



Customizing oral health instructions and motivation with the help of smart technologies

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Interproximal cleaning is an essential part of obtaining and maintaining a good oral health. The interproximal space is so critical because it forms the perfect habitat for the proliferation of bacteria, which in turn gives rise to a high incidence of caries and gingival inflammation (*).

The role of the dental hygienist is to motivate patients and instruct them on how to correctly clean and maintain the oral cavity. This can be done by providing them with information, instructions, and suggestions with regard to suitable tools (**).

As shown in various studies, the interdental brush is the ideal tool for cleaning the interproximal space (***). Other studies show that a sonic toothbrush removes more plaque than a manual toothbrush (****). From this, it follows that the personalization and customization of professional oral hygiene treatments will be fundamental to the creation of patient compliance.

**How to make patients understand which interdental brush size to use?
How to make patients understand which areas are showing signs of inflammation, while offering them a simple and understandable assessment that they can use to monitor their oral health situation?**

The BOB app functions as a motivational tool that can be used to customize a professional hygiene treatment. Patients are also actively involved throughout the process by compiling data within the application, using a relatively simple and very interactive interface.

The BOB app provides a mouth map, indicating the recommended interdental brush size for each interdental space and highlighting the presence - or absence - of areas of inflammation, which manifest itself through gingival bleeding after using the interdental brush.

It also generates a value, which is known as the "bleeding on interdental brushing score", or, in short, the BOB score. Furthermore, the app inserts the BOB score into a graph, allowing for an evaluation of results over time when future BOB scores are added as well. This way, it becomes an effective monitoring tool.

How to improve the disintegration process of bacterial plaque? How does the sonic toothbrush help patients in controlling the biofilm? The hydrodynamic flow is generated by water, toothpaste and saliva. The use of the sonic toothbrush is simple as it doesn't require patients to execute a particularly demanding technique.

Materials and methods

BOB is an acronym of Bleeding On Brushing, as derived from the Bleeding On Interdental Brushing index (BOIB) (*****). This index is based on bleeding triggered by the use of an interdental brush. With the help of the IAP probe (Interdental Access Probe), the correct size for the interdental brush can be determined.

This process is facilitated through the use of a probe with stripes in different colours that match with the corresponding interdental brush size. The use of the probe therefore facilitates the correct determination of interdental brush size (*****).

After choosing the correct size, the next step is to perform the bleeding index using the bleeding on interdental brushing technique as follows. Insert an interdental brush of the correct size into the interdental space and complete a sextant, then wait 30 seconds before entering bleeding data in the app.

The BOB index is calculated and placed into one of four categories of inflammation: no inflammation; mild inflammation; moderate inflammation; and severe inflammation. The inflammation index is completed with a photo taken immediately after completing the bleeding index assessment, which will then be inserted in a final evaluation overview/graph. This way, the application establishes the initial state of oral health and then monitors the situation over time by entering new data collected during follow-up visits and check-ups. The software guides the professional through the simple compilation procedure.

The sonic toothbrush "Hydrosonic" from Curaprox has seven different cleaning modes, starting from 22.000 to 42.000 side by side movements per minute with different amplitudes. It comes with two drop-shaped brush heads and one single brush for precision cleaning of gingival sulcus, implants and hard to reach areas. Bristle motions at a high frequency generate turbulent fluid flows, thanks to the presence of water, toothpaste and saliva in the oral cavity. The hydrodynamic forces disrupt the bacterial plaque. In vitro study shows plaque reduction for non-contact brushing with sonic powered toothbrushes(*****) and clinical studies shows improvement in probing attachments levels of periodontal pockets(*****)

Case Study

A case study of a middle-aged female patient in good systemic health.

The patient presents itself at the dental office after 10 years of absence, complaining about pain around implants present in the first sextant. The patient reports brushing her teeth twice a day using a manual toothbrush and claims to have somewhat neglected herself during the last few years due to family problems. By carefully observing the anatomical and tissue characteristics of the oral cavity and the inter-proximal spaces, evidence was found of bacterial biofilm and generalized tartar was noticed supra, as well as sub-gingival. Furthermore, there was a high prevalence of accumulation in the inter-proximal spaces (**Fig1**).

