Content available at: https://www.ipinnovative.com/open-access-journals

IP International Journal of Maxillofacial Imaging

Journal homepage: https://www.ijmi.in/

Editorial

Digitalization in dentistry: An ongoing revolution shaping the future of dentistry

Amina Sultan [1,*]

[1] *Dept. of Paediatric and Preventive Dentistry, Faculty of Dentistry Jamia Millia Islamia, New Delhi, India*

ARTICLE INFO

Article history:
Received 06-02-2023
Accepted 13-02-2023
Available online 18-04-2023

Keywords:
Artificial intelligence (AI)
CAD/CAM
Digital dentistry
Electronic Health Records (EHR)

ABSTRACT

The biggest breakthrough in the field of dentistry in recent years has been the advent of digital dentistry. Digital dentistry widely refers to "Any dental technology or equipment that comprises digital or computer-regulated components in contrast to that of mechanical or electrical alone". A significant drawback of digital dentistry are expenses involved with its implementation. Nevertheless, if the new technology lives up to expectations, it might be viewed as a benefit in the long run.

1. Introduction

Like any other medical field, dentistry has not remained untouched by technological advancements. The biggest breakthrough in the field of dentistry in recent years, has been the advent of digital dentistry. The Digital revolution in dentistry has opened up a whole new world of opportunities for dental professionals and patients. Digital dentistry widely refers to "any dental technology or equipment that comprises digital or computer-regulated components in contrast to that of mechanical or electrical alone".[1] There is no doubt that establishing a correct diagnosis and treatment plan is one of the most critical parts of the dental management of the patient. Computer technology has certainly enhanced the clinician's capability to provide more accurate diagnosis and treatment outcomes, curtail risks and obtain better results. For detecting and managing dental diseases, dentists are increasingly relying on digital technologies such as Laser Fluorescence, Cone Beam Computed Tomography (CBCT), Computed Tomography (CT), Ultrasonography, Nuclear Magnetic Resonance (NMR)) including clinical techniques such as CAD/CAM technologies, optical impression, stereo lithography, and 3D printers.[2] With advanced technology like Laser Fluorescence, we can more accurately and reliably find dental caries in its early stages before it causes extensive tooth destruction and thus helps to preserve the healthy state of dentition. The prosthodontics speciality has entered a new frontier with the recent advent of computer-aided design and computer-aided manufacturing (CAD-CAM). Dentists can now easily fabricate dental prostheses for their patients with the help of the CAD-CAM system through the digital impression obtained with the intra-oral scanner. The creation and widespread application of CBCT imaging in implant therapy has made it possible to design an implant site that is more precise and detailed while significantly reducing radiation exposure.[3] Digital intraoral sensors (IOS), CAD-CAM, and 3D-printing technology have significantly transformed the dental impression-making procedure by making it more pleasant and tolerable to patients, particularly the younger population. Furthermore, CAD-CAM/3D printing technology can be utilized for quickly delivering oral protective gear such as mouth guards to athletes involved in active sports.[4] Artificial intelligence(AI), a rapidly evolving technology that mimics human cognitive abilities, has

* *Corresponding author*.
E-mail address: asultan@jmi.ac.in (A. Sultan).

https://doi.org/10.18231/j.ijmi.2023.001

captured the attention of scientists globally and particularly its application in dentistry has grown remarkably. Dental radiography is one area where AI is steadily making progress, with a focus on diagnostic records of virtual IOPAs/RVGs, 3-D images, and cone-beam computed tomography. Artificial intelligence technologies, can be efficiently used in endodontics, along with analysing the anatomy of the root canal system, predicting the vitality of pulpal stem cells, working lengths assessment, locating root fractures and periapical pathologies, and predicting the success of retreatment.[5] Virtual dental assistants powered by artificial intelligence can perform several activities with more accuracy, fewer mistakes, and with less labour like scheduling and coordinating routine appointments, reminding patients and dentists to schedule check-ups and assisting with clinical diagnosis and treatment planning.[6]

Another significant component of digitalization in dentistry is the evolution of electronic health records (EHR). EHR is a digital form of medical history that includes all the essential elements of clinical examinations, vital signs, past medical records, diagnoses, treatment plans, and any conclusions drawn from investigations. Currently, computer-specific software for dental offices has been developed that not only maintains patient appointments but also documents the treatment progress.[7] Additionally, these digital records can be shared with dentists in rural or remote locations through telecommunications technology, thus enhancing communication, sharing health information, and access to medical care facilities for less privileged patients.[8]

