

Title

A qualitative study for evaluation of the ease of use of 2017 Classification of Periodontal and Peri-implant Diseases and Conditions versus 1999 classification of periodontal diseases.

Authors

Mahima Mishra, Postgraduate student, Department of Periodontology, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, 576104, mahima.mishra@learner.manipal.edu

Lakshmi Puzhankara, MDS, Department of Periodontology, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, 576104, lakshmi.puzhankara@manipal.edu

Correspondence: Lakshmi Puzhankara, Department of Periodontology, Manipal College of Dental Sciences, Manipal, Manipal Academy of Higher Education, 576104, lakshmi.puzhankara@manipal.edu

Abstract

Background

Periodontal disease classification plays an important role in the diagnosis, treatment plan and effective communication amongst the clinicians. Implementation of the recent 2017 classification system has been met with a mixed response due to its complexity and lack of familiarity. Understanding the difficulties in applying the 2017 classification system is an important factor to develop strategies for its better utilization. This qualitative study aimed to assess the acceptance of 2017 classification as well as to understand the difficulties encountered in utilization of the same amongst the periodontists.

Methods

This qualitative study involved the development of an in-depth interview guide based on the existing literature and conduct of in-depth interviews with periodontists. Thematic analysis was performed to develop themes and subthemes pertaining to the topic. The number of participants included was based on achievement of data saturation.

Results

Five themes and nineteen subthemes emerged as a result of thematic analysis of the data. It was seen that the periodontists understand the importance of classification systems but expressed a preference for the 1999 classification due to its simplicity. Challenges expressed by the participants related to the 2017 classification system include complexity and increase in time-consumed to complete the examination as it involves extensive evaluation.

Conclusion

While the 2017 classification offers a comprehensive diagnosis and risk assessment, its complexity poses implementation challenges. Regular training and simplified decision-making tools can help reduce the complexity and increase the adoption rate, thereby enhancing periodontal diagnosis accuracy and treatment plans and ultimately improving patient care.

Keywords: Classification, Diagnosis, Periodontal disease, Peri-implant disease

Background

Periodontal disease (PD) is an inflammatory disease primarily initiated in response to a specific group of bacteria and characterized by a complex host-biofilm interaction.¹ Periodontitis is a major global health concern due to its vast prevalence and association with systemic health conditions like Diabetes and Cardiovascular diseases.^{2,3}

Classification of periodontal disease and condition, along with accurate diagnosis, holds paramount importance in formulating the correct treatment plan.⁴ History speaks about the evolution of the classification system over the years, reflecting the substantial advancement in the understanding of the pathogenesis of gingival, periodontal, and peri-implant disease and conditions.⁵

The classification that has been in extensive use prior to the introduction of the recent 2017 classification is the 1999 classification of periodontal diseases and conditions.⁶ However, the 1999 Periodontal Classification faced challenges. Overlapping diagnosis, absence of categorization of peri-implant disease and condition, insufficient recognition of risk factors being a few.⁴

This prompted the re-classification leading to the development of the 2017 classification system for gingival, periodontal and peri-implant disease and condition by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP).⁷

The 2017 classification addressed the limitations of the 1999 classification and included the introduction of a staging and grading system to assess the severity and progression of the disease, inclusion of peri-implant disease and conditions, and considering systemic risk factors like Diabetes and Smoking as modifiers of disease progression.⁶ The 2017 classification

system was introduced to enhance diagnostic accuracy, standardize treatment protocols, and facilitate interdisciplinary communication.⁸ However, due to the fact that the 1999 classification system had been in use for a long period of time and due to the difficulty in shifting to a newer classification system, the use of the 2017 classification system, especially in clinical practice has been significantly compromised.