The BOB app dental mouth map was then filled out, indicating missing teeth and presence of crowns and implants. For each inter-proximal space, the correct tool was determined - brushes, dental floss, or others. In this case, it was decided to only let the patient use interdental brushes.



Fig.1

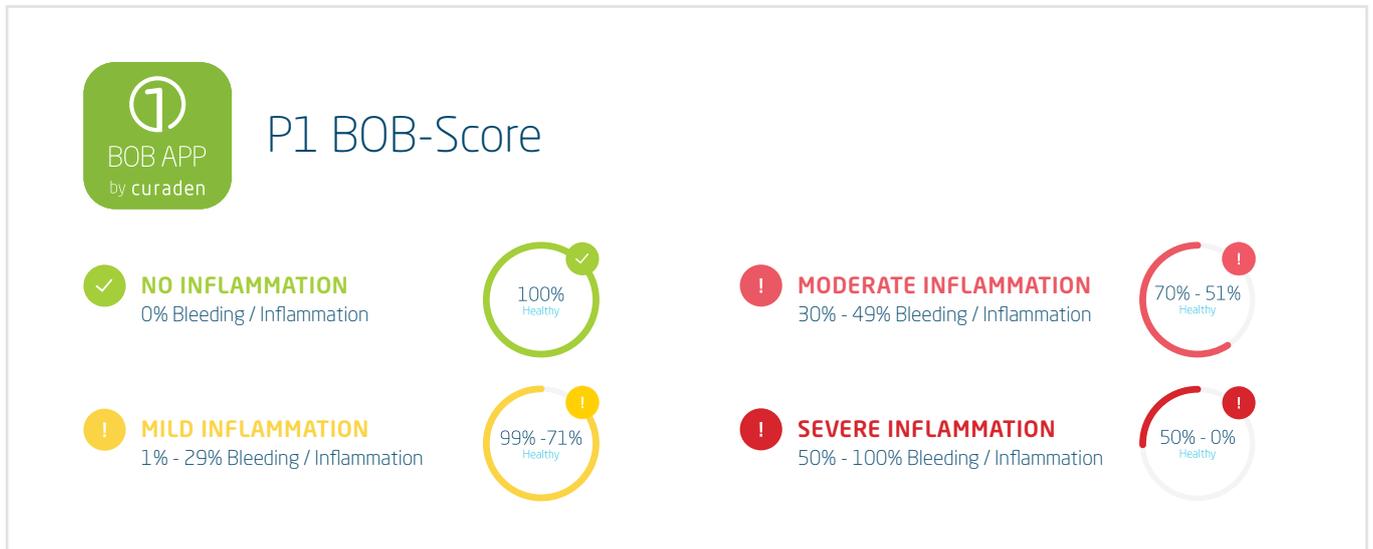


Fig.2

The determination of the correct brush size was facilitated by the IAP biometric probe (**Fig2**).

The choice of brush size is very important: when the interdental brush is too small, it can be ineffective in combating inflammation. Selecting a size that is too large, on the other hand, can damage the tissue. The interdental brushes that are compatible with the BOB app (Curaprox Prime and Perio) are categorized by color and size. There are a total of nine sizes, each with a corresponding color (**Fig2**).



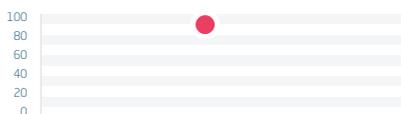
Fig.3

The procedure then continued with the BOIB method (Fig3). After indicating the recommended size and tracking the bleeding triggered by the use of the interdental brush, the BOB app requested to take a photograph. Afterwards, the patient was invited to click on the "finished" button. Then, the application automatically provided a percentage of inter-proximal inflammation (BOB score), together with an overview and a mouth map that indicates and visualizes the corresponding interdental brush size with a colored dot on the outside of the dental arch. Similarly, the presence of inflammation is illustrated with a red dot in-between the teeth. There is also a dedicated field for the professional to write a personal note for the patient.

