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Smartphones: The Future of Smart Dentistry

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Abstract

Smartphones is the new technological device that is available in more than three fourth of the population. The different use of smart phones can be considered in dentistry thereby utilizing the recent advancement. The various features in smartphones can be taken into different application levels, so that it is useful to dentist, patients and even for students. Everything is made available at fingertips in a matter of seconds with the help of smart phones. Smart phone can be used in teledentistry, clinics, photography, biomechanics, diagnosis, orthodontics, triaging emergencies, brushing evaluation, shade matching, anxiety assessment and so on. Dentistry can make use of the smartphones with various apps and features added to it day by day. Smartphone with internet has made it accessible anything at any time within seconds. The world is changing, so as the dentistry. Smartphone is thus the key for smart dentistry.

Keywords: Smartphone, Smartdentistry, Teledentistry, Photography.

INTRODUCTION

Information technology has recently been amplified in several areas, including communication, business, and education, among others, exposing these areas in completely new ways. It is also changing how healthcare is provided in a variety of ways, from self-diagnosis to consultations to improving patient autonomy and independence. Information technology has been expanded in a variety of ways, including through the usage of smartphones, mobile internet devices and proprietary software applications (apps). Digital dentistry advancements were impacted and made possible, frequently at a startling pace, by other technologies concurrently. These technologies undoubtedly include sensor miniaturisation, artificial intelligence, augmented and virtual reality, robotics, 3D printing, telehealth, big data, interoperability, the internet of things, smartphones, nanotechnology, quantum computing, biomedical engineering, cost of data storage, connectivity, and others.

Smartphones is the new technological device that is available in more than three fourth of the population. So, the different use of smart phones can be considered in dentistry thereby utilizing the recent advancement. The various features in smartphones can be taken into different application levels, so that it is useful to dentist, patients and even for students. Everything is made available at fingertips in a matter of seconds with the help of smart phones. Smart phones at this level of advancement already replaced many devices. Thus, it helps in saving money, space and can be taken to anywhere. The advancement in smart phone is still going on and this will be so useful in dentistry.

USES OF SMARTPHONES IN DENTISTRY

The uses of smartphones in dentistry involves various aspects including dentist, patient and students.

- **Teledentistry with Smartphone**

One aspect of telemedicine is teledentistry. In order to increase access to dental care, teledentistry combines dentistry and telecommunications. It entails the digital interchange of clinical information between a patient and a hospital or other healthcare facility. Teledentistry can be applied for on-site job training, treatment planning and monitoring, appliance production, and remote dental consultation. Smartphone helps in communication between patient and doctors regarding any doubts and appointments.

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patient and doctors regarding any doubts and appointments.

- **Smartphone in Clinics**

In clinics smartphone can be used to provide information, healthcare tips, appointment date and timing to patients regularly in the form of messages and status. This remind patient regarding their routine dental check-up and the dental health will be maintained. Dentist also can make use of this by arranging the patient in order and can be kept as reminder. There are many applications that can be installed in smartphones which helps in calculation, arranging patients information, treatment given to them, digital record of patients which can be opened at any time anywhere by the doctor and can be updated.

Dental Smart Phone Photography

Dentistry has benefited from the updated perception of daily clinical practise provided by the usage of photographs. Photography can be used for a variety of things besides teaching, including treatment planning, monitoring treatment progress, documenting, evaluating, communicating, publishing, lecturing, and marketing, as well as for artistic images, insurance, or legal purposes. Smartphone cameras can be trusted to provide dentists with comparable and accurate linear measurements for smile designs.

Smartphone for Dental Biomechanics

Tracking markers are applied to smartphone videos to measure musculoskeletal conditions with cranial and mandibular origin, and medical professionals and therapists can use the technology's potential significance. The current technology operates on the Mobile Practice Assistant, or MPATM, a mobile health platform. This clarifies the cranial problems related to sleep, posture, gnathology, and muscular effects on jaw, head, and neck function [1].

