

**EFP INNOVATION AWARD 2022**



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## Need

Until now, in dentistry, curative care has received the most attention. However, the cause of the condition and the outcome of treatment depend to a large extent on the patient's behaviour. Dental Coach is a dental e-health prevention programme with an app that focuses entirely on behavioural change and prevention in all its facets. The programme gives both the dental care provider and the patient a completely new opportunity for obtaining and maintaining a behavioural change in oral care. The programme focuses entirely on prevention (primary and tertiary) in all its facets. Dental Coach is developed by two Dutch periodontists (L.J.M.M. Gründemann & M.G. Vroom EFP/NVvP members) and is so far available in English, German and Dutch.

The EFP has published a Perio Focus green paper (April 2017) that emphasises the need for dental prevention. Dental Coach focuses primarily on prevention using various behavioural techniques.

The World Health Organization (WHO) recently released a report/handbook because it believes it is necessary to provide governments, universities, colleges and insurers with tools on how to implement e-health/m-health. This report mentions Dental Coach. You will find the link to this WHO handbook below.

<https://www.who.int/publications-detail-redirect/9789240035225>

## Aim

### 1. Innovation for the Public

The Dental Coach **app** provides a new opportunity to stimulate behavioural change in patients by using various behavioural intervention techniques from health care. The use of Dental Coach responds to primary and tertiary prevention, resulting in an improvement in oral health.

### 2. Innovation for the dentist

The Dental Coach e-health **prevention programme** supports the dentist in many facets with regard to behavioural changes and prevention in patients. The use of Dental Coach responds to primary and tertiary prevention, resulting in an improvement in oral health.

### 3. Innovation for periodontal research

Dental Coach opens a new area for research in the field of e-health/behavioural change in dentistry. Consider in this respect the effectiveness of e-health in dentistry and in which disciplines it is best deployed. Whether the application of e-health in healthcare requires new behavioural techniques can also be investigated.

### 4. Innovation for Universities (Dental education)

Teaching dental students the usage of e-health and making them aware of its possibilities.

## The market

The market today offers mainly non-personalised brushing apps that focus on one item and are made for only adults or children. Other (brushing) apps are mainly used as advertisement or selling platforms and are limited to certain brands. Some apps are self-diagnosing or planning apps related to oral health.

There are several advantages of Dental Coach compared with other apps. Some of these are:

1. Individually adjustable settings to create a unique patient dental profile for each patient, so truly personalised dentistry.
2. A focus on all facets of prevention.
3. An open platform and not limited to a single brand.
4. The oral health provider and patient can both apply input in the Dental Coach that becomes visible for both (e-health both ways).
5. Option of teledentistry.
6. The application of motivation interviewing techniques.
7. Informs the patient about their personal oral health status.
8. Personalised motivational messages.
9. Implant passport.
10. Developed by dental carers for dental carers.
11. Dental Coach offers a complete prevention package so there is no need for the dentist to use various other dental apps.
12. Uniformity: all users have the same information, same tools.
13. When the patient moves to another place or to another health provider, which also uses the Dental Coach programme, the new health provider instantly has a complete insight into the oral hygiene status, measures, motivation, and risk profile of the patient.

### **Presentation of the idea**

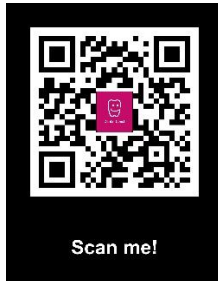
The idea is that essentially most dental problems are caused by an inadequate oral hygiene and nutrition. In short, an unhealthy oral care behaviour. If we want to get and keep the mouth healthy, we will have to focus on changing the patient's behaviour. Until now, motivating the patient has been limited to advices and treatments at the dental care provider's chair / office. After that, the patient is more or less left to his own and will have to practice at home. Dental Coach systematically supports the dental care provider with a whole range of (extra) options to influence the patient's behaviour and supports the patient where he needs it most, namely when he is out of the dental office and at home. Dental Coach is purely focused on behavioural change and is an instrument for both the dental care provider and the patient. Dental Coach consists of two parts. 1) The Dental Coach programme for the healthcare provider's computer and 2) the Dental Coach app on the patient's smartphone. These two parts are linked when the patient scans the unique practise QR code. The healthcare provider can enter individual patient related information into his Dental Coach programme in a dashboard on his computer. The patient can see this personalised dental information on his smartphone. On his turn, the patient can enter information on his smartphone in the Dental Coach app which the healthcare provider can see in the dashboard on the computer in the dental office.