All of this will be sent to the patient by e-mail upon closing the patients folder (Fig4).

The final BOB-score was shared with the patient. In this case, the initial result was a score of 92% - indicating that almost all of the interproximal spaces had a bleeding reaction within 30 seconds after using the interdental brush. Using the mouth map as shown in the application, personalized instructions as well as some motivation for the correct use of the interdental brushes was provided. This map is also a great help for the patient as it serves as a visual guide that they can follow at home. The recommended interdental brush sizes were CPS light blue 06 and CPS yellow 09.

The oral cavity was decontaminated with an EMS ultrasound instrument and a scaler was also used for the fifth sextant. The appointment ended by advising the patient to use an enzymatic toothpaste (Curaprox Enzykal 1450ppm) and by setting a date for a new appointment.



P1 - Dental Folder

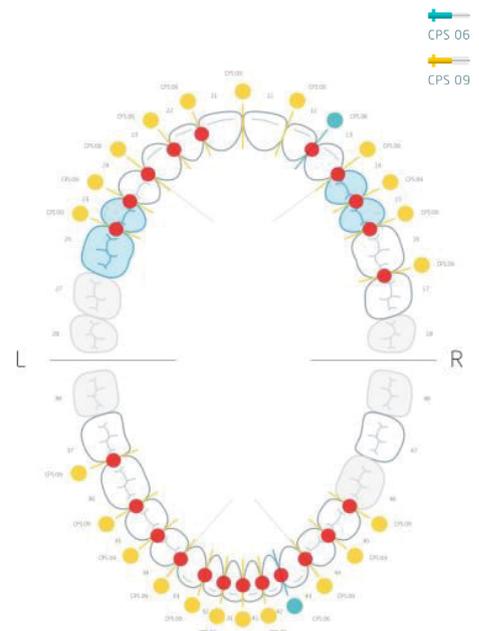


Fig.4

At the follow-up appointment after 2.5 weeks, the BOB app was once again used to record the bleeding triggered by the interdental brushes. This way, a new BOB score was calculated, showing the patient's commitment to using the indicated interdental brushes. In this case, inflammation had significantly decreased to a BOB percentage of 17%. This is indicative of a compliant patient. Thanks to the improved oral health, combined with the reduced inflammation, the gingival papillae were also less swollen. Based on the new interproximal tissue widths, CPS 09 was replaced by CPS 011 and CPS 06 was maintained (Fig5).

The new results were shared with the patient; she was encouraged to use the new sizes and instructed on how to use them. As the patient had by now created a new daily habit of using the interdental brush, she was ready to receive instructions on how to improve her plaque control. Proceeding with a plaque detector, the presence of bacterial biofilm was detected and visually shared with patient (Fig6).