Caries Diagnosis

It is possible and accurate to use smartphone photos for photographic diagnostics to differentiate between healthy tooth surfaces and severe caries lesions. Unlike other techniques, such as dental radiography, traditional visual inspection does not give a physical record of the teeth examined. Since it would allow discussing clinical issues at a distance by sharing exam findings with professionals, using a remote discussion approach like photography might significantly improve dentistry education and case discussion.

Cephalometric Analysis in Orthodontics

In order to assess dentofacial proportions, clarify the anatomic basis for a malocclusion, and examine growth- and treatment-related alterations, cephalometrics is a crucial part of clinical orthodontics and orthognathic surgery. The semiautomatic computer programme that mainly replaced manual cephalometric analysis has now been overtaken by software applications made to run on smartphones and tablets, which enable automatic calculation of cephalometric measurements after manually identifying landmarks [2].

Dental Edge Biometrics

On smartphones, user authentication is essential for security and privacy protection. On smartphones, there are many different authentication methods, yet security gaps are constantly being found. Smile Auth uses the distinctive traits of each individual's tooth edge biometrics to provide trustworthy and practical user authentication. By slightly rotating the smartphone to take a few pictures from various camera angles, Smile Auth is able to extract a variety of dental edge properties [3]. The tooth's size, shape, location, and surface abrasion are what give it these distinctive characteristics.

Dental Erosion Evaluation

In adolescence, roughly 30% of permanent teeth are thought to be impacted by dental erosion, a process of degradation of the tooth hard tissue. The Intact-Tooth programme enables better problem estimation, integration into the diagnostic process, and improved patient care and prevention. In order to measure the degree of vulnerability and the fundamental erosive wear evaluation index, photos of patients with tooth erosion were uploaded [4]. The application's use in patient management could aid in the early detection and treatment of enamel problems.

Diagnosis of Traumatic Injuries of Teeth

Dental trauma is very common. When determining prognosis, the immediate treatment given at the scene of the accident is crucial. Initial treatment, though, requires a precise diagnosis. To assess traumatic injuries to the teeth and supporting tissues, the "Injured Tooth" app was made. This app can be downloaded in every smartphone. Based on images and a series of questions, the app offers the diagnosis of dental trauma. It classifies severe injuries to the teeth and supporting structure according to Andreasen's system.

Oral Lesion Diagnosis

Using smartphone pictures, teliagnosis of oral lesions demonstrated nearly complete agreement and diagnostic accuracy comparable to in-person diagnosis. Therefore, it can be recommended that this method be used to support the referral process in oral medicine from basic to secondary care. The lesions were photographed using a smartphone camera and emailed along with clinical information to evaluators.

Smartphone in Esthetic Dentistry

Smartphone videos can be used to improve analysis, smile design decisions, and to elaborate 2D smile frame that helps in 3D digital smile design project. The smartphone video is documented with snapshots of the video [5]. The use of dynamic documentation of the smile allows esthetic rehabilitative planning from a facial perspective, improvement of communication with the patient, integration between the specialists and the predictable quality of the treatment.

Mobile Educational Software

It is feasible and reasonable to expand the learning activities to include smartphone use. It is advised to create educational resources that may be accessed via smartphones in addition to computers. Overall, the mobile software has been successful in raising students understanding of the unit's dental considerations for patients with systemic issues. Therefore, despite the fact that this technology has not yet been incorporated into the official curriculum, smartphones can be used for educational purposes. This presents an opportunity for every educational system to design the appropriate methods, activities, and educational materials for smartphones so that students can use this technology and receive a variety of teaching methods.

Evaluation of Tooth Brushing

The use of smartphone audio data to assess tooth-brushing performance is a novel approach. In order to accomplish this, audio data containing different sorts of tooth brushing motions, such as brushing the inner surface of the back teeth and the outside surface of the front teeth, are recognised using hidden Markov models (HMMs). In order to estimate tooth brushing performance scores, such as the quality of the stroke used to clean the rear inner teeth and the length of time spent brushing the front teeth, regression models can be built using the output of the HMMs.