It is important to understand the aspects of the new classification system that the clinicians feel are difficult to apply in clinical practice. In addition, it is also necessary that constructive opinion on the various aspects of the new classification system be obtained. This qualitative study was conducted to assess the attitude of clinicians and academicians in the field of periodontology towards the ease of applying the 2017 classification system so as to understand the challenges as well as opportunities encountered by the clinicians in employing the 2017 classification in periodontal disease diagnosis.

Materials and Methods

This study was designed in compliance with the ethical principles put forth in the Helsinki Declaration and the principles given by the Indian Council of Medical Research. Kasturba Medical College and Kasturba Hospital Institutional Ethics Committee provided ethical clearance for the project.

This qualitative study aimed to assess the perception of periodontists regarding the ease of use and implementation of the 2017 classification in clinical practice compared to the 1999 classification, which is essential for the enhancement of patient care and the standardization of treatment protocols.

Periodontists who were willing to participate in the study were included for in-depth interviews conducted both online and offline. The major topics included in the in-depth interview guide were: necessity of classification systems in periodontal disease diagnosis; 1999 and 2017 classification- a comparison; need for further modification of the 2017 classification system. The questions were molded around these topics so as to obtain the data necessary for thematic analysis.

The sample size for the qualitative arm was determined to be till the point of achieving data saturation. Informed consent was obtained and recorded from the participants. Transcripts were created from the recordings of the interviews. The data underwent thematic content analysis using QDA Minerlite software. Twelve periodontists contributed, and five main themes with 19 subthemes emerged from these interviews.

Results

Nineteen subthemes emerged under five basic themes obtained after thematic analysis of the in-depth interview. The themes and subthemes are given in Table 1.

Table 1: Themes and subthemes
Theme 1: Need for classification
Efficient diagnosis.
Efficient treatment plan formulation.
Efficient communication between clinicians.
Interdisciplinary collaborations.
Research work and documentation
Facilitates effective communication between international healthcare community
To evaluate the disease status, progression, prognosis.

Theme 2: Difference between the 1999 classification and the 2017 classification
Inclusion/exclusion of additional categories under the broad classification of periodontal diseases and conditions Changes in terminology Increased clarity in terms of subclasses of periodontal disease diagnosis Introduction of staging and grading system for periodontitis. Inclusion of the term Molar-Incisor pattern with exclusion of the term aggressive periodontitis. Risk factors have been considered. Differentiation between attachment loss due to periodontitis and non-periodontitis causes.
Theme 3: Perceptions on the ease of use of 1999 classification and 2017 classification
1999 classification-ease of use 2017 classification- easy or difficult to use
Theme 4: Need for further modification of the 2017 classification system
Disadvantages of 2017 classification Clear definition of parameters to avoid confusion, overestimation or underestimation of the disease.
Theme 5: Perception on the comparative efficiency of the 1999 and 2017 classification systems
Efficient use of 2017 facilitates more accurate diagnosis

The goal of this study was to evaluate the opinions of clinicians and academicians in the field of periodontology regarding the necessity of a classification system and the ease of applying the 2017 classification. Periodontists expressed the belief in the importance of having a classification system for facilitating effective communication between clinicians, accurate diagnosis, interdisciplinary collaborations, research endeavors, and documentation, as well as

for evaluating disease status, progression, and prognosis. This aligns closely with the rationale behind the development of classification systems as outlined in existing literature.⁹

Participant P1 stated that the need for classification is ‘For better diagnosis and to formulate a treatment plan and for better communication between dentists.’ P2 stated ‘Periodontal diseases, it is not only one disease, but there are also many diseases, so a classification system, which classifies different conditions and diseases, first will give us a system-it will give us a list of what are the conditions and diseases, second it will provide an efficient system for diagnosing.’