*Scan the following QR-code to watch the presentation of the idea.*



A number of pilot studies have been carried out by Utrecht University of Applied Sciences and the Nijmegen Faculty of Dentistry. You can view the original studies by scanning the QR code. At the end of this document you will find the English summaries of these studies. See attachment for a summary of various scientific pilot studies (English).

For the full articles, scan the following QR codes



Dutch



English



Dutch

There is a Dental Coach website for patients and dental care providers where information is available. [www.dentalcoach.app](http://www.dentalcoach.app) (Dutch and English versions)

### **Business plan**

Dental Coach is already launched and on the market. There is a need to increase the awareness of Dental Coach and additional finances to expand the programme.

So far, promotion has been done on a low-profile scale by attending dental meetings and giving presentations. We are in consultation with universities about the possibilities of implementing Dental Coach in the dental curriculum. The Dental Coach programme is being continuously expanded with additional features.

For dental professionals and the public, there is a need to increase the awareness of Dental Coach and its possibilities. The aim is to introduce Dental Coach as part of the dental education in universities and making universities and students aware of e-health possibilities, while also making the future dental healthcare providers acquainted with Dental Coach and improving the chance they will use it in their future practice. As a result, the public will get to know Dental Coach.

Costs: Patients can use the Dental Coach app free of charge. The dental health provider pays subscription costs. This depends on the number of dental chairs in a practice and can vary between 20 to 35 euros per month.

Market size: Nearly 448 million people live in Europe and there are 273,280 dentists (excluding dental hygienists). So there is a large market for using the Dental Coach programme.

So far, the Dental Coach project does not cover the costs, so there is a need for additional financing. To protect the original idea and the Dental Coach project, there is a patent pending on the e-health prevention programme/app.

## A summary of various scientific (pilot) studies (English).

### **Dental Coach application: *Substantiated advice concerns good self-care in patients with gingivitis***

Maryam Latifi & Nurbanu Yurttagul 21 June 2019 Dental Hygiene, Hogeschool Utrecht

#### Summary

**Aim:** The goal of this research is to gain knowledge and an insight into the effectiveness of the Dental Coach eHealth app for the reduction of plaque and bleeding. In addition, self-reported oral care behaviour, the need for an information channel and the experiences of patients with gingivitis are evaluated.

**Methods:** Participants over the age of 18 participated in this pilot study. This research is quantitative and comparative in nature and has a pre-experimental design. The study covers a period of two weeks, consisting of a baseline measurement and a post-measurement. In this study, participants were asked to complete oral hygiene questionnaires and a user-friendliness questionnaire. The Plaque Control Record (PCR) and Bleeding On Marginal Probing (BOMP) were used for the clinical tests. The results were processed with SPSS-24 using the Wilcoxon signed-rank test. Prior to the measurements, the researcher performed an intra-rater reliability test. The results are found to be significant at a P-value of  $\leq 0.05$ .

**Results:** Twenty-five participants were examined using the PCR, BOMP and the questionnaires. The intra-rater reliability showed a level of agreement of 0.692. All participants completed the study. The results of the questionnaires showed that the app users found the app to be effective and that during the research period, there was a significant increase in oral care ( $P = \leq 0.001$ ), along with changes in the need for information channels.

**Conclusion:** Based on the research, it can be tentatively concluded that the Dental Coach app has an influence on bleeding and plaque, with highly rated user-friendliness and a favourable change in information channel choice and self-reported oral care behaviour. A follow-up study should be conducted to find out whether the app actually has an effect on oral health.

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### Pilot Study 2

#### **Dental Coach: *Substantiated advice on improving oral hygiene behaviour by means of push notifications in patients with gingivitis***

Dental Hygiene Hogeschool Utrecht 15 January 2020 Hafsa Ben Allouch & Zayema Kakar.

#### Resume

**Aim:** The aim of this practice-oriented research is to gain knowledge and insight into the effectiveness of the use of the mobile application Dental Coach with the aim of improving oral hygiene in patients with gingivitis by sending daily push messages. In addition, the

experiences of the participants about the functionality of push messages of the application were evaluated by completing the survey.

**Methods:** The purely experimental design consisted of an exploratory study. It was a 2-week, randomized and single blinded study. Forty participants aged 18 years and older with pre-existing gingivitis participated in this quantitative study. Both the control group and the experimental group used the Dental Coach app for 2 weeks, but only the experimental group received push messages for two weeks to remind them about cleaning the teeth. Pre- and post-measurements were carried out in both groups. The measurements were carried out with the measuring instruments the Plaque Control Record (PCR) and the Bleeding on Marginal Probing (BOMP). In addition, a satisfaction questionnaire about the application Dental Coach was completed by both groups. During this study, the Wilcoxon signed rank test and the Mann Whitney U test were used to analyse data. These results have been processed with SPSS-24 program. The results are found to be significant at a P value of  $\leq 0.05$ . Prior to the investigation, the investigator conducted an intra-observer reliability test, and the agreements were validated with Fleiss-Kappa.