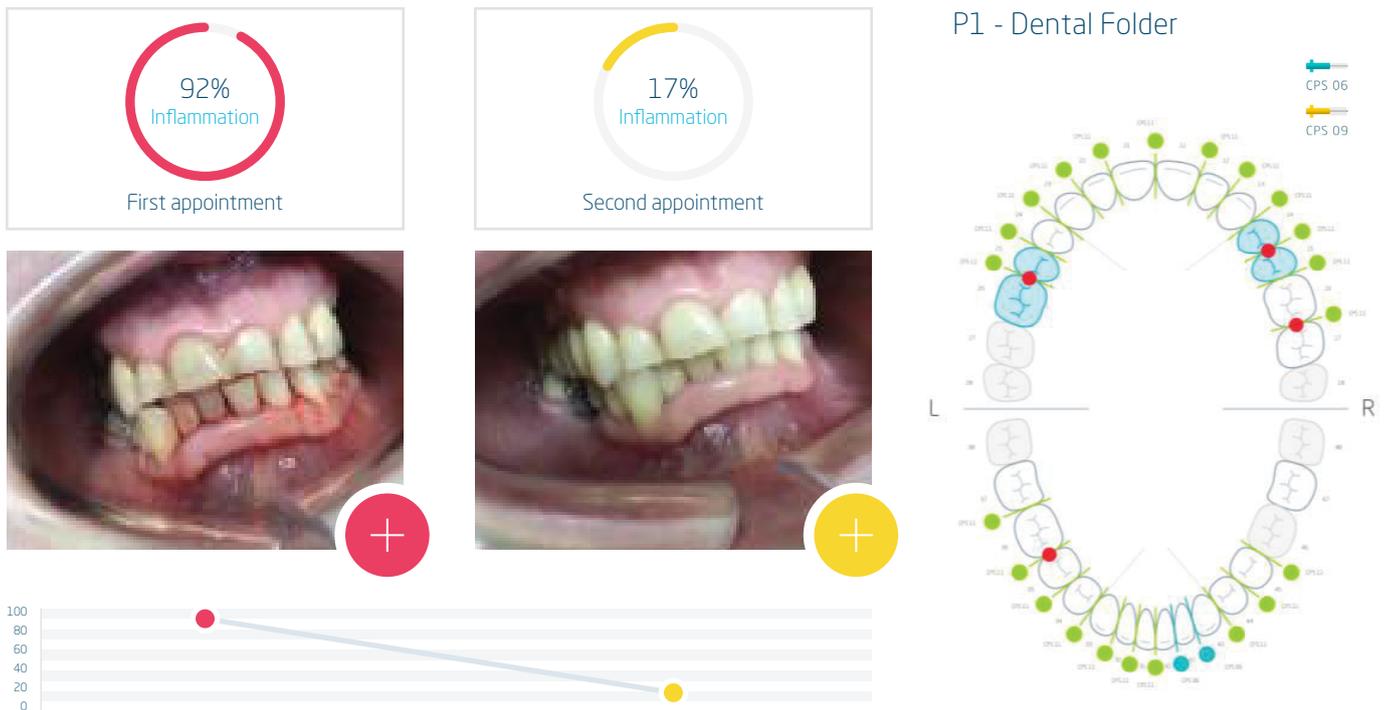


Fig.5



Fig.6

The patient was instructed to brush with the Curaprox Sonic toothbrush Hydrosonic Pro, using the drop shaped and single brush heads (Fig7). The appointment concluded with a decontamination procedure of the oral cavity with EMS and special manual instrumentation and Airflow. A new follow-up appointment was made.



