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# Use of digital dentistry in clinical practice among dental practitioners - A review

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ABSTRACT

The aim of the study is to find an opinion about the use of digital dentistry in clinical practice among dental practitioners. Digital dentistry is the use of dental technologies and devices that incorporate digital (or) computer controlled components that carry out dental procedures than using mechanical (or) electrical tools. A detailed study is done by reviewing several articles about digital dentistry in dental practice. Many dentists are focusing on advanced dentistry now-a-days, which causes them to take care of conventional issues with present day arrangements. The purpose behind this article is to analyze the idea of computerized dentistry, its focal points and restrictions, and offer expressions and perceptions on explicit areas of advanced dentistry dependent on research, understanding, and correspondence with clinicians around the world. It is expected to give a functional perspective on computerized dentistry, an improvement for more prominent selection of the areas that are concerned with digital dentistry, and quicker incorporation of new innovations.

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## INTRODUCTION

Digital dentistry is characterized as the utilization of dental advances and gadgets that fuses computerized (or) PC controlled parts that do dental related tasks than utilizing mechanical (or) electrical apparatuses (Karthiga *et al.*, 2018). The use of digital dentistry is that dental procedures can be done more efficiently than using mechanical tools for restoratives as diagnostic purposes (Adams, 2011). Digital dentistry helps in facilitating dental treatment and helps in meeting patients demands. The French professor Francois Duret known as the "God Father" of digital dentistry invented CAD\CAM in 1973. Technologies used in advanced dentistry are intraoral camera, CAD\CAM, 3D printing, digital radiography, electrical and careful\implant handpieces, computer based implant dentistry and patient record management software (Beer and Burrows, 2010). More research was done dependent on digital dentistry in recent times. The areas of computerized dentistry involve improved productivity concerning cost and time, improved accuracy in techniques compared to traditional methods and high level of accurate outcomes. The major problem in advanced dentistry is, it is more expensive (Fasbinder and Neiva, 2019). In computerized dentistry,

there will be an increase in care which helps in enhanced diagnosis and advancement in digital dentistry helps the patients to receive modern treatment for traditional problems. Digital dentistry and its advancements have impacted in the clinical angle, lab methods, preparation of understudies, quiet inspiration, the practice of executives and dental explores also. Digital dental and its technologies are extremely helpful in the diagnosis and treatment of oral injury conditions (Ravikumar *et al.*, 2017). This review highlights the uses of digital dentistry in clinical practice.

**Introduction of digital dentistry in modern life**

Digital technologies have been logically used in all fields including computerised designs, clinical diagnosis and treatment, banking, computerized photography, communications, data\information storage, devices and tools designing, mapping, drug designing, food review, games, animations and a lot more to mention (Gheena and Ezhilarasan, 2019). Presentation of computerized dentistry into today's life makes an innovative method to treat the patients and furthermore. Many dental techniques are changing now-a-days like communication and information handling, which is becoming more computer based. Digital radiology and photography are commonly used now-a-days for diagnosis and dental treatments which depend on advanced techniques for procedures like impression taking, treatment arranging and implant surgeries (Schleyer and Spallek, 2001).

**Digitized dentistry impact on clinical practice**

Digitalization has impact over dental practice management, patients motivation and clinical treatment procedures (Masri and Driscoll, 2015). It has been implemented in numerous dental procedures including advanced radiography aiding in diagnosis, CAD\CAM innovation, digital crown shade matching, prosthesis manufacture, fast prototyping, stereolithography for maxillofacial, advanced face bows, virtual articulators and many more to mention (Ashwini *et al.*, 2017). The presentation of computers based implants, including their designs and fabrication, is turning into a further prime basic part in clinical practice (Juntavee *et al.*, 2018). Numerous dentists now-a-days generally use advanced methods which give better thought in diagnosis and better treatment (Ezhilarasan *et al.*, 2017a). In digital shade matching techniques, it gives the exact shade of the patient's teeth which makes their teeth look natural (Anitha and Ashwini, 2017). Before utilizing the computerized procedures, one must know everything about the advanced dentistry and its strategies to give appropriate treatment to patients (Govindaraju *et al.*, 2017).

