

EDITORIAL



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Utilizing technology to enhance compliance and oral health.

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Treatment of caries, periodontal disease and dental trauma is only successful if the patient is compliant with home care and regular dental visits [1-3]. Relapse, recurrence and further progression of disease can occur if oral health compliance is neglected. The consequences of disease progression might include tooth loss, reduced chewing ability, unfavorable esthetics and reduced quality of life [4]. Thus, compliance plays an utmost important role in dental treatment and oral health. The issue of compliance can also be seen in other healthcare fields. Brown et al reported that patient nonadherence to medications occurs 50% of the time [5]. The lack of compliance is associated with increased hospitalizations, health care burden, post-operative pain, and mortality [6]. There is a need to explore additional methods to increase patient participation in the treatment of their acute or chronic conditions. In the field of physical therapy, for instance, long-term exercise plays a significant role in improvement and recovery of function [7]. The lack of compliance to home-based exercise programs will have a negative effect on the patient's health and fitness. As health care professionals, it is our responsibility to educate and provide our patients with resources to help achieve the desired treatment outcomes. The use of technology has been proven to be an advantageous resource in medication adherence [8-10]. The reported success can be used as an example for oral health care compliance enhancement.

Enhancing oral health for better overall health

Oral diseases can influence a patient's overall health and poor oral health was found to be related to many systemic diseases and

conditions (Figure 1). For example, it is well documented that periodontal disease has an association with diabetes [11, 12]. Prevention and treatment of periodontitis can improve glycemic control in type II diabetic patients [12]. On the other hand, lack of periodontal care leads to poor glycemic control and can contribute to diabetic complications. Another association made to periodontitis is cardiovascular disease [13]. The bacteria involved in periodontitis can enter the blood stream and increase risks for future cardiovascular events [14].

From the accumulation of data regarding the oral-systemic connections it is now clear that patients' compliance to home care measures not only affects their own oral health, but also profoundly influences their general overall health and wellbeing. This can also affect pediatric patients' risk of early childhood caries [15]. Another aspect of the perio-systemic relationship is pregnancy outcomes. Pregnancy brings about major physiologic changes to the body. The oral cavity should not be ignored and pregnant patients should continue to present for recall appointments [16, 17]. Timing is critical and compliance with regular dental visits plays a significant role. From these examples, and many more, it is clear that the importance of oral health education and compliance is vital, not only for dental integrity, but also for patients' overall wellbeing.

Technological advancements can serve as valuable tools to enhance compliance and awareness of patients in order to improve treatment outcomes and oral health. Few examples of the utilization of technology for education and improved compliance are presented here.

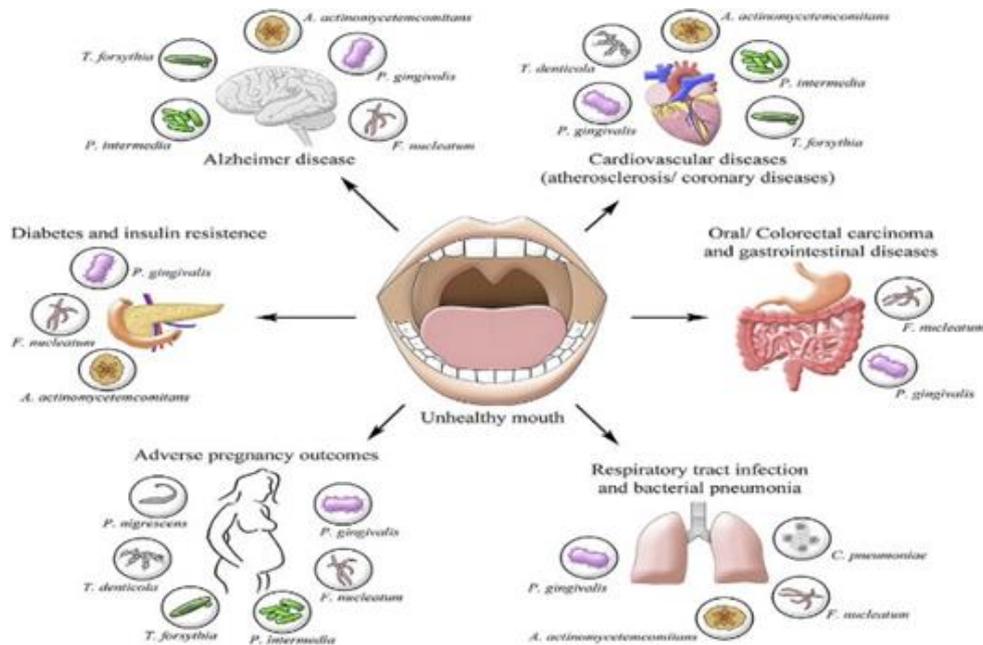


Figure 1. The various studied relationships between oral and systemic diseases. Reproduced with permission from Bui FQ, Almeida-da-Silva CLC, Huynh B, Trinh A, Liu J, Woodward J, Asadi H, Ojcius DM.