In the assessment of the perception regarding the differences between the two classification systems as well as the usefulness of the classification systems for periodontal diseases, the participants acknowledged that the 2017 classification provided a more detailed and informative diagnosis than 1999 classification. They appreciated the clarity in differentiating between health and disease, the inclusion of tooth loss in assessing disease severity, and the introduction of staging and grading systems to evaluate the severity and complexity of the disease. Moreover, they highlighted the significance of the staging and grading system. They stressed the usefulness of the 2017 classification in diagnosing periodontitis based on systemic risk factors. Periodontist P3 said, ‘In 2017 classification they have incorporated various other risk factors like diabetes, smoking, patient habits, all these things they have incorporated and formulated and classified according to the stages and grades, that was something missing in 1999 classification.’ P6 has stated, ‘The difference in 2017 classification from 1999 classification is the inclusion of Periodontal and gingival health, Staging and grading system. Also, it takes into consideration the radiographic tissue levels. In 1999 classification

Aggressive periodontitis term was there which is removed in 2017 classification. A separate class of disease caused by systemic disorders is included in 2017 classification.' An additional difference and advantage of the 2017 classification is the inclusion of the peri-implant health and disease, P5 mentioned, 'They have included Periodontal health as a category. Plus, Peri-implantitis is defined for the first time, so it is a major achievement.' P10 has stated that 'we have this implant classification also in the 2017 classification, so that makes it more useful for the diagnosis of the periodontal disease.' P2 has summarised the difference between the two classification systems, '1999 classification, the first difference is, there is no health, we cannot write health. My understanding is that we have to write chronic generalised gingivitis just for all the patients, even if we don't see any visible clinical signs of inflammation, we have to write chronic generalised gingivitis. The first difference is they added health, periodontal and gingival health, so this clear cut distinguishes between health and disease, so we don't have to write any inflammation status for the patient who does not have visible signs, clear cut definition of health and disease. Then they added, peri-implant disease and conditions, which were not there in the 1999 classification, because implant science is growing, we are placing more and more implants, peri-implant conditions are also increasing day by day, so we need peri-implant conditions' classification also. That has been added in periodontal disease classification system. Second is, new classification for endo-perio lesions, earlier there was a lot of confusion in diagnosing endo-perio lesions, and after diagnosing also, determining which type of endo-perio lesion was a dilemma. That has been taken care with new classification of endo-perio lesions. This is a broad classification of periodontal disease. When it comes to classifying periodontitis itself, there is a staging and grading system, that is also different. Now earlier in 1999 classification, there were four forms of periodontitis, they

classified periodontitis as four forms, first is chronic periodontitis, second is aggressive periodontitis. Next is, ulcerative necrotising periodontitis. The fourth one is periodontitis as a manifestation of systemic disease. Four forms were there. In the 2017 classification there are only three forms. First change is, Chronic periodontitis has been modified to periodontitis only. They have removed the word chronic, because there is no acute form, so, it does not make any sense to keep chronic, so periodontitis. Next is, aggressive periodontitis form is completely removed, because they say there is no evidence to distinguish both, to keep both as different entities, so they have removed that term. So only three forms and, necrotizing earlier was called necrotizing ulcerative periodontitis, now ulcerative word is removed, because they say that necrosis will cause definitely ulcers, you do not have to mention ulcerative, so now it is only necrotizing periodontitis. So there are three forms as opposed to four forms in the 1999 classification, that is periodontitis, necrotizing periodontitis, periodontitis as a manifestation of systemic disease. Now when it comes to periodontitis, the first form, there is staging and grading. Now how they have changed this is, in 1999 classification, there is only mild, moderate and severe, based on CAL 1-2mm, 2-3mm and more than 4mm, something like that. Now here they have taken much more factors, for example, staging is what is, we can compare staging to that mild, moderate and severe in 1999. Now here how it is different is, first is CAL, they take CAL into consideration, exactly same way, second radiographic bone loss, percentage of bone loss on the root, and third is tooth loss, that is one more difference. Tooth loss has never been considered till now, I think 1999, earlier classification also doesn't consider tooth loss, I think, but this classification, when compared to 1999 has tooth loss.'