**Impacts of digital dentistry on training and education**

Virtual reality dental training gives an opportunity for dental undergraduates to practice on 3D computer generated real images of oral cavities (Mehl *et al.*, 1997). The availability of wide varieties of audio visual aid has provided practical education and training to dental students due to a better presentation of the subjects. Learning through visual software like virtual dental patients (CANDIDETM, PERIOSLMIM) provides effective learning with the true feeling as being working on an existing patient (Rao, 2012).

**Digital radiography in clinical practice**

Digital radiography is a form of radiography that uses X-ray sensitive plates to directly capture data during patient examination and immediately transfer it to the computer without the use of an intermediate cassette (Lakshmi *et al.*, 2015). The advantage of digital radiography includes time efficiency through bypassing chemical processing and the ability to digitally transfer and enhance the image (Marchiori, 2004). There are two main types of digital sensor in dentistry; one is based on charge coupled device technology and the other consists of phosphor storage plates (Brennan, 2002; Perumalsamy *et al.*, 2018). In forensic dentistry, digital radiography is used to determine the age of an individual by assessing the stage of the eruption of the tooth as well as for evidence in the identification of the suspect, to determine the cause of death, to find faulty charting of teeth, body identification and postmortem examination (Prabhusankar, 2014).

**Intraoral camera**

Intraoral cameras (IOC) are used by dentists to show a patient their interior surface of their mouth, as an alternative to mouth mirrors (Sharma *et al.*, 2019; van der Zande *et al.*, 2018). It was first invented in the year 1989. Intraoral cameras allow the patient to see a clear picture of the inner surface of their mouth, and help the dentist in consulting with them on various treatment options (Ezhilarasan *et al.*, 2017b). The benefits of Intraoral cameras are early detection of oral health problems, improved patient-doctor relation, improves the accuracy of the advised treatment, for future case documentation, enhances doctor's credibility and better for insurance (Karthiga *et al.*, 2018). Pictures can be given to a patient's document for future reference (Pentapati and Siddiq, 2019). The advantages of Intraoral cameras are early identification of oral medical issues, improved patient-doctors

connection, improves the quality of the treatment, for future case documentation, upgrades doctors believability and better protection claims (Neuman, 1996). The fundamental objective in the utilization of intraoral cameras is to survey and analyze oral medical issues (Mehta *et al.*, 2019). The photos and videos taken by the intraoral camera will serve as a basis of the oral health condition of the patients. With the photos in the file, the dentist will be able to assess whether dental treatments in the past have indeed made positive progression in the dental health of the patient (Pentapati, 2017).

**Diagnosis of caries**

Caries brings about structural changes to the dental hard tissue. Demineralization process happens, which brings about loss of mineral substance (Menon *et al.*, 2018). The parts where minerals are lost are loaded up with microbes and water (Ezhilarasan *et al.*, 2018). This area will have greater porosity contrasted with different zones which bring about particular change in the optical properties of the influenced dental tissues (Rajeshkumar *et al.*, 2018a). Optically put together strategy recognizes caries with respect to changes in explicit optical properties. Quantitative light initiated fluorescence changes in veneer fluorescence can be distinguished and estimated when the tooth is lit up by violet - blue light from a camera hand piece (Ezhilarasan, 2018). The picture is spared and processed. The finished result is the picture which gives the proportion of the degree and seriousness of caries (Rajeshkumar *et al.*, 2018b).

## CONCLUSION

Hereby we conclude that, even though it has disadvantages like more cost, it also has numerous advantages for both doctors\dentists and patients. Many dentists are practicing digital dentistry now-a-days, which helps them to solve traditional problems with modern solutions. It is very useful for clinical practitioners to learn about digital dentistry to fulfil the patient's needs. As the digital dentistry continues to adapt and becomes more common, the approach to incorporating digital dentistry in learning outcomes during dental training also changes. As we enter "the digital age of dental education" future practitioners need to be exposed to new digital procedures in the curriculum and teaching.

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**Conflict of Interest**

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