Association between periodontal pathogens and systemic disease. Biomed J. 2019 Feb;42(1):27-35. doi: 10.1016/j.bj.2018.12.001.

Dental trauma emergency management interactive guide

In recent years, phone applications relating to dental care have been released for use by the public. One example is the ToothSOS app that was created by the International Association of Dental Traumatology as a free service to provide information on emergency

management and prevention of dental injuries [18]. Parents and patients can find easy to read instructions and pictures to guide them through a dental injury before visiting their dentist (Figure 2). In addition, patients have access to information about injury prevention and the types of mouthguards.

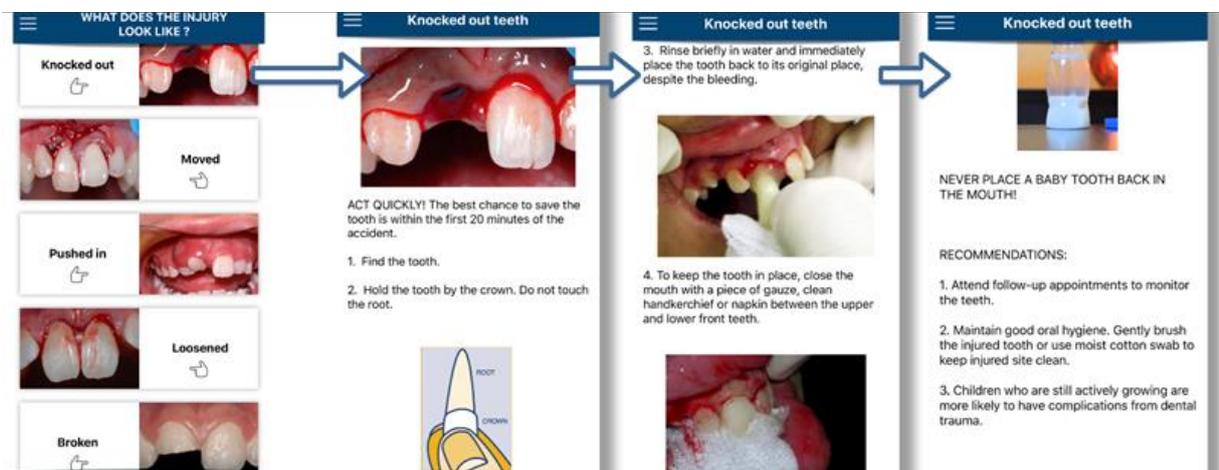


Figure 2. Tooth injury types and recommendations provided in the patient section of the free ToothSOS app developed by the International Association of Dental Traumatology (IADT).

The incidence of dental trauma occurs at higher rates amongst children and adolescents [19]. The importance of prevention and treatment of dental injuries cannot be underestimated as it has an influence on patients' future oral health [20]. The ToothSOS app has the potential to spread knowledge and improve treatment outcomes of traumatic dental injuries. Patient engagement with the app may improve compliance with dental visits and as a result, improve their overall oral health.

Better toothbrushing guided by an app

Another important example is a dental application that was released as an effort to

increase patient brushing time and efficacy. With Bluetooth connectivity to an Oscillating-Rotating Electric Toothbrush, the free application can track brushing habits and provide feedback based on recommendations by dental professionals (Figure 3). The app also includes a personalized coaching feature that allows the user to track their weekly and monthly progress. The feedback generated is individualized and targeted to improve each patient's oral hygiene status. In addition, the user has the opportunity to assess their gum health with the Gum Guard feature. It indicates where the patient is brushing harshly on the gums and tracks gum bleeding.