The participants mentioned the challenges associated with the 2017 classification, stating its complexity, time-consuming nature, and need for extensive evaluation. However, despite its complexities, they appreciated the comprehensive nature of the 2017 classification. In contrast, some participants unequivocally praised the ease of use of the 1999 classification, valuing its simplicity, straightforwardness, quick applicability, and suitability for chairside use. For the reasons above, the participants consistently preferred the 1999 classification. P1 said, ‘1999 is much easier. 2017 is difficult because stage 2 and 3 are overlapping. So it’s confusing. Also, for grading A, B and C you need X-rays and it is not economical for patients.’ P2 stated that, ‘See this ease of use or difficulty in use is always in comparison. When you compare to 1999 classification, 2017 classification is more complex, more time consuming, more difficult to use, but that does not mean it is bad, because it takes into account more factors, it takes into account more information to give a diagnosis and the diagnosis has more information in it, so I think the 2017 classification is better than 1999 in terms of describing periodontitis, describing the disease phenotype, it is better than 1999, but at the same time, because it takes into account lot of factors, it is more time consuming, more complex, more difficult to use, and all that in comparison with 1999. If you leave 1999 out of the equation and see 2017 classification as a standalone classification, it is a very good classification, but because we are used to 1999 classification, daily we have been using 1999 classification, now 2017classification takes considerably more effort and more time, that is why we feel it is difficult, and I also feel it is difficult.’

In terms of improvements and recommendations for updating the 2017 classification for ease of use, some participants suggested devising a flow chart that makes it easy to reach a diagnosis, adding new components like, biomarker and microbial analysis, a more thorough

classification connected to the host immune response, and bringing back components such as aggressive periodontitis. P12 detailed a few areas of potential modifications, ‘There is confusion between Stage 2 and 3 which may be interpreted differently by different clinicians, potentially leading to variations in diagnosis and treatment planning. It may lead to the over estimation of the disease, which could result in unnecessary treatments and increased healthcare costs or it may under estimate the disease leading to improper treatment. So, that needs to be looked into to clear the confusion. The 2017 classification system primarily relies on clinical and radiographic parameters to categorize periodontal diseases. While it acknowledges the importance of biomarkers in understanding disease pathogenesis and progression, it does not fully integrate them into the diagnostic criteria... Incorporating validated biomarkers into the classification system can enhance diagnostic accuracy and provide insights into disease activity and prognosis. However, this would require standardizing biomarker measurements and establishing their clinical relevance...The classification system says that for each stage we need to describe extent as localized, generalised or molar-incisor Pattern. This is little confusing as there is no clarity whether the extent is based on the overall dentition or the teeth which are affected at that particular stage. This can lead to overestimation or underestimation of the disease and hence may need a modification.’ Other participants have suggested that more widespread use of the classification should be facilitated and then, based on the requirements, modifications can be made. P4 has said, ‘I do not think so there is any more additions or modifications required because already it has a lot of components in it. So, according to me, we actually have to get into using the system even before making any changes to it.’

Discussion

Classifying diseases is crucial for clear communication among clinicians and for creating suitable treatment plans. However, the adoption of any new classification system entails a learning curve, which may span several years. To assure accuracy and avoid errors in treatment planning, careful implementation, and consistent practice are important.¹⁰ Inconsistencies in defining disease can lead to variations in prevalence, severity, and extent in epidemiological studies.^{11–13}

Therefore, the objective of this qualitative study was to evaluate the ease of diagnosing periodontitis cases based on the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions as compared to the classification of periodontitis cases using the 1999 classification system.

Numerous studies in literature have examined various aspects of the 2017 World Workshop Classification. The study conducted by Graetz et al.¹³ marked the initial comparison between the 1999 classification and the 2017 World Workshop Classification.