A significant drawback of digital dentistry are expenses involved with its implementation. Nevertheless, if the new technology lives up to expectations, it might be viewed as a benefit in the long run. Also, the "digital revolution" in the medical and dental field involves the usage of social media, websites, and instant messaging apps for networking and disclosure of findings related to treatment outcomes. As health professionals, we might seek suggestions for complex clinical scenarios, discuss new materials or technologies, and share opinions while exchanging information with peers and patients. As a result, there is a possibility of malicious manipulation of digital clinical records of patients in a much easier way when compared to analogue data.[9] Artificial intelligence (AI) based tools for diagnosis may raise issues related to accountability and responsibility. Due to the rising demand for digital technology, there may be a tendency toward over-treating the patient. Also, digital technologies are associated with apprehensions about patient information privacy and data security.[10] Furthermore, the continuous use, maintenance, and replacement of ever-newer technology leaves a remarkable digital trace and may result in digital pollution. Henceforth, it is critical to keep track of the potentiality and the challenges posed by digitalization in dentistry. Adoption of digitalization can help the dentist in achieving excellent returns on investment, satisfaction in practising dentistry, and better patient care when correctly implemented.

2. Conclusion

Digital dentistry is more than just hype. As we embrace the exciting era of digitalization, future dentists need to be introduced to innovative digital techniques in their dental curricula and undergo training for better adoption.

3. Conflict of Interest

None.

References

1. Paul L, Child JR. Digital dentistry: is this the future of dentistry? *Dent Econ*. 2011;101. Available from: https://www.dentaleconomics.com/science-tech/article/16394539/digital-dentistry-is-this-the-future-of-dentistry.
2. Spagnuolo G, Sorrentino R. The Role of Digital Devices in Dentistry: Clinical Trends and Scientific Evidences. *J Clin Med*. 2020;9(6):1692. doi:10.3390/jcm9061692.
3. Alauddin MS, Baharuddin AS, Ghazali M. The Modern and Digital Transformation of Oral Health Care: A Mini Review. *Healthcare (Basel)*. 2021;9(2):118. doi:10.3390/healthcare9020118.
4. Khan MK. Modern digital pediatric dentistry with the advent of intraoral sensors, computer-aided design/computer-aided manufacturing, and three-dimensional printing technologies: A comprehensive review. *J Dent Res Rev*. 2022;9(3):195–201.
5. Agrawal P, Nikhade P. Artificial Intelligence in Dentistry: Past, Present, and Future. *Cureus*. 2022;14(7):27405. doi:10.7759/cureus.27405.
6. Ahmed N, Abbasi MS, Zuberi F, Qamar W, Halim M, Maqsood A. Artificial Intelligence Techniques: Analysis, Application, and Outcome in Dentistry-A Systematic Review. *Biomed Res Int*. 2021;2021:9751564.
7. Sultan A. Ethical liabilities in electronic health records (EHR). *Int Dent J Student's Res*. 2022;10(3):73–6.
8. Singh N, Sultan A, Juneja A, Aggarwal I, Palkit T, Ohri T. Integration of teledentistry in oral health care during COVID-19 pandemic. *Saint Int Dent J*. 2020;4(2):77–81.
9. Iorgulescu G, Cristache CM, Burcea CC, Ionescu I, Perieanu VS, Marcov N. Ethical and medico-legal aspects behind the use of digital technologies in dentistry. *Rom J Leg Med*. 2020;28(2):202–7.
10. Favaretto M, Shaw D, Clercq D, Joda E, Elger T. Big Data and Digitalization in Dentistry: A Systematic Review of the Ethical Issues. *Int J Environ Res Public Health*. 2020;17(7):2495. doi:10.3390/ijerph17072495.

Author biography

Amina Sultan, Professor and Incharge https://orcid.org/0000-0001-5245-4416

Cite this article: Sultan A. Digitalization in dentistry: An ongoing revolution shaping the future of dentistry. *IP Int J Maxillofac Imaging* 2023;9(1):1-2.