iO Interactivity: Daily Compliance Coaching

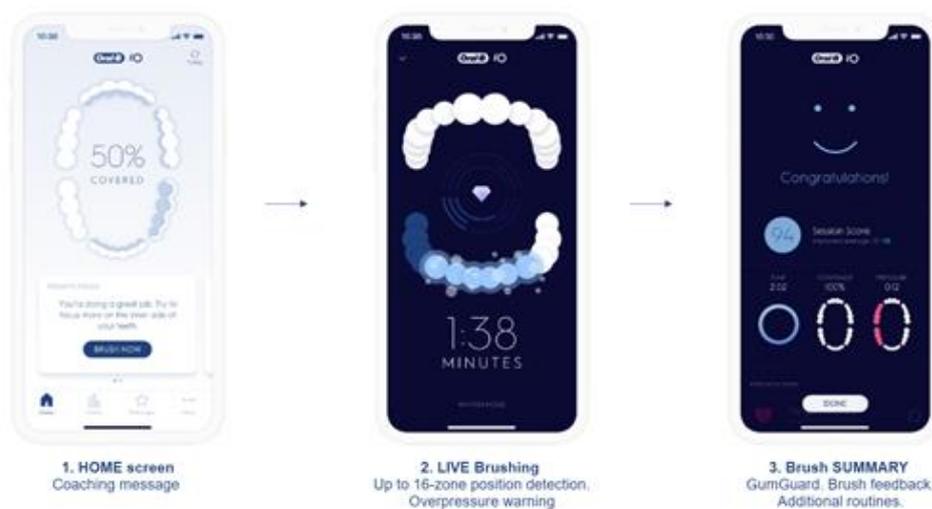


Figure 3. Coaching and feedback features of the Oral-B app connected via Bluetooth technology to the Oscillating-Rotating electric toothbrush.

Phone applications can improve patient compliance because it is convenient and most of the time, comes at no cost. The app can also provide a report to the dental professional about the recent performance of the patient with relation to home care. This can be used to facilitate conversation, enhance home care habits and overall oral health. With technology, the patient has easy access to many oral health care resources.

Social media as an educational tool

Another accessible way to share oral health information is through social media sites, such as Facebook, Instagram or TikTok (Figure 4).

It allows for wide distribution of educational resources at a low cost. Patient engagement may improve if they see their dental practitioner active on social media. The benefits of social media may include: increased patient education, increased patient compliance, improvements in overall health and better treatment outcomes [21].

On the other hand, social media does not filter false information and thus allows for the spread of "fake medical news" [22, 23]. For example, many influencers share recipes for homemade teeth whitening pastes without any evidence of their effectiveness [24].

Healthcare professionals should act to counter disinformation by sharing evidence-based facts through social media platforms [25].

If more reliable content exists on social media, then patients are less likely to come across false information.



Figure 4. Oral health education video posted on social media in order to improve communication with patients, enhance compliance and better performance of home care measures.

Teledentistry

Dental care compliance may be influenced by a number of factors, including patient motivation, financial constraints or location barriers. Teledentistry is a new development aimed to improve accessibility to dental care [26, 27]. It allows for the delivery of care to individuals who are unable to seek dental advice in-person. Virtual consultations and remote monitoring of patients are two ways in which teledentistry can be used. A dental practitioner can promote and encourage oral hygiene compliance by conducting one-on-one online sessions with their patients. This approach allows for continued care and communication with patients that have limited access to a dental clinic. Teledentistry has many advantages and will continue to grow as more and more patients turn to technology to find readily available information.

As identified by Talla et al, there are some obstacles with teledentistry [26]. Dental professionals require training prior to offering online services to their patients. In addition,

privacy and security measures must be implemented. Lastly, online services have yet to be recognized by regulatory bodies and insurance companies. The mentioned obstacles might be mitigated with a combined effort from the dental community. Using technology to advance oral health care is the way to go and teledentistry is an approach that may help get us there.

Conclusions

The advances in technology give dental practitioners the opportunity to directly reach out to a larger audience. The goal is to bring awareness to the importance of oral hygiene and improve compliance. If compliance is enhanced, the patient will likely see improvements in their oral health. In addition, better oral health will positively contribute to a patient's overall wellbeing. The use of technology in dentistry is an important tool to share reliable and well researched information with the general public.

Conflict of interest: Ms. Anahat Khehra reports no conflict of interest; Prof. Levin provides occasional lectures and consulting services to oral health companies such as Colgate, Procter & Gamble and Sunstar as well as to several implant companies. He is also currently the president-elect of the International Association of Dental Traumatology (IADT).

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