Recent studies utilizing epidemiological data have demonstrated a strong level of agreement between the previous classification and the 2017 classification.^{14–16} However, conflicting outcomes were reported in other studies.^{17,18}

The difficulty in diagnosis based on the 2017 classification, as mentioned by the periodontists, may arise from the difference in knowledge about the classification system, lack of practice, lack of familiarity, difference in probing force, and variation in the experience of the examiners. Training along with practice can help reduce discrepancies in diagnosing periodontal diseases.

In the study conducted by Marini et al.,¹⁹ a moderate inter-examiner agreement was observed among periodontists, general dentists, and undergraduate students regarding the stage, grade, and extent of periodontitis. The participants revealed facing challenges in distinguishing between stage III and IV and the periodontists in this study explicitly stated that the 1999 classification is easier to use, more straightforward, and less time-consuming compared to the 2017 classification. The clinical implications of this challenge are particularly significant, as it may impact communication with the patient regarding the complexity of managing their case. This difficulty may arise from calculating the number of teeth lost due to periodontitis, which is the primary severity factor distinguishing stage III from stage IV. Additionally, this assessment should consider hopeless teeth, which can be challenging to define appropriately.

20,21

In another study by Ravida et al.,²² 10 clinical cases featuring severe periodontitis were electronically distributed to five experts and 103 members from the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP). Among the 103 examiners, moderate inter-examiner agreement was observed for the stage, grade, and extent of periodontitis. As anticipated, adapting to the new classification system entails a learning curve. Therefore, thorough training, effective implementation, and consistent practice are crucial to prevent misclassification and ensure accurate treatment planning. Lane et al.²³ proposed that regular participation in calibration sessions and study clubs may mitigate dispersion in responses among dentists.

Similar conclusions were drawn by Kornman and Papapanou²⁴ who emphasized the importance of establishing ground rules, clarifications, and addressing "grey zones" for the

clinical application of the new classification. They highlighted the necessity for a collective assessment of potential complexity factors in determining the stage, rather than simply checking off isolated features. Furthermore, they stressed that a correct implementation of the staging system demands a nuanced, comprehensive interpretation of a wide range of findings by a knowledgeable clinician. These "grey zones" were further emphasized in a similar online case-based study by Ravidà et al.²² To enhance the classification agreement, it is necessary to identify diagnostic challenges and complexities, thereby promoting the training of clinicians.

The difficulties in differentiating between the different grading systems was stressed by the participants of the qualitative study and they expressed the necessity for standardization of bone loss assessment. This need arises because clinicians often misinterpret the percentage of bone loss due to imperfect calculations based on panoramic radiographs (OPG). Assessing bone loss as a percentage of root length is inherently a rough estimate, relying on the clinician's interpretation of factors such as the most apical location of alveolar bone support, the location of the cementoenamel junction (CEJ), and the position of the root apex.²⁴ Grading, particularly for new patients, can be challenging and potentially misleading because dental practitioners often lack previous periodontal records, such as clinical attachment level (CAL) or radiographic bone level (RBL) measurements. Dental practitioners frequently rely on the % bone loss/age index as indirect evidence.²⁵ Kornman's method²⁵ for evaluating bone loss may introduce some grey areas in subjectivity when converting this bone loss into a percentage which, in turn, may affect the determination of the diagnosis.

The 2017 Classification suggested that the diagnosis should incorporate a comment on the patient's risk factor profile, particularly regarding smoking and diabetic status. However, other

potential risk factors such as diet, genetics, obesity, or stress should also be noted in the patient's history. Recognized risk factors that contribute to severe destruction at an earlier age and negatively impact treatment response have not been adequately addressed in previous periodontitis classification systems. Enhanced understanding of how risk factors influence periodontitis suggests that risk factors should be taken into account in the classification of the disease. By incorporating risk factors into the classification system, future disease susceptibility can be predicted more accurately. Therefore, the new classification can be viewed as a forward-looking system that considers not only the current status of the disease but also the potential for future outcomes based on individual risk profiles.²⁶

Conclusion

This study provides insightful information about the challenges associated with diagnosing periodontal disease and conditions using the 2017 classification system. The strength, weakness, opportunities and challenges associated with the use of the classification was identified. Although the 2017 classification is an improvement over its predecessor in terms of comprehensive diagnosis and risk factor assessment, the issues with its practical applicability, complexity, and difficulty stresses on the need for regular training sessions to ensure knowledge transfer, to facilitate using the classification system daily, to provide quality patient treatment based on updated scientific evidence.

