891 patients. Limitations of the study included the impossibility of accounting for the range of periodontal probes used in practice in the UK, as well as the lack of any calibration between clinicians. This is of course representative of 'real world' dentistry in the UK. Similarly, it has not been possible to account for the period over which this clinical data were initially collected, as it was dependant on the patients last attendance at the practice.

Conclusion

To our knowledge, this is the first study to review the practical application of the BSP implementation of the new classification of periodontal diseases in a UK dental practice

since its publication in January 2019. Repeated application of the classification allows review of its impact on clinical practice. Importantly, this study has shown that implementation of the classification is possible in clinical practice, with 92% of patients being diagnosed based on the new classification. This may be in part due to the great efforts made by the BSP to widely distribute educational material regarding the classification, aided by the uptake of social media in the dental profession. Such an implementation was arguably impossible at the time the 1999 classification was released.

It is also clear that the classification offers an exciting opportunity to assess the effectiveness of pathways of care in periodontal management. Significantly, the ability to define clinical gingival health for the first time has highlighted the importance of %BOP as a true, validated and tangible marker of disease activity which is readily understood by patients.

Ethics declarations

No ethical approval or consent was required as this was a non-interventional, retrospective study using historic, anonymised patient records.

The image displays five screenshots of a data collection tool interface, showing various dropdown menus and input fields for patient data and clinical findings.

- Demographics:** Includes fields for Patient Number, Patient Code, DOB, Age, Male, Female, No Diag, Clinical Gingival Health (CGH Diagnosis, CGH % BOP), Localised Gingivitis (LG Diagnosis, LG % BOP), and Generalised Gingivitis (GG Diagnosis, GG % BOP).
- BPE Code 3:** Includes fields for Bilateral Bite Wing Radiographs (BBWR), Scan View Radiographs (SVR), Code 3, and Periodontitis Molar-Incisor Pattern (PM-IP) with Stage 1 and Stage 2 grades (A, B, C).
- BPE Code 4:** Includes fields for Generalised Periodontitis with Stage 1 and Stage 2 grades (A1-C4, A5-C7, A8-C10, A11-C13).
- Periodontal Status:** Includes fields for Code 4 BOP%, Scan View radiograph, Stable, In Remission, Unstable, Smoking, Family History, Diabetes, Adverse Medical History, Denture, and BOP%.
- BPE:** Includes fields for Code 0/1/2, Code 3, Code 4, Highest Recorded Code, BPE Code 4, and NOTES.

Appendix 1 Screenshots of data collection tool

Author contributions

Nicholas Claydon, Dave W. Thomas, Robert Adams and Nicola West: study design, data collection and manuscript editing. Shaun Hodge: study design, data collection and manuscript writing and editing.

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