Fig.7

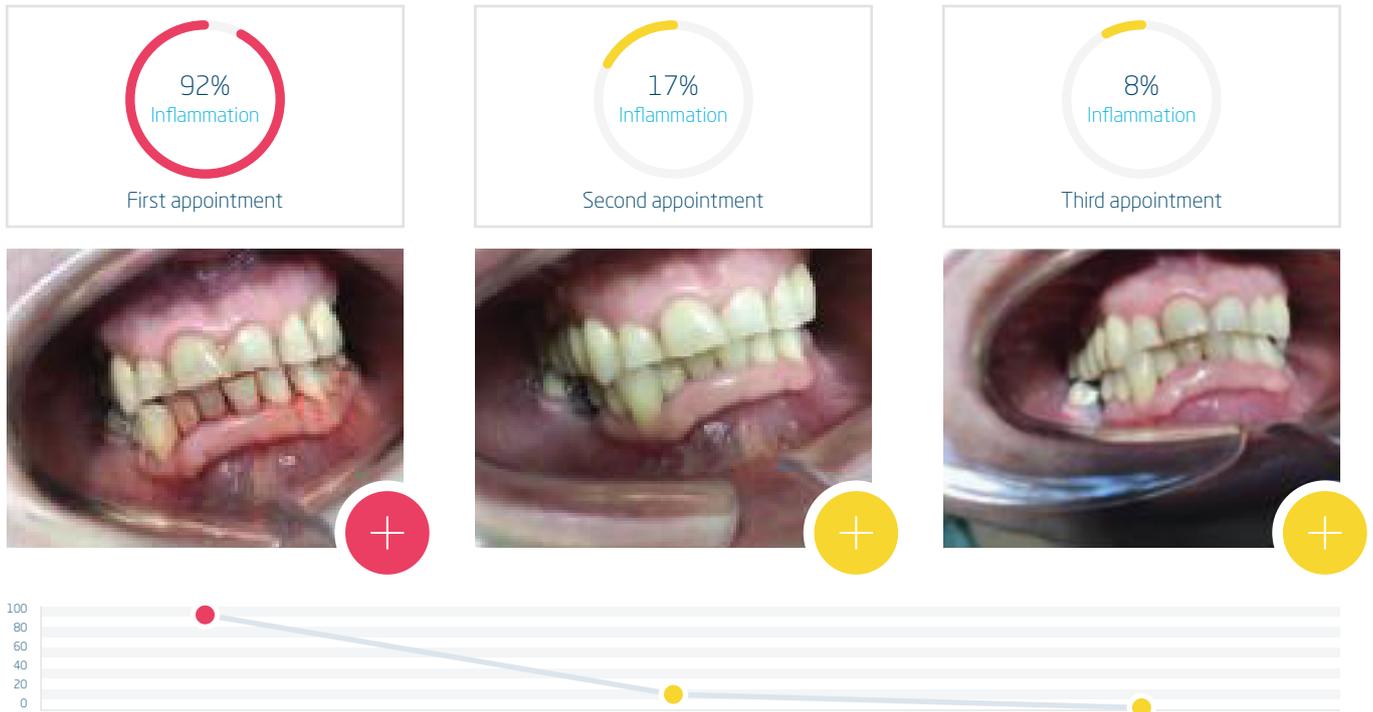


Fig.8

At the follow-up appointment after fourteen days, a new BOB score was performed. This showed further improvement of the inter-proximal inflammation, which was now at 8%. Based on the new tissue width, the measurements of the brushes were once again calibrated and determined to be CPS 011 Prime and CPS 405 Perio (Fig8).

The new results were shared with the patient, who was once again encouraged to use the recommended new sizes and instructed on how to use them. Proceeding with the plaque detector (Fig9) still indicated the presence of too much plaque, especially in and around the implants. The patient was re-instructed on the use of the Curaprox Hydrosonic Pro toothbrush. The oral cavity was decontaminated with special manual instruments and Airflow. A new follow-up appointment was made.