Declarations

Ethics approval and consent to participate

Kasturba Medical College and Kasturba Hospital Institutional Ethics Committee provided ethical clearance for the project. The IEC number is IEC2: 35/2022. Written informed consent was obtained from all the participants.

Consent for publication

Not applicable.

Availability of data and materials

The datasets obtained, used and analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

Funding

The authors have not received funding for the conduct of the research

Authors' contributions

MM: Contribution to conception, analysis, interpretation of data, drafting the article, final approval of the manuscript; LP: Contribution to conception, analysis, interpretation of data, revising it critically, final approval of the manuscript

Acknowledgements

We would like to thank the participants of the quantitative study for their valuable time and willingness to participate in this study and the periodontists who participated in the qualitative interviews and encouraged further clarifications of the new classification of periodontal diseases published in 2017.

References:

1. Sanz M, D'Aiuto F, Deanfield J, Fernandez-Aviles F. European workshop in periodontal health and cardiovascular disease--scientific evidence on the association between periodontal and cardiovascular diseases: a review of the literature. *European Heart Journal Supplements*. 2010;12(Suppl B):B3-B12. doi:10.1093/eurheartj/suq003
2. Zardawi F, Gul S, Abdulkareem A, Sha A, Yates J. Association Between Periodontal Disease and Atherosclerotic Cardiovascular Diseases: Revisited. *Front Cardiovasc Med*. 2021;7. doi:10.3389/fcvm.2020.625579
3. Casanova L, Hughes FJ, Preshaw PM. Diabetes and periodontal disease: a two-way relationship. *Br Dent J*. 2014;217(8):433-437. doi:10.1038/sj.bdj.2014.907
4. Armitage GC. Development of a Classification System for Periodontal Diseases and Conditions. *Ann Periodontol*. 1999;4(1):1-6. doi:10.1902/annals.1999.4.1.1
5. Armitage GC. Classifying periodontal diseases – a long-standing dilemma. *Periodontol 2000*. 2002;30(1):9-23. doi:10.1034/j.1600-0757.2002.03002.x
6. Babay N, Alshehri F, Al Rowis R. Majors highlights of the new 2017 classification of periodontal and peri-implant diseases and conditions. *Saudi Dent J*. 2019;31(3):303-305. doi:10.1016/j.sdentj.2019.04.006
7. Caton JG. Preface. *Ann Periodontol*. 1999;4(1). doi:10.1902/annals.1999.4.1.i
8. Lane BA, Luepke P, Chaves E, et al. Assessment of the Calibration of Periodontal Diagnosis and Treatment Planning Among Dental Students at Three Dental Schools. *J Dent Educ*. 2015;79(1):16-24. doi:10.1002/j.0022-0337.2015.79.1.tb05852.x
9. Armitage GC. Development of a Classification System for Periodontal Diseases and Conditions. *Ann Periodontol*. 1999;4(1):1-6. doi:10.1902/annals.1999.4.1.1