Triaging Dental Emergencies

In order to speed up emergency care, mobile applications can enable the best information sharing between dentists and patients. With the help of common smartphone inputs including text and radio buttons, audio recording, and high-resolution photos, the application can successfully assist clinical information collecting by patients. It is possible for patients to self-report emergency dental issues utilising a smartphone application. In cases where direct patient contact is less practicable, dentists can also evaluate patient treatment remotely.

Capitalising on Smartphone

There is increasing pressure on dentists all around the world to raise both profitability and client satisfaction at the same time. It is feasible to incorporate current smart mobile device apps into the dental office to boost resource efficiency for management and patients alike in terms of time, money, labour, and other resources^[6]. Dental practices, with increasing financial and competitive pressures, may improve the efficiency and profitability of operations and better manage patients, employees and stakeholders by integrating smart mobile technology.

Shade Matching

When appropriate colour attributes are correctly modified, dental shade matching using digital photos may be possible. When using the right computational technique, smartphone cameras even those without internal settings can be used as shade measuring devices. These colorimeter apps for smartphones provided a cheap, portable shade matching alternative and allowed the results to be stored and shared^[7]. Digital images and intraoral scanners, along with the corresponding software, offer a reliable substitute for the spectrophotometer when it comes to matching shades.

Anxiety Assessment

Throughout a dental operation, dental anxiety is a multifaceted phenomenon that frequently happens. Although it may result in adverse events and patient safety issues during normal treatment, it is frequently ignored. The WeChat Applet for Dental Anxiety (WADA) was created with the following features and seeks to assist patients with managing their dental anxiety, give people a way to monitor their physical health, and give dentists a platform for online evaluation and teleconsultation. WADA is effective by reducing treatment risks, improving patients satisfaction and dentists convenience. It also in managing high risk patient during the covid 19 pandemic.

CONCLUSION

Dentistry has undoubtedly been impacted by digital developments. Patient experience has improved with these advances. Some advancements in dentistry are developing swiftly, and our profession has sped up their adoption as is the case with teledentistry following COVID-19. The acceptance of such innovative therapies and technologies also relies on a change in our mindsets, which are often conservative when it comes to healthcare. They can be adopted more quickly and overcome early resistance if new regulations, improved infrastructure, and cheaper upfront expenses are implemented.

Dentistry can make use of the smartphones with various apps and features added to it day by day. Dentist, patients and even students are benefited from this. Smartphone with internet has made it accessible anything at any time within seconds. The world is changing, so as the dentistry. Smartphone is thus the key for smart dentistry.

Conflict of Interest

None declared.

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REFERENCES

1. Adams BW. Automation and apps for clinical dental biomechanics. *The J Craniomandibular Sleep Pract* 2016; 4(5): 343-347.
2. Livasa C, Dellib K, Spijkervet FKL, Vissinkd A, Dijkstra PU. Concurrent validity and reliability of cephalometric analysis using smartphone apps and computer software. *Angle Ortho* 2019; 89(6): 889-896.
3. Jijang H, Cao H, Liu D, Xiong J, Cao Z. SmileAuth: Using Dental Edge Biometrics for User Authentication on Smartphones. *Proc. ACM Interact Mob Wearable Ubi Technol* 2020; 4:1-23.
4. Butera A, Maiorani C, Gallo S, Pascadopoli M, Buono S, Scribante A. Dental Erosion Evaluation with Intact-Tooth Smartphone Application: Preliminary Clinical Results from September 2019 to March. *Sensors* 2022; 22: 1-12.
5. Coachman C, Calamita MA, Sesma N. Dynamic documentation of the smile and the 2D/3D digital smile design process. *Int J Perio Rest Dent* 2017; 37: 183-193.
6. Plangger K, Bredican J, Mills AJ, Armstrong J. Smart dental practice: capitalising on smart mobile technology. *Brit Dent J* 2015; 219: 135-138.
7. Moussa R. Dental Shade Matching: Recent Technologies and Future Smart Applications. *J Dent Heal Oral Res* 2021;2(1):1-10.

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