P1 - Dental Folder

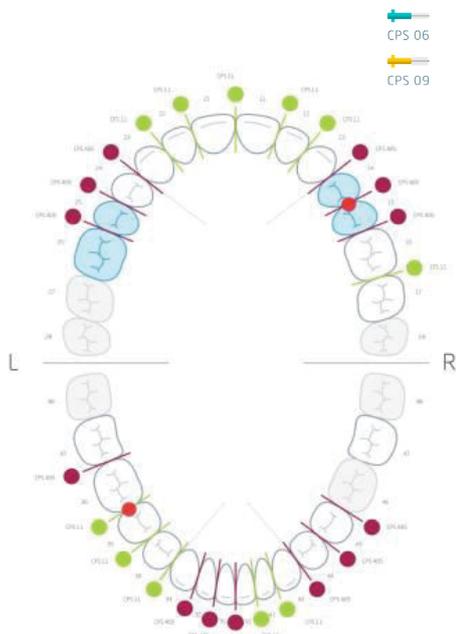


Fig.9

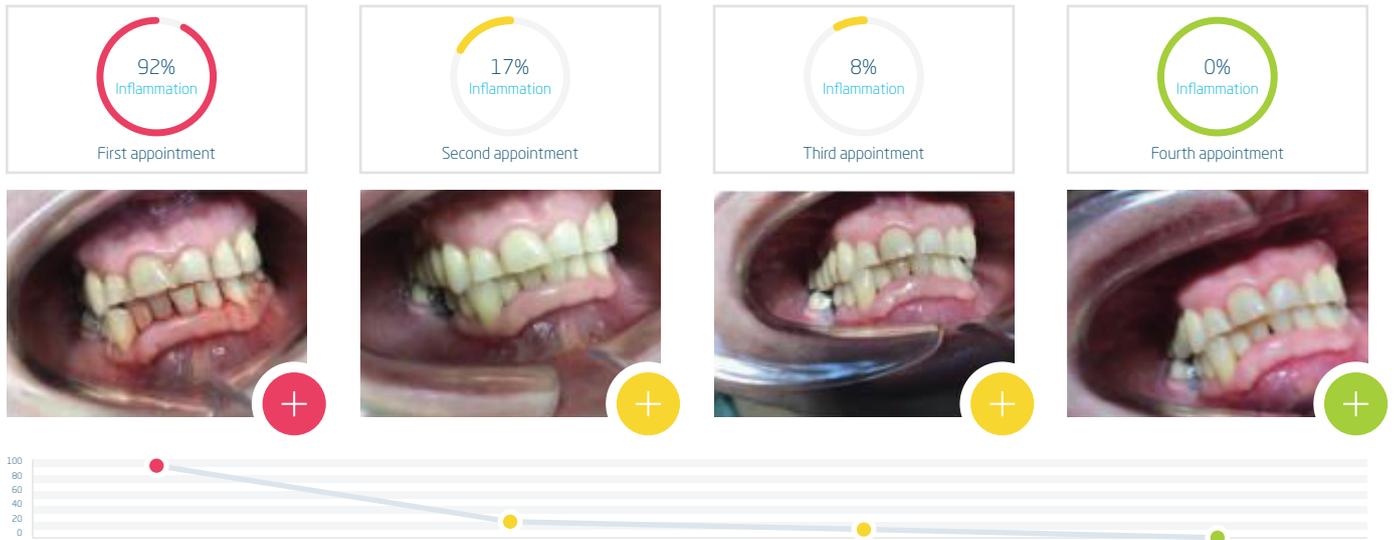
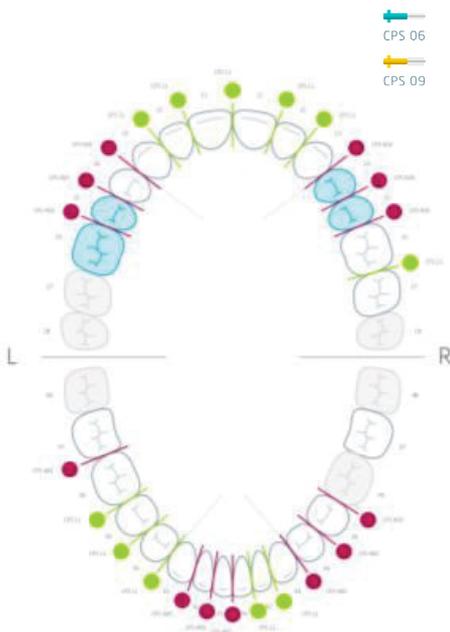


Fig.10

P1 - Dental Folder



The BOB score results as obtained through the BOB app and an adequate control of the bacterial plaque using the Hydrosonic toothbrush allowed the patient to understand the importance of correctly cleaning and maintaining the oral cavity using personalized tools - that are suitable for the patient's dexterity and lifestyle.

At the fourth session, after four weeks, the updated BOB-score gave the perfect result of 0% interstitial inflammation (Fig10). The sizes of the interdental brushes were still adequate and therefore remained unchanged. Proceeding with the plaque detection, it was clear that there was now adequate plaque control through the correct and constant use of the Hydrosonic Pro toothbrush (Fig11).



Fig.11

Conclusion

A personalized approach and communication of the dental professional with the patient can significantly improve the patient's oral hygiene compliance as practiced at home. Selecting suitable personalized tools in addition to the use of the monitoring tool and the provision of visual support as offered by the BOB app, both in the practice and at home, has positively contributed to the patient's motivation and oral health awareness.

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