10. Hefti AF, Preshaw PM. Examiner alignment and assessment in clinical periodontal research. *Periodontol 2000*. 2012;59(1):41-60. doi:10.1111/j.1600-0757.2011.00436.x
11. Borrell LN, Papapanou PN. Analytical epidemiology of periodontitis. *J Clin Periodontol*. 2005;32(s6):132-158. doi:10.1111/j.1600-051X.2005.00799.x
12. Page RC, Eke PI. Case Definitions for Use in Population-Based Surveillance of Periodontitis. *J Periodontol*. 2007;78(7S):1387-1399. doi:10.1902/jop.2007.060264
13. Graetz C, Mann L, Krois J, et al. Comparison of periodontitis patients' classification in the 2018 versus 1999 classification. *J Clin Periodontol*. 2019;46(9):908-917. doi:10.1111/jcpe.13157
14. Ortigara GB, Mário Ferreira T de G, Tatsch KF, et al. The 2018 EFP/AAP periodontitis case classification demonstrates high agreement with the 2012 CDC/AAP criteria. *J Clin Periodontol*. 2021;48(7):886-895. doi:10.1111/jcpe.13462
15. Alawaji YN, Alshammari A, Mostafa N, Carvalho RM, Aleksejuniene J. Periodontal disease prevalence, extent, and risk associations in untreated individuals. *Clin Exp Dent Res*. 2022;8(1):380-394. doi:10.1002/cre2.526
16. Brito LF, Taboza ZA, Silveira VR, Teixeira AK, Rego RO. Diagnostic accuracy of severe periodontitis case definitions: Comparison of the CDC/AAP, EFP/AAP, and CPI criteria. *J Periodontol*. 2022;93(6):867-876. doi:10.1002/JPER.21-0365
17. Mishra R, Chandrashekar K, Tripathi V, Trivedi A, Daryani H, Hazari A. Analysis of curtailing prevalence estimates of periodontitis post the new classification scheme: A cross-sectional study. *J Indian Soc Periodontol*. 2019;23(6):569. doi:10.4103/jisp.jisp_57_19
18. Morales A, Strauss FJ, Hämmerle CHF, et al. Performance of the 2017 AAP/EFP case definition compared with the CDC/AAP definition in population-based studies. *J Periodontol*. 2022;93(7):1003-1013. doi:10.1002/JPER.21-0276

19. Marini L, Tonetti MS, Nibali L, et al. The staging and grading system in defining periodontitis cases: consistency and accuracy amongst periodontal experts, general dentists and undergraduate students. *J Clin Periodontol.* 2021;48(2):205-215. doi:10.1111/jcpe.13406
20. Sanz M, Papapanou PN, Tonetti MS, Greenwell H, Kornman K. Guest Editorial: Clarifications on the use of the new classification of periodontitis. *J Clin Periodontol.* 2020;47(6):658-659. doi:10.1111/jcpe.13286
21. Sanz M, Herrera D, Kebschull M, et al. Treatment of stage I–III periodontitis—The EFP S3 level clinical practice guideline. *J Clin Periodontol.* 2020;47(S22):4-60. doi:10.1111/jcpe.13290
22. Ravidà A, Travan S, Saleh MHA, et al. Agreement among international periodontal experts using the 2017 World Workshop classification of periodontitis. *J Periodontol.* 2021;92(12):1675-1686. doi:10.1002/JPER.20-0825
23. Lane BA, Luepke P, Chaves E, et al. Assessment of the Calibration of Periodontal Diagnosis and Treatment Planning Among Dental Students at Three Dental Schools. *J Dent Educ.* 2015;79(1):16-24. doi:10.1002/j.0022-0337.2015.79.1.tb05852.x
24. Kornman KS, Papapanou PN. Clinical application of the new classification of periodontal diseases: Ground rules, clarifications and “gray zones.” *J Periodontol.* 2020;91(3):352-360. doi:10.1002/JPER.19-0557
25. Papapanou PN, Sanz M, Buduneli N, et al. Periodontitis: Consensus report of workgroup 2 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Clin Periodontol.* 2018;45(S20). doi:10.1111/jcpe.12946
26. Walter C, Ower P, Tank M, et al. Periodontal diagnosis in the context of the 2017 classification system of periodontal diseases and conditions: Presentation of a middle-aged patient with localised periodontitis. *Br Dent J.* 2019;226(2):98-100. doi:10.1038/sj.bdj.2019.45