All smiles for AI: How artificial intelligence can add value to orthodontic treatment

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One of the simplest definitions of artificial intelligence (AI) is “the ability of a computer program or of a machine to ‘think and learn’” and the term is often used to “describe machines or computers that mimic ‘cognitive’ functions that humans associate with the human mind, such as ‘learning’ and ‘problem solving’.”

Although the academic discipline of AI was founded in 1956, many people still feel that AI is a vision of a distant future. In reality, of course, the everyday lives of all of us are already strongly influenced by AI-driven processes—you only have to think of such simple examples as the algorithms of Google Search and social networks, not to mention digital assistants like Siri and Alexa.

Dental practices as a natural environment for AI

The health sector overall can be considered a natural field of application for AI. Among other reasons, this is due to the sheer volume of data and knowledge that may be relevant to a diagnosis or treatment decision, possibly overwhelming the practitioner. Intelligent and self-learning software can be used profitably here. In the physical execution of treatments, which is often characterised by extremely high demands on precision, hygiene and repeatability that are difficult for humans to satisfy, sensitive and intelligent machines can be a great help too.

Dentistry is not lagging behind other medical disciplines; on the contrary, the first attempts at working with AI already took place in the 1970s and 1980s, exclusively in the field of CAD/CAM procedures for restorative and prosthetic dentistry. These are still among the most developed and adopted dental applications of AI today. Owing to the increased use of intra-oral scanners and 3D radiographic devices, large amounts of data can be collected even for a single treatment situation, making such a diagnostic and possibly also decision aid no longer just a convenient option but almost a necessity.
The clinician may perhaps already be visually overwhelmed by the analysis and evaluation of all the data, but certainly will be in time. Of course, AI can offer this kind of help, and AI always remains subordinate to the clinician in the actual decision-making process and treatment planning.

**Orthodontic clear aligners—a vanguard of AI applications**

Despite the large amounts of data that can potentially be collected, missing, incomplete or inaccurate digital data sets in today’s average dental office are still one of the main obstacles to greater and faster penetration of practice processes using AI-controlled systems. Among the most common limitations are that the history of digital data does not go back long enough or has gaps and that the data records produced by different devices are incompatible with each other.

It makes it all the more interesting, in view of such obstacles, to see applications that already today provide dental services in a coherent way using AI that were previously not feasible. Orthodontic treatments, especially of mild to moderate malocclusion, are seeing some interesting developments at the moment. In recent years, clear aligners have experienced a strong upswing. This trend could even intensify now, because the history of digital data does not go back long enough or has gaps and that the data records produced by different devices are incompatible with each other.

This trend could even intensify now, because the relative comfort of wearing such clear aligners will be complemented in the future by very user-friendly AI-controlled software, advancing the treatment experience for the patient. ClearCorrect, the Straumann Group’s aligner system, will be launched on the global market together with sophisticated software that can both process data input from the patient and are therefore increasingly in demand.

**Smart use of AI boosts patient acceptance of treatment**

This app, called DenToGo, involves patients and healthcare providers equally in several stages. At the initial Vitals Check, a first assessment of the patient’s oral situation is made in the practice. All a dentist needs is the access to DenToGo VitalsCheck on a PC to read the report and a smart phone with the DTG VitalsCheck App for the scan. Vitals Check’s feedback is given in a patient-compatible language, and therefore the qualified clinician comes into play only for the discussion about treatment options, which is obviously the part with increased added value for the practice.

The next step of the DenToGo software is MySmile, which simulates the smile with the potential appliances for orthodontic correction—metal brackets, ceramic brackets, clear aligners. Further customer can see a simulation of his future smile—like before and after. This customised preview significantly increases the conversion rate from interested candidates to patients willing to pay for treatment—thanks to Al, of course.

During the treatment phase, DenToGo’s Monitoring function ensures close-meshed care and continuous exchange of information between the practice and the patient—most of the time without a traditional practice appointment. At agreed regular intervals, the patient takes photos of his or teeth with his or her smartphone using an app and a centring device, at home or even when travelling. This data can be processed by the DenToGo practice software, and the dentist can choose whether he or she wants the built-in Al to determine the progress of the treatment and to automatically send the patient the appropriate messages. Only if the dentist deems it necessary does he or she intervene in the communication or, if necessary, have the patient invited to a practice appointment.

Even after the actual treatment is finished, this extension of the clinician’s practice to the patient’s smartphone is retained. The DenToGo Smile Guard monitors the situation after treatment and helps to prevent relapses and to check sufficient oral hygiene—while keeping the number of necessary in-practice appointments relatively low.

**Clinicians can focus on added-value activities**

This example of an already running dental application of AI shows some remarkable potential for the clinicians who use it: the comparatively closely spaced follow-up intervals generated by DenToGo ensure patients feel well taken care of, promoting above-average customer loyalty. At the same time, the dentist can allocate chair time to activities with high added value, without compromising the quality of treatment. The patient benefits as least as much from this AI-driven approach to dental treatment: he or she sees his future smile before and after. This customised preview significantly increases the conversion rate from interested candidates to patients willing to pay for treatment—thanks to Al, of course.

There is even an instant chat function integrated into DenToGo that provides automated responses to frequent individual questions and, of course, recognition of more difficult questions. For digital natives, such a chat might well be much more than just an acceptable alternative to a call to the practice; it could even be their preferred channel of communication with a healthcare provider, at least for simple and everyday concerns.

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