**Result:** A total of 37 participants with gingivitis completed the two-week study. The result of the intra-observer reliability test shows that an outcome of 0.896 is "almost perfect". There is a clear significant difference ( $P = <0.001$ ) in improvement of PCR and BOMP during the T2 measurement when using the Dental Coach application with receiving daily push messages in the experimental group. By means of the satisfaction survey, it can be traced that the participants experienced the use of the Dental Coach application with receiving daily reminders by means of push messages as positive. This can also contribute to improving oral health.

**Conclusion:** Based on the results of this study, it can be concluded that the use of daily push messages from the Dental Coach application shows to be effective in reducing bleeding and plaque in patients with gingivitis ( $P <0.001$ ).

## 5. Conclusion

The above problem statement has been examined and answered on the basis of the four sub-questions drawn up:

1. What is the effect of daily motivational push messages from the application Dental Coach on plaque retention in gingivitis patients? A significant difference with a p-value of  $<0.001$  has been observed in the effect of daily push messages from the Dental Coach application on plaque retention in gingivitis patients.

2. What is the effect of daily motivational push messages from the Dental Coach application on the bleeding score in gingivitis patients? A significant difference with a p-value of  $<0.001$  has been observed in the effect of daily push messages from the application Dental Coach on the bleeding score in gingivitis patients.

3. What effect does daily motivational push messages have on the motivation of the participants to improve oral hygiene? The results of the satisfaction survey show that the push messages had added value in motivating and improving oral hygiene.

4. What are the user experiences of the participants who received push messages from the Dental Coach application? The participants were very positive about receiving the push messages. They found the installation and use of the push messages motivating and easy to use. The majority of participants plan to use the application for at least another 4 weeks.

This quantitative practice-oriented research focused on the following problem statement: What is the effect of using the Dental Coach application with daily push messages, compared to using the Dental Coach application without daily push messages to improve oral hygiene in gingivitis patients? and how is this experienced?

On the basis of the elaboration of the research questions, it can be concluded that there is a significant difference between the results of the variables BOMP and PCR. There is clearly promising improvement in the reduction of plaque and bleeding when using the Dental Coach application with the push message's function compared to the use of the Dental Coach application without the push messages function ( $P < 0.001$ ). As a result, the push notification's function can be recommended in addition to the usual information and instruction. By applying this advice, behavioural change with regard to improving self-care can be stimulated. The surveys also show that the participants experience the Dental Coach application as a positive and informative application. Finally, the experimental group was very pleased with the push message's function and would like to recommend this to others in the future.

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### **Study 3**

***The perspectives of dental professionals and students on general eHealth and oral health prevention applications What are the perspectives of dental professionals and students on general eHealth and oral health preventive applications?***

A quantitative study Author: Danique Dinjens, S4561090 Supervisor: Dr. Cees Kreulen Field of Interest: eHealth Blok M3We1s Tandheelkunde Radboud UMC, Nijmegen  
Summary Thesis

Currently, there is not much known on the perspectives of dental professionals and students on eHealth in dentistry. The aim of this study is to research the current perspectives of dentists, dental hygienists, dentistry students and dental hygiene students on (1) eHealth in general and on (2) oral health preventive applications. The thesis statement belonging to this study is: What are the perspectives of dental professionals and students on general eHealth and oral health preventive applications? To answer the thesis statement the following hypotheses were formulated:

H1) The majority (>50%) of dental professionals and students do believe that eHealth can be of use in dentistry;

H2) The majority (>50%) of dental professionals and students are of opinion that patients will be likely to misunderstand information that they obtain online;

H3) The majority (>50%) of dental professionals and students do believe that an application can be of use in dentistry;

H4) The majority (>50%) of dental professionals and students are unfamiliar with dental applications.

This study made use of a three-parted questionnaire and a corresponding walk-through of a preventive oral health application. The questionnaire covered questions on general eHealth, eHealth applications (**Dental Coach**) and the eHealth literacy score (eHeals).

The majority of the participants do see the possible added value of eHealth and would like to work with it. Furthermore, the majority of the participants are of opinion that patients are likely to misunderstand the information which can be obtained online. Unfortunately, the dental experts and students are still very unfamiliar with the different possibilities which eHealth can offer. Dental professionals and students rarely make use of eHealth even though they believe that eHealth can higher the effectiveness of